Independent Quality of Service Survey In Pakistan – Cities

First Quarter 2024

Enforcement Wireless –II Directorate
PTA | F-5/1, Islamabad

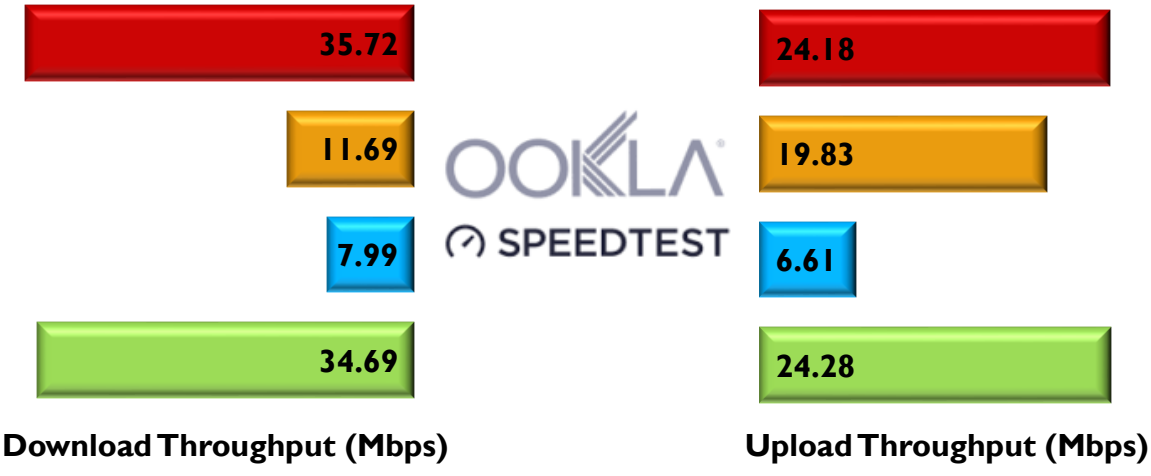
Executive Summary

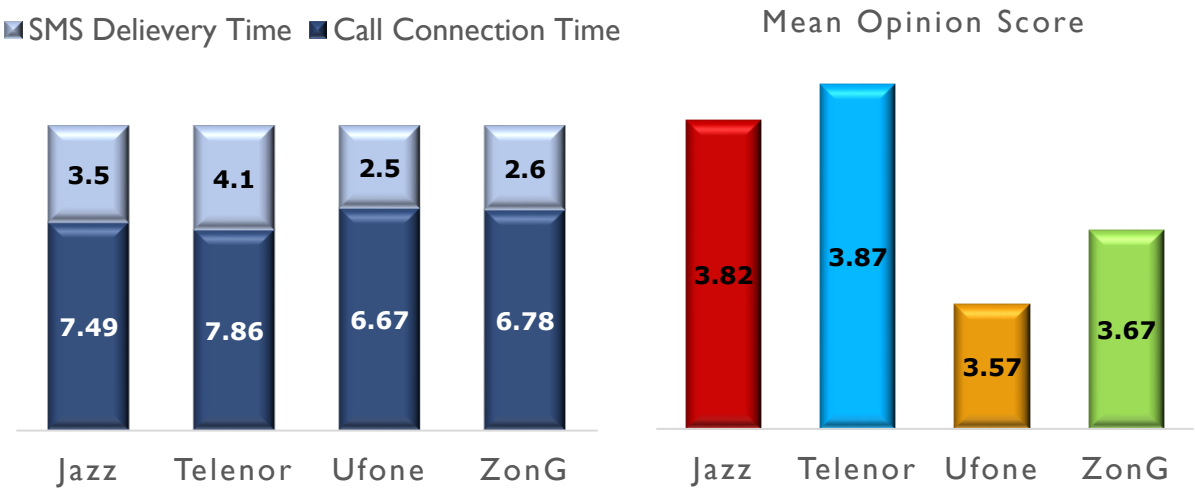
1. QUALITY OF SERVICE SURVEY

Pakistan Telecommunication Authority (PTA) has carried out independent Quality of Service (QoS) Survey in 16 x cities of Pakistan during 1st Quarter 2024. During the survey, performance of Cellular Mobile Operators (CMOs) has been assessed in accordance with the Cellular Mobile Network Quality of Service (QoS) Regulations 2021.

2. OVERVIEW

The survey drive comprised of approximately 2,270KMs travelling for each operator in 60 days to cover maximum areas of surveyed cities. During the survey 0.25 Million tests of Mobile Broadband, 45,000 Calls & SMS while 0.13 Million Ookla Speed test conducted. Summary of the survey and overall results are as below:





Network Latency (Ookla)

3. RANKING

Based upon the compliance level of each KPI in surveyed cities against threshold defined in QoS Regulations, CMOs have been ranked between 1st to 4th position in Mobile Network Coverage, Mobile Broadband, Voice and SMS Services. CMOs scoring 1st position in respective services are shown as:

Cellular Mobile Operator	Coverage	Mobile Broadband					Voice	SMS
		Throughput		Latency		Browsing		
		Auto Mode	Ookla	Auto Mode	Ookla	Auto Mode		
Jazz	✓	✓			✓	✓	✓	
Zong 4G	✓		✓		✓			
Ufone 4G	✓			✓	✓			✓
Telenor								

Quality of Service Survey

1. SURVEY CITIES

Quality of Service Survey was conducted in 16x cities of Khyber Pakhtunkhwa, Punjab, Sindh and Balochistan form 1st January till 31st March 2024. Survey routes were selected in a manner to cover maximum population area of the respective surveyed cities. The names of cities along with survey dates are mentioned in Table 1.1: QoS Survey Cities & Dates:

S. #.	City	Province	Days	Survey Dates	KMs
1	MARDAN	KHYBER PAKHTUNKHWA	04	22nd~25th Jan, 2024	193
2	D.I KHAN		04	29th Jan~1st Feb, 2024	240
3	BAHAWALNAGAR	PUNJAB	04	23rd~26th Jan, 2024	57
4	LAHORE		04	22nd~25th Jan, 2024	174
5	CHUNIAN		04	26th~29th Feb, 2024	159
6	RAWALPINDI		04	23rd~26th Jan, 2024	236
7	SAMUNDARI		03	13th~19th Feb, 2024	133
8	JHELUM		04	20th~23th Feb, 2024	166
9	SHARAQPUR		04	5th~8th Mar, 2024	180
10	QUETTA	BALOCHISTAN	04	20st~23rd Feb, 2024	92
11	NUSHKI		04	26th~29th Feb, 2024	50
12	SHIKARPUR	SINDH	04	22nd ~25th Jan, 2024	82
13	KARACHI MALIR		03	12th~14th Feb, 2024	221
14	HYDERABAD		03	20th~22th Feb, 2024	89
15	NAWABSHAH		04	22nd ~25th Feb, 2024	140
16	KOTRI		03	5th~7th Mar, 2024	59

Table 1.1: QoS Survey Dates and Samples

2. TEST STATISTICS

During the survey, Quality of Services tests were conducted in the areas of Voice, Mobile Broadband (i.e. Data (Automode), Data (Ookla), Latency (Ookla) & Web Browsing) and Short Messaging Service (SMS). Service wise tests conducted for each CMO are shown in Table 2.1: Test Statistics.

Service	Jazz	ZonG	Telenor	Ufone
Data (Download)	6116	6093	6118	6134
Data (Upload)	6120	6096	6122	6140
Ookla (Download)	10423	10928	10551	10641
Ookla (Upload)	10423	10928	10551	10641
Ookla (Latency)	10423	10928	10551	10641
Webpage Browsing	17081	16583	17118	17171
Voice Call	5320	5296	5245	5311
Short Messaging Service	5109	5021	5095	5077

Table 2.1: Test Statistics

3. KEY PERFORMANCE INDICATORs (KPIs)

As per Cellular Mobile Network Quality of Service (QoS) Regulations 2021, all CMOs are required to meet or exceed the benchmark of QoS KPIs as shown in Table 3.1: QoS KPIs

Key Performance Indicators			Threshold Value
Voice	Network Accessibility		≥ 99%
	Call Setup Success Rate		≥ 98%
	Call Connection Time		< 7.5 Seconds
	Call Completion Ratio		> 98%
	Mean Opinion Score		> 3
	ISHO for CS Voice		≥ 98%
	RAB Setup Success Rate		≥ 98%
SMS	SMS Success Rate		≥ 99%
	SMS End-to-End Delivery Time		≤ 12 Seconds
Data (Automode)	Latency		< 75 ms
	Webpage Loading Time		< 5 Seconds
	Download Throughput		> 4 Mbps
	Download Throughput		> 1 Mbps
Network Coverage	Signal Strength (RSRP)	Signal Level	Minimum -100dBm
		Confidence Level	> 90%
	Signal Strength (RSCP)	Signal Level	Minimum -100dBm
		Confidence Level	> 90%

Table 3.1: QoS KPIs

4. NETWORK COVERAGE – 4G

During the survey, while conducting data test in technology auto detect mode, 4G/LTE signal strength samples were recorded on survey routes. City wise compliance of 90% Confidence Level of signal strength is shown in Table 4.1: 4G Signal Confidence Level- Technology Auto Detect Mode.

4G Signal Confidence Level- Technology Auto Detect Mode								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	99.22	**76.63**	99.39	99.61	Yes	**No**	Yes	Yes
D.I KHAN	91.4	96.46	98.65	92.2	Yes	Yes	Yes	Yes
LAHORE	98.20	**85.16**	99.51	99.57	Yes	**No**	Yes	Yes
MARDAN	97.58	95.71	99.10	99.89	Yes	Yes	Yes	Yes
SAMUNDARI	98.00	95.00	100	99.00	Yes	Yes	Yes	Yes
SHIKARPUR	96.35	**79.63**	99.47	99.73	Yes	**No**	Yes	Yes
HYDERABAD	98.91	**87.21**	96.81	99.40	Yes	**No**	Yes	Yes
JHELUM	97.11	**79.96**	99.17	97.74	Yes	**No**	Yes	Yes
KARACHI MALIR	97.87	**87.38**	98.06	93.43	Yes	**No**	Yes	Yes
NAWABSHAH	98.59	**84.24**	98.06	99.84	Yes	**No**	Yes	Yes
NUSHKI	N/A	**89.02**	94.47	95.09	N/A	**No**	Yes	Yes
QUETTA	99.64	90.10	99.75	99.29	Yes	Yes	Yes	Yes

4G Signal Confidence Level- Technology Auto Detect Mode								
RAWALPINDI	97.53	97.72	99.68	99.30	Yes	Yes	Yes	Yes
CHUNIAN	98.15	**78.93**	96.86	99.05	Yes	**No**	Yes	Yes
SHARAQPUR	97.42	**83.00**	99.59	98.43	Yes	**No**	Yes	Yes
KOTRI	98.35	90.02	94.45	98.62	Yes	Yes	Yes	Yes

Table 4.1: 4G Signal Confidence Level- Technology Auto Detect Mode

5. NETWORK COVERAGE – 3G

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. City wise compliance of 90% Confidence Level of signal strength is shown in Table 5.1: 3G Signal Confidence Level - Technology Auto Detect Mode

3G Signal Confidence Level - Technology Auto Detect Mode								
City	Confidence Level (%)				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	N/A	100.00	100.0	N/A	N/A	Yes	Yes	N/A
D.I KHAN	N/A	100.00	100.00	N/A	N/A	Yes	Yes	N/A
LAHORE	N/A	100.00	100.00	N/A	N/A	Yes	Yes	N/A
MARDAN	N/A	100.00	100.00	100.00	N/A	Yes	Yes	Yes
SAMUNDARI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SHIKARPUR	N/A	N/A	100.00	100.00	N/A	N/A	Yes	Yes
HYDERABAD	N/A	100.00	100.00	100.00	N/A	Yes	Yes	Yes
JHELUM	N/A	99.63	100.00	100.00	N/A	Yes	Yes	Yes
KARACHI MALIR	100.00	99.94	99.79	99.44	Yes	Yes	Yes	Yes
NAWABSHAH	N/A	N/A	100.00	N/A	N/A	N/A	Yes	N/A
NUSHKI	N/A	N/A	100.00	N/A	N/A	N/A	Yes	N/A
QUETTA	N/A	100.00	100.00	100.00	N/A	Yes	Yes	Yes
RAWALPINDI	N/A	100.00	100.00	100.00	N/A	Yes	Yes	Yes
CHUNIAN	N/A	99.92	100.00	N/A	N/A	Yes	Yes	N/A
SHARAQPUR	100.00	N/A	N/A	N/A	Yes	N/A	N/A	N/A
KOTRI	N/A	99.80	100.00	100.00	N/A	Yes	Yes	Yes

Table 5.1: 3G Signal Confidence Level - Technology Auto Detect Mode

6. MOBILE BROADBAND SERVICE – DATA SPEED

Automode Testing. In order to measure the performance of Mobile Broadband Services, Data Download and Upload tests were performed. During the test, a File of 10GB was downloaded and Uploaded for 3 minutes duration. Test Statistics are shown in Table 6.1: Data Tests Statistics while the Download and Upload Speed Results are shown in Table 6.2: Download Data Throughput and Table 6.3: Upload Data Throughput respectively.

DESCRIPTION		Jazz	Telenor	Ufone	Zong
DOWNLOAD	ATTEMPTS	6116	6093	6118	6134
	SPEED (Mbps)	22.60	9.19	9.52	23.37
UPLOAD	ATTEMPTS	6120	6096	6122	6140
	SPEED (Mbps)	20.77	5.65	17.07	19.53

Table 6.1: Data Tests Statistics

DOWNLOAD DATA THROUGHPUT ≥ 4Mbps								
City	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	12.78	13.35	9.35	23.74	Third	Second	Fourth	First
D.I KHAN	18.04	**2.23**	4.110	7.12	First	**Fourth**	Third	Second
LAHORE	27.65	9.62	13.61	33.21	Second	Fourth	Third	First
MARDAN	25.67	4.32	6	16.25	First	Fourth	Third	Second
SAMUNDARI	19.98	9.99	7.71	20.59	Second	Third	Fourth	First
SHIKARPUR	21.30	10.00	8.80	17.2	First	Third	Fourth	Second
HYDERABAD	28.9	9.15	13.36	25.56	First	Fourth	Third	Second
JHELUM	39.28	8.08	8.46	32.52	First	Fourth	Third	Second
KARACHI MALIR	23.72	10.19	11.93	22.94	First	Fourth	Third	Second
NAWABSHAH	9.90	7.9	9.6	11.4	Second	Fourth	Third	First
NUSHKI	N/A	5.22	**2.38**	19.49	N/A	Second	**Third**	First
QUETTA	26.26	9.2	12.32	23.61	First	Fourth	Third	Second
RAWALPINDI	28.72	5.06	6.77	18.08	First	Fourth	Third	Second
CHUNIAN	22.03	11.82	6.66	32.4	Second	Third	Fourth	First
SHARAQPUR	23.20	12.89	12.68	28.93	Second	Third	Fourth	First
KOTRI	23.81	9.83	15.42	16.3	First	Fourth	Third	Second

Table 6.2: Download Data Throughput

UPLOAD DATA THROUGHPUT ≥ 1Mbps								
City	Upload Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	5.54	5.27	16.77	20.7	Third	Fourth	Second	First
D.I KHAN	5.49	2.14	12.59	12.51	Third	Fourth	First	Second
LAHORE	7.4	8.70	20.2	22	Fourth	Third	Second	First
MARDAN	6.87	5.05	14	18.07	Third	Fourth	Second	First
SAMUNDARI	6.15	7.40	17.56	20.31	Fourth	Third	Second	First
SHIKARPUR	6.55	4.94	20.8	18.9	Third	Fourth	First	Second
HYDERABAD	27.92	4.09	18.82	22.44	First	Fourth	Third	Second
JHELUM	24.02	8.05	14.56	21.1	First	Fourth	Third	Second
KARACHI MALIR	24.58	3.16	17.65	22.17	First	Fourth	Third	Second
NAWABSHAH	5.9	4.3	6.7	8.2	Third	Fourth	Second	First
NUSHKI	N/A	1.63	10.06	11.05	N/A	Third	Second	First
QUETTA	20.04	2.92	13.97	19.52	First	Fourth	Third	Second
RAWALPINDI	20.3	5.84	15.74	16.56	First	Fourth	Third	Second
CHUNIAN	19.55	7.41	16.15	21.21	Second	Fourth	Third	First
SHARAQPUR	21.31	7.23	18.75	16.22	First	Fourth	Second	Third
KOTRI	24.8	3.63	19.49	21.38	First	Fourth	Third	Second

Table 6.3: Upload Data Throughput

Ookla Speed Test. Ookla Speed Test was also carried out to measure Download and Upload Data Throughput. During the survey, Speed Test servers were automatically selected based on the lowest ping and geographical location of the server. Ookla Test Statistics are shown in Table 6.4: Ookla Tests Statistics while the Download and Upload Speed Results are

shown in Table 6.5: Download Data Throughput and Table 6.6: Upload Data Throughput respectively.

DESCRIPTION		Jazz	Telenor	Ufone	Zong
DOWNLOAD	ATTEMPTS	10423	10928	10551	10641
	SPEED (Mbps)	34.69	7.99	11.68	35.73
UPLOAD	ATTEMPTS	10423	10928	10551	10641
	SPEED (Mbps)	24.299	6.612	19.831	24.195

Table 6.4: Ookla Tests Statistics

OOKLA DOWNLOAD DATA THROUGHPUT ≥ 4Mbps								
City	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	24.88	18.32	11.32	29.85	Second	Third	Fourth	First
D.I KHAN	22.69	**2.03**	6.79	23.461	Second	**Fourth**	Third	First
LAHORE	35.13	10.81	4.75	42.1	Second	Third	Fourth	First
MARDAN	31.14	4.75	7.29	19.64	First	Fourth	Third	Second
SAMUNDARI	31.2	12.31	10.65	30.14	First	Third	Fourth	Second
SHIKARPUR	25.97	12.02	12.34	22.92	First	Fourth	Third	Second
HYDERABAD	36.75	10.8	17.2	30.78	First	Fourth	Third	Second
JHELUM	52.13	5.06	10.91	49.08	First	Fourth	Third	Second
KARACHI MALIR	28.96	13.32	13.79	30.76	Second	Fourth	Third	First
NAWABSHAH	20.58	9.79	14.46	34.71	Second	Fourth	Third	First
NUSHKI	N/A	8.36	**2.71**	26.67	N/A	Second	Third	First
QUETTA	50.08	10.01	16.6	31.8	First	Fourth	Third	Second
RAWALPINDI	37.6	**2.6**	9.2	25.2	First	**Fourth**	Third	Second
CHUNIAN	27.33	13.18	9.26	43.84	Second	Third	Fourth	First
SHARAQPUR	31.43	11.86	17.41	37.19	Second	Fourth	Third	First
KOTRI	30.08	11.2	14.77	26.17	First	Fourth	Third	Second

Table 6.5: Ookla Download Data Throughput

OOKLA UPLOAD DATA THROUGHPUT ≥ 1Mbps								
City	Upload Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	27.75	5.89	20.84	23.76	First	Fourth	Third	Second
D.I KHAN	21.171	3.734	18.67	17.833	First	Fourth	Second	Third
LAHORE	26.76	7.78	21.61	29.3	Second	Fourth	Third	First
MARDAN	23.57	4.64	14.4	16.37	First	Fourth	Third	Second
SAMUNDARI	25.5	8.26	21.68	28.62	Second	Fourth	Third	First
SHIKARPUR	23.47	5.29	24.47	22.28	Second	Fourth	First	Third
HYDERABAD	27.53	6.24	23.68	30.09	Second	Fourth	Third	First
JHELUM	28.1	7	18.3	26.4	First	Fourth	Third	Second
KARACHI MALIR	23.28	7.76	20.95	28.14	Second	Fourth	Third	First
NAWABSHAH	19.14	5.22	20.96	34.78	Third	Fourth	Second	First
NUSHKI	N/A	2.72	9.95	12.8	N/A	Third	Second	First
QUETTA	20.94	6	16.7	24.6	Second	Fourth	Third	First
RAWALPINDI	21.4	5	18	21	First	Fourth	Third	Second
CHUNIAN	22.97	10.25	18.51	26.99	Second	Fourth	Third	First
SHARAQPUR	23.64	7.34	22.15	14.06	First	Fourth	Second	Third
KOTRI	26.14	4.76	19.26	23.12	First	Fourth	Third	Second

Table 6.6: Ookla Upload Data Throughput

7. MOBILE BROADBAND SERVICE – LATENCY

Latency is a vital indicator of Mobile Broadband Performance as user experience is highly dependent of it. During the survey, Network Latency was measured by calculating the ping between different websites and Ookla Speed Test servers. Latency Test Statistics are shown in Table 7.1: Latency Tests Statistics while the Results are shown in Table 7.2: Automode Latency and Table 7.3: Ookla Latency respectively.

DESCRIPTION		Jazz	Telenor	Ufone	Zong
Automode	ATTEMPTS	6162	5927	6168	6180
	LATENCY (ms)	110.53	77.11	69.96	84.13
Ookla	ATTEMPTS	10423	10928	10551	10641
	LATENCY (ms)	34.5	42.7	36.9	21.6

Table 7.1: Latency Tests Statistics

LATENCY IN AUTOMODE TESTING								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	**78**	67	52.64	73.49	**No**	Yes	Yes	Yes
D.I KHAN	**109**	**79**	**105**	**83**	**No**	**No**	**No**	**No**
LAHORE	60	50	55	43	Yes	Yes	Yes	Yes
MARDAN	**77**	57	**76**	**106**	**No**	Yes	**No**	**No**
SAMUNDARI	**120**	75	**93.28**	74	**No**	Yes	**No**	Yes
SHIKARPUR	50	**82**	45	49	Yes	**No**	Yes	Yes
HYDERABAD	70	70	60	70	Yes	Yes	Yes	Yes
JHELUM	**95**	69	**77**	**152**	**No**	Yes	**No**	**No**
KARACHI MALIR	**85**	**78**	60	73	**No**	**No**	Yes	Yes
NAWABSHAH	**109**	**79**	59	**78**	**No**	**No**	Yes	**No**
NUSHKI	N/A	**243**	**106**	**474**	N/A	**No**	**No**	**No**
QUETTA	**88**	**119**	**107**	**101**	**No**	**No**	**No**	**No**
RAWALPINDI	62	57	58	**121**	Yes	Yes	Yes	**No**
CHUNIAN	**127**	**120**	70	38	**No**	**No**	Yes	Yes
SHARAQPUR	**115**	46	62	41	**No**	Yes	Yes	Yes
KOTRI	**95**	**85**	72	**103**	**No**	**No**	Yes	**No**

Table 7.2: Automode Latency

LATENCY IN OOKLA TESTING								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	34	65	49	29	Yes	Yes	Yes	Yes
D.I KHAN	52	**80**	59.82	26.18	Yes	**No**	Yes	Yes
LAHORE	27	19	31.46	15	Yes	Yes	Yes	Yes
MARDAN	28.05	31	39.59	26.28	Yes	Yes	Yes	Yes
SAMUNDARI	29.8	33	53.09	22.54	Yes	Yes	Yes	Yes
SHIKARPUR	25.6	44.2	29.4	30.8	Yes	Yes	Yes	Yes
HYDERABAD	24.91	27.77	28.25	22.56	Yes	Yes	Yes	Yes
JHELUM	28	29.59	32.58	19.94	Yes	Yes	Yes	Yes
KARACHI MALIR	26.69	28.32	19.51	20.44	Yes	Yes	Yes	Yes
NAWABSHAH	31.5	32	27.01	23.78	Yes	Yes	Yes	Yes
NUSHKI	N/A	**225**	39.57	74.9	N/A	**No**	Yes	Yes

QUETTA	30.12	46.1	47.17	27.12	Yes	Yes	Yes	Yes
RAWALPINDI	21	42.5	23.7	16.5	Yes	Yes	Yes	Yes
CHUNIAN	38.56	46.26	36.96	16.78	Yes	Yes	Yes	Yes
SHARAQPUR	29.19	22.51	35.58	15.68	Yes	Yes	Yes	Yes
KOTRI	24.99	26.83	38.25	23.3	Yes	Yes	Yes	Yes

Table 7.3: Ookla Latency

8. MOBILE BROADBAND SERVICE – WEB PAGE LOADING

Web Page Loading Time of different national and international websites were tested. Results of testing are shown in Table 8.1: Web Page Loading Time.

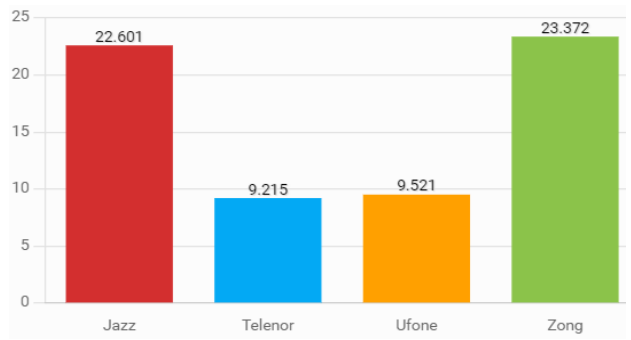
WEBPAGE LOADING TIME IN IN TECHNOLOGY AUTO DETECT MODE								
City	Webpage Loading Time [seconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	0.12	0.88	0.89	0.14	Yes	Yes	Yes	Yes
D.I KHAN	2.20	**6.60**	2.80	1.9	Yes	**No**	Yes	Yes
LAHORE	3.26	1.68	1.62	1.24	Yes	Yes	Yes	Yes
MARDAN	2.9	**5.2**	2.6	1.9	Yes	**No**	Yes	Yes
SAMUNDARI	0.68	0.31	0.34	0.14	Yes	Yes	Yes	Yes
SHIKARPUR	3.9	2.70	2.90	1.9	Yes	Yes	Yes	Yes
HYDERABAD	4.9	**6.7**	**6.5**	4.9	Yes	**No**	**No**	Yes
JHELUM	1.9	2.5	2.3	2.1	Yes	Yes	Yes	Yes
KARACHI MALIR	4.4	**7.2**	**6.2**	4.7	Yes	**No**	**No**	Yes
NAWABSHAH	4.6	2.5	3.1	1.7	Yes	Yes	Yes	Yes
NUSHKI	N/A	**6.6**	**7.6**	**5.3**	N/A	**No**	**No**	**No**
QUETTA	**5**	**7.5**	**6.5**	**5.4**	**No**	**No**	**No**	**No**
RAWALPINDI	2.3	2.7	2.3	2.1	Yes	Yes	Yes	Yes
CHUNIAN	**6.6**	**7.1**	**7.1**	**6.5**	**No**	**No**	**No**	**No**
SHARAQPUR	**5.3**	**6.4**	**6.9**	**5.9**	**No**	**No**	**No**	**No**
KOTRI	4.5	**6.9**	**6.6**	**5.1**	Yes	**No**	**No**	**No**

Table 8.1: Web Page Loading Time

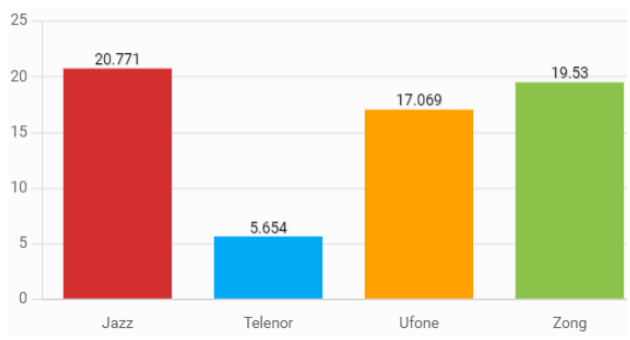
Overall survey results of Mobile Broadband Services for each Mobile Operator are shown in the below graphs.

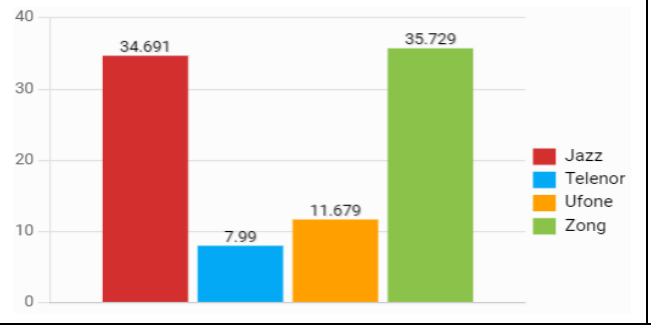
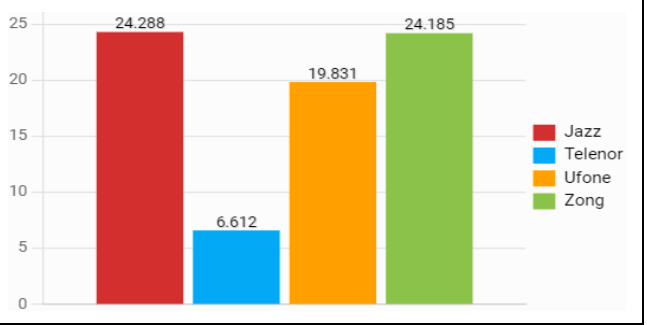
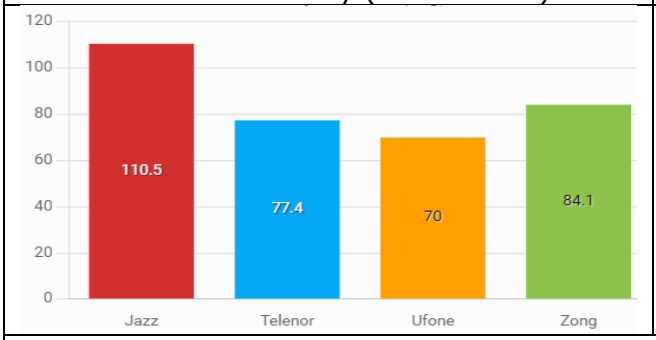
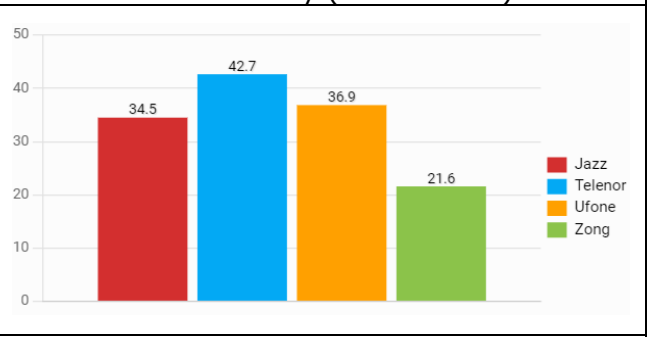
MOBILE BROADBAND SERVICE

Automode Download Throughput (Mbps)

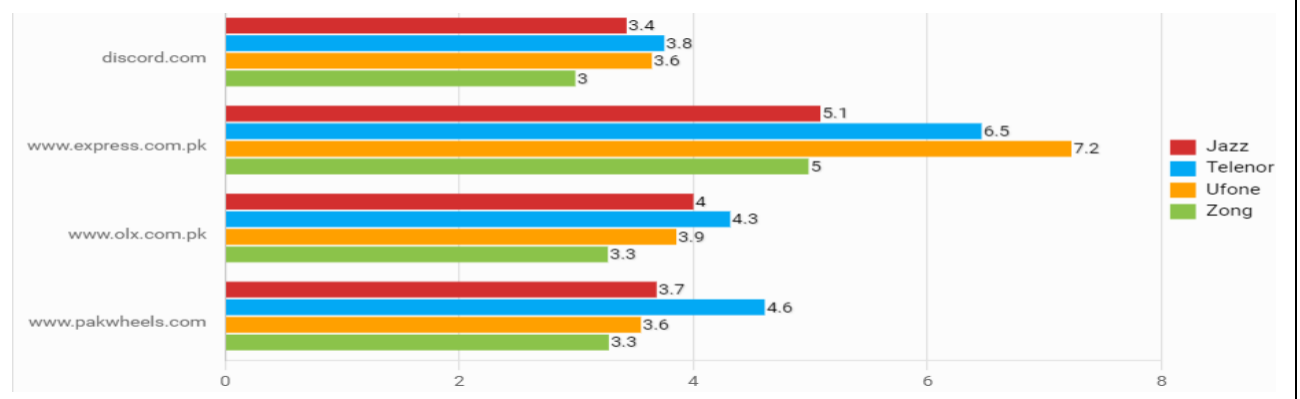


Automode Upload Throughput (Mbps)



Ookla Download Throughput (Mbps)	Ookla Upload Throughput (Mbps)
	
Automode Latency (milliseconds)	**Ookla Latency (milliseconds)**
	

Webpage Loading Time Per Website (seconds)



9. VOICE SERVICE

A total of 20,485 Call attempts were made and out of which 339 were failed attempts. In 20,146 successful call attempts, 143 calls dropped prior to completion of two minutes duration, whereas, 20,003 calls remained connected for the complete duration of two minutes. The 5 x QoS KPIs (i.e. Network Accessibility, Call Setup Success Rate, Call Setup Time, Call Completion Rate and Mean Opinion Score) have been measured while testing voice services in the surveyed cities. Company wise call statistics is shown in Table 9.1: Call Statistics, while the compliance in each surveyed city is shown in Table 9.2: Voice QoS KPIs Compliance Level , Table 9.3: Voice QoS KPIs Compliance Level and Table 9.4: Voice QoS KPIs Compliance Level

Description	Jazz	Telenor	Ufone	Zong
Total Calls Attempts	5101	4988	4705	4690
Failed Calls Attempts	42	143	98	57
Established Calls Attempts	5059	4845	4607	4633
Dropped Calls Attempts	0	1	0	1
Completed Calls Attempts	5059	4844	4607	4632
Call Setup Success Rate (%)	99.18	**97.13**	**97.92**	98.78
Call Setup Time (Sec)	**7.49**	**7.86**	6.67	6.78
Call Completion Rate (%)	100	**71.43**	98.61	**98.48**
Mean Opinion Score	3.82	3.87	3.57	3.67
Total Speech Test	50845	48666	46332	46536

Table 9.1: Call Statistic

CMO	KPIS	BAHWALNAGAR	D.I KHAN	LAHORE	MARDAN	SAMUNDARI	SHIKARPUR
Jazz	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	**No**	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
Telenor	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	**No**	**No**	**No**	Yes	Yes	**No**
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	**No**	Yes	**No**	Yes	**No**
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	**No**	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes

** Note Voice QoS KPIs: Network Accessibility (NA), Call Setup Success Rate (CSSR), Call Connection Time (CCT) , Call Completion Ratio (CCR) , Mean Opinion Score (MOS)*

Table 9.2: Voice QoS KPIs Compliance Level

CMO	KPIS	HYDERABAD	JHELUM	MALIR	NAWABSHAH	NUSHKI	QUETTA
Jazz	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	No	Yes
Telenor	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	**No**	**No**	**No**	**No**
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	**No**
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes	**No**	**No**
	CCT	Yes	Yes	Yes	Yes	Yes	Yes

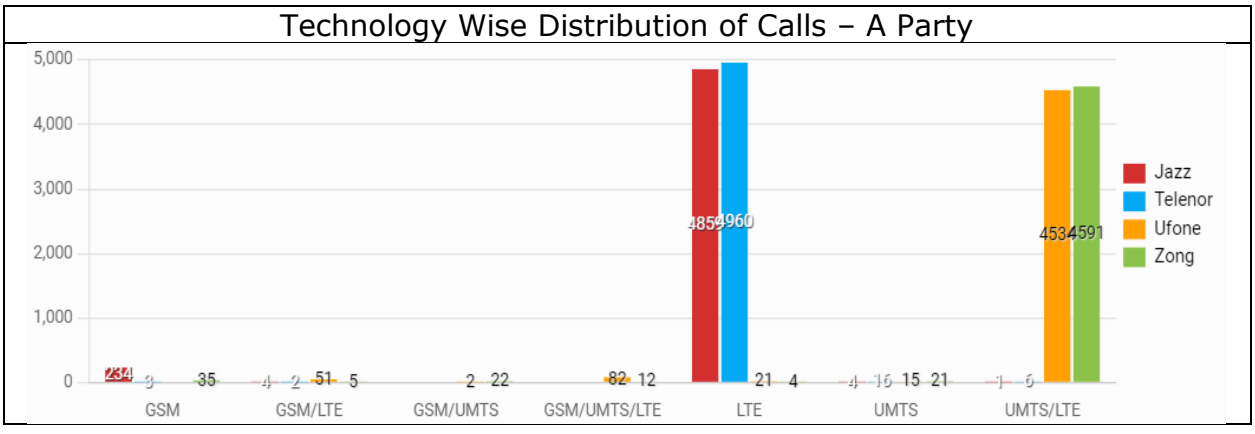
CMO	KPIS	HYDERABAD	JHELUM	MALIR	NAWABSHAH	NUSHKI	QUETTA
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
ZonG	NA	Yes	Yes	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes	**No**	**No**
	CCT	Yes	Yes	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes	Yes	Yes
** Note Voice QoS KPIs: Network Accessibility (NA), Call Setup Success Rate (CSSR), Call Connection Time (CCT) , Call Completion Ratio (CCR) , Mean Opinion Score (MOS)*							

Table 9.3: Voice QoS KPIs Compliance Level

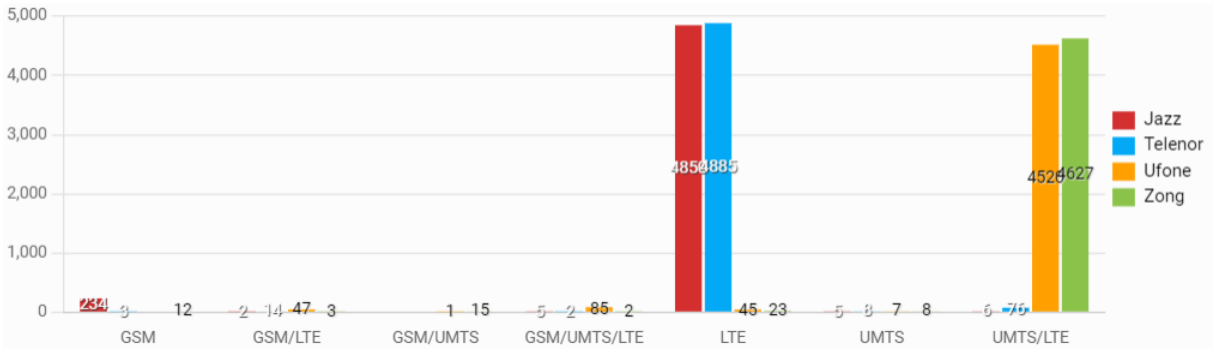
CMO	KPIS	CHUNIAN	SHARAQPUR	KOTRI	RAWALPINDI
Jazz	NA	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes
Telenor	NA	Yes	Yes	Yes	Yes
	CSSR	**No**	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes
	CCR	**No**	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes
Ufone	NA	Yes	Yes	Yes	Yes
	CSSR	**No**	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes
	CCR	**No**	Yes	**No**	Yes
	MOS	Yes	Yes	Yes	Yes
ZonG	NA	Yes	Yes	Yes	Yes
	CSSR	Yes	Yes	Yes	Yes
	CCT	Yes	Yes	Yes	Yes
	CCR	Yes	Yes	Yes	Yes
	MOS	Yes	Yes	Yes	Yes
** Note Voice QoS KPIs: Network Accessibility (NA), Call Setup Success Rate (CSSR)> 98%, Call Connection Time (CCT) , Call Completion Ratio (CCR) , Mean Opinion Score (MOS)*					

Table 9.4: Voice QoS KPIs Compliance Level

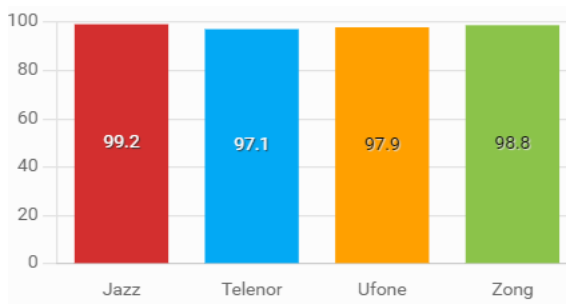
Overall survey results of Voice Services for each Mobile Operator are shown in the below graphs.



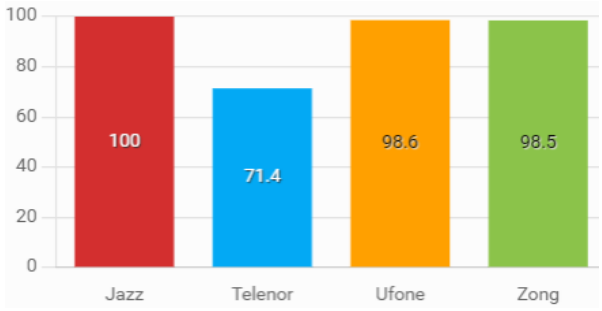
Technology Wise Distribution of Calls – B Party



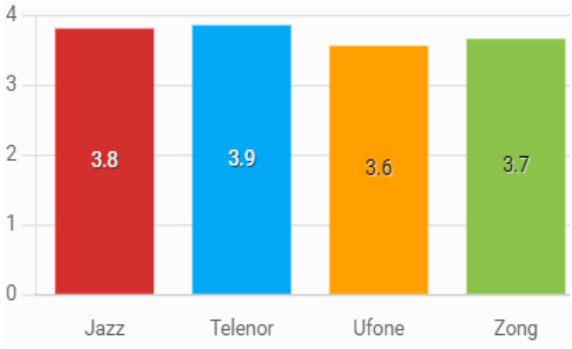
Call Setup Success Rate



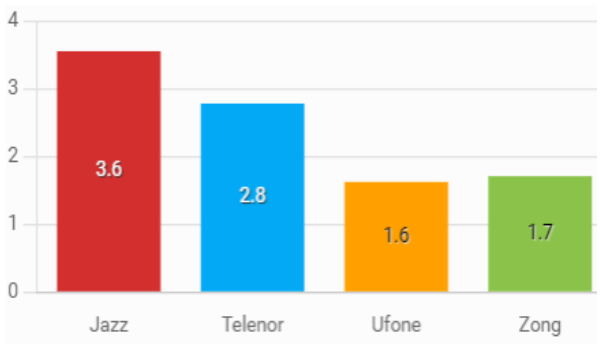
Call Retainability



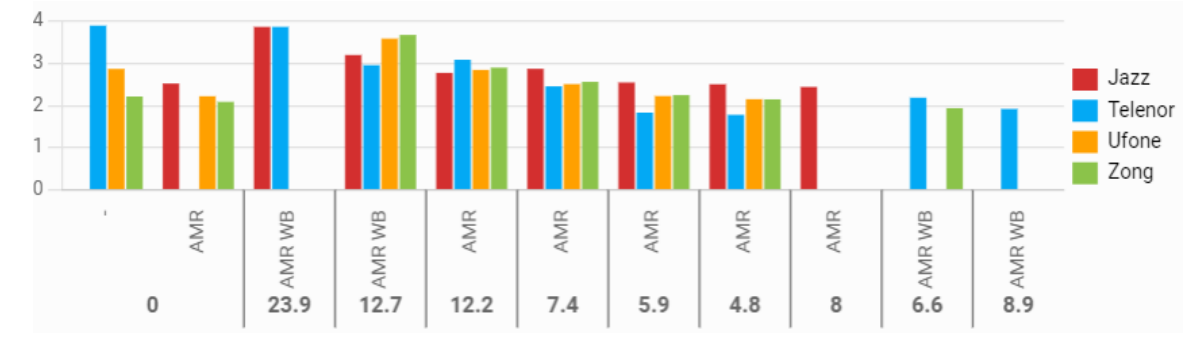
Mean Opinion Score - Average



Mean Opinion Score < 1.6 (Percentage)



Mean Opinion Score – Voice Codec



10. SMS SERVICE

A total of 20,433 SMS sending attempts were conducted, out of which 20,372 SMS were successfully transmitted by A-Party while 20,203 SMS were successfully received at B-Party. The 2 x SMS QoS KPIs (i.e. Success Rate and Delivery Time) have been measured while testing SMS services in the surveyed cities. Company wise SMS statistics are shown in Table 10.1: SMS Statistics, while the compliance in each surveyed city is shown in Table 10.2: SMS QoS KPIs Compliance Level.

Description	Jazz	Telenor	Ufone	Zong
SMS Send Request	5109	5021	4720	4702
SMS Successfully Transmitted	5092	4986	4706	4697
SMS Successfully Received	5062	4836	4679	4661
SMS Receive Success Rate (%)	99.08	96.32	99.13	99.13
End-To-End Delivery Time (Sec)	3.54	4.09	2.51	2.58

Table 10.1: SMS Statistics

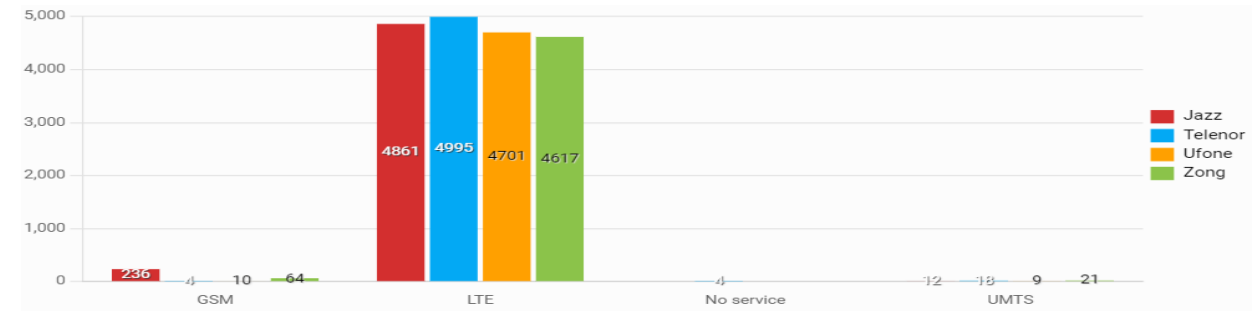
Operator		Jazz		Telenor		Ufone		ZonG	
SMS KPI		SR	DT	SR	DT	SR	DT	SR	DT
Surveyed Cities	BAHWALNAGAR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	D.I KHAN	Yes	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	LAHORE	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	MARDAN	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	SAMUNDARI	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	SHIKARPUR	Yes	Yes	**No**	Yes	**No**	Yes	**No**	Yes
	HYDERABAD	Yes	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	JHELUM	**No**	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	KARACHI MALIR	**No**	Yes	**No**	Yes	**No**	Yes	Yes	Yes
	NAWABSHAH	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	NUSHKI	**No**	Yes	**No**	Yes	Yes	Yes	Yes	Yes
	QUETTA	Yes	Yes	**No**	Yes	**No**	Yes	**No**	Yes
	RAWALPINDI	Yes	Yes	**No**	Yes	Yes	Yes	**No**	Yes
	CHUNIAN	**No**	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	SHARAQPUR	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	KOTRI	**No**	Yes	**No**	Yes	Yes	Yes	Yes	Yes

** Note SMS QoS KPIs: Success Rate (SR), Delivery Time (DT)*

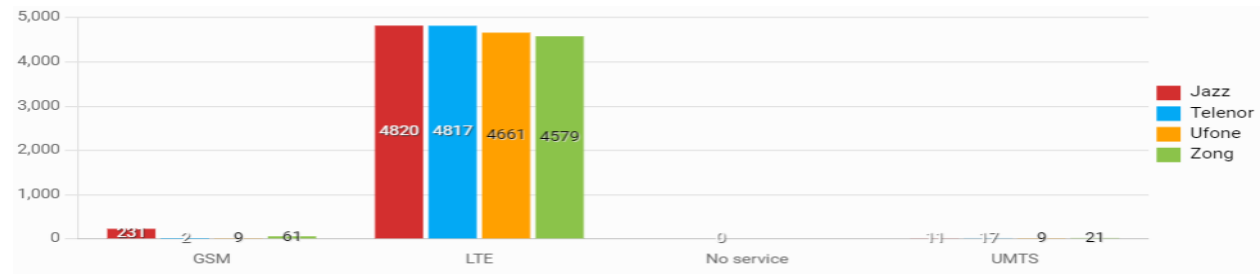
Table 10.2: SMS QoS KPIs Compliance Level

Overall survey results of SMS Services for each Mobile Operator are shown in the below graphs.

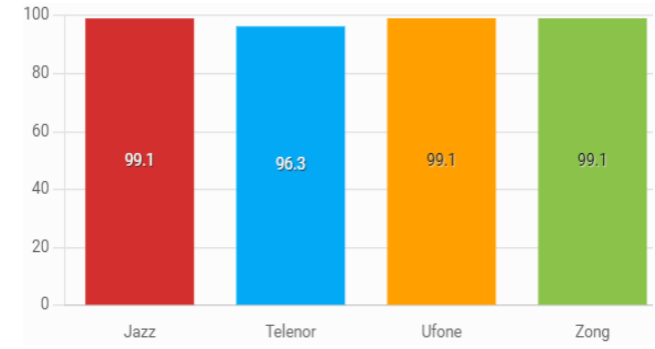
SMS SEND REQUEST BY TECHNOLOGY



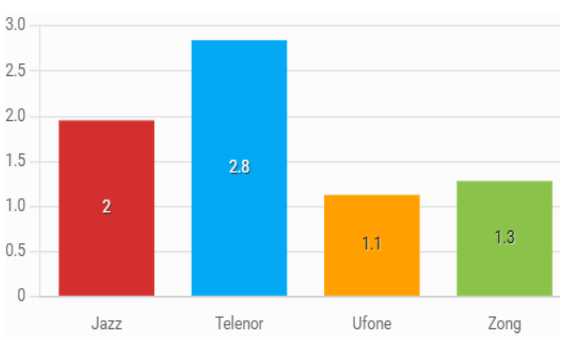
SMS SUCCESSFUL RECEPTION BY TECHNOLOGY



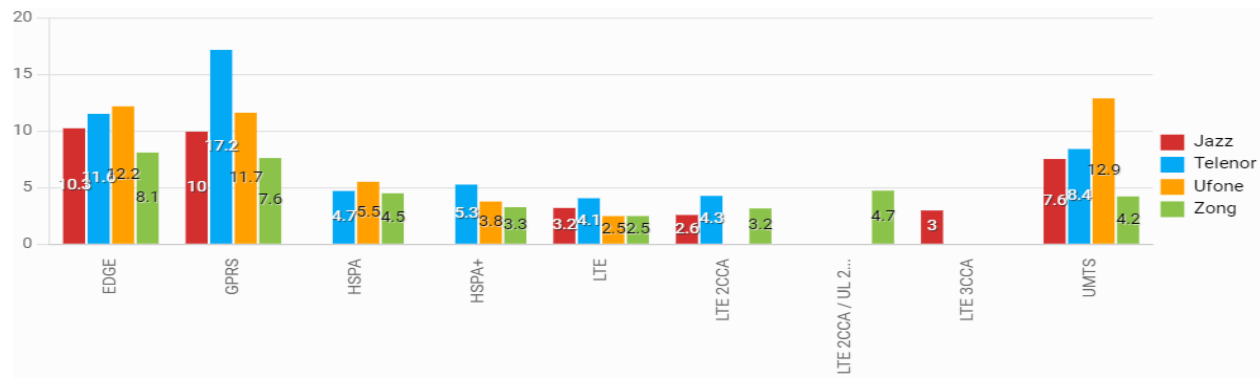
SMS RECEIVE SUCCESS RATE (%)



SMS END TO END DELIVERY TIME(S)



SMS DELIVERY DURATION BY TECHNOLOGY



11. <u>SURVEY STANDING - MOBILE NETWORK COVERAGE</u>

The categorization of CMOs in Mobile Network Coverage i.e. Signal Strength of 4G/LTE and 3G Networks (in case of fallback) measured in

Technology Auto Detect Mode is shown in Table 11.1: 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	16	14	30	-	-	-	1st
2.	ZonG	16	8	24	-	-	-	1st
3.	Jazz	15	2	17	-	-	-	1st
4.	Telenor	6	11	17	10	-	10	2nd

Table 11.1: CMOs Standing in Mobile Network Coverage – Technology Auto Detect Mode

12. SURVEY STANDING - MOBILE BROADBAND SERVICE

The categorization of each CMOs in Mobile Broadband Service is as under:

i. Download Data Throughput (Auto Mode). The Download Data Throughput, as per the highest to lowest obtained results, is shown in Table 12.1: CMOs Standing in Download Data Throughput – Auto Mode Testing.

S. #	Operator	Highest Download Throughput – Number of Cities				Standing
		1st	2nd	3rd	4th	
1.	Jazz	9	5	1	-	1st
2.	Zong	7	9	-	-	2nd
3.	Telenor	-	2	4	10	3rd
4.	Ufone	-	-	11	5	4th

Table 12.1: CMOs Standing in Download Data Throughput– Auto Mode Testing

ii. Upload Data Throughput (Auto Mode). The Upload Data Throughput, as per the highest to lowest obtained results, is shown in Table 12.2: CMOs Standing in Upload Data Throughput – Auto Mode Testing.

S. #	Operator	Highest Upload Throughput – Number of Cities				Standing
		1st	2nd	3rd	4th	
1.	Zong	7	8	1	-	1st
2.	Jazz	7	1	5	2	2nd
3.	Ufone	2	7	7	-	3rd
4.	Telenor	-	-	3	13	4th

Table 12.2: CMOs Standing in Download Data Throughput– Auto Mode Testing

iii. Webpage Loading Time. The categorization of each CMOs, as per the maximum compliant of Webpage Loading Time, is shown in Table 12.3: CMOs Standing in Webpage Loading Time.

S. #	Operator	Webpage Loading Time - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Jazz	12	3	1st
2.	Zong	11	5	2nd
3.	Ufone	9	7	3rd
4.	Telenor	7	9	4th

Table 12.3: CMOs Standing in Webpage Loading Time

iv. Latency (Ookla). The categorization of each CMOs, as per the maximum compliant of cities in terms of Latency, is shown in Table 12.4: CMOs Standing in Latency (Ookla).

S. #	Operator	Latency - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Jazz	15	-	1st
2.	ZonG	16	-	1st
3.	Ufone	16	-	1st
4.	Telenor	14	2	2nd

Table 12.4: CMOs Standing in Latency (Ookla)

v. Latency (Automode). The categorization of each CMOs, as per the maximum compliant of cities in terms of Latency, is shown in Table 12.5: CMOs Standing in Latency (Automode).

S. #	Operator	Latency - Number of Cities		Standing
		Compliant	Non-Compliant	
1.	Ufone	10	6	1st
2.	ZonG	8	8	2nd
3.	Telenor	8	8	2nd
4.	Jazz	4	11	3rd

Table 12.5: CMOs Standing in Latency (Ookla)

vi. Download Data Throughput (Ookla). The Ookla Download Throughput, as per the highest to lowest obtained results, is shown in Table 12.6: CMOs Standing in Download Throughput – Ookla.

S. #	Operator	Highest Download Throughput – Number of Cities				Standing
		1st	2nd	3rd	4th	
1.	Zong	8	8	-	-	1st
2.	Jazz	8	7	-	-	2nd
3.	Telenor	-	1	4	11	3rd
4.	Ufone	-	-	12	4	4th

Table 12.6: CMOs Standing in Download Throughput – Ookla

vii. Upload Data Throughput (Ookla). The Ookla Upload Throughput, as per the highest to lowest obtained results, is shown in Table 12.7: CMOs Standing in Upload Throughput – Ookla.

S. #	Operator	Highest Upload Throughput – Number of Cities				Standing
		1st	2nd	3rd	4th	
1.	Zong	8	5	3	-	1st
2.	Jazz	7	7	1	-	2nd
3.	Ufone	1	4	11	-	3rd
4.	Telenor	-	-	1	15	4th

Table 12.7: CMOs Standing in Upload Throughput – Ookla

13. SURVEY STANDING – VOICE & SMS SERVICE

The categorization of each CMOs, as per the maximum compliant of Voice and SMS QoS KPIs are shown in (i) Table 13.1: CMOs Standing in Voice Service & (ii) Table 13.2: CMOs Standing in SMS Service

S.#	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	Jazz	78	2	1st
2.	Zong	77	3	2nd
3.	Ufone	72	8	3rd
4.	Telenor	69	11	4th

Table 13.1: CMOs Standing in Voice Service

S. #	Operator	SMS QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	Ufone	29	3	1st
2.	Zong	28	4	2nd
3.	Jazz	27	5	3rd
4.	Telenor	20	12	4th

Table 13.2: CMOs Standing in SMS Service

14. SURVEY STANDING - OVERALL

The overall standing of each CMOs in different category of services is mentioned in Table 14.1: CMOs Overall Standing in QoS Survey. Wherein, 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).

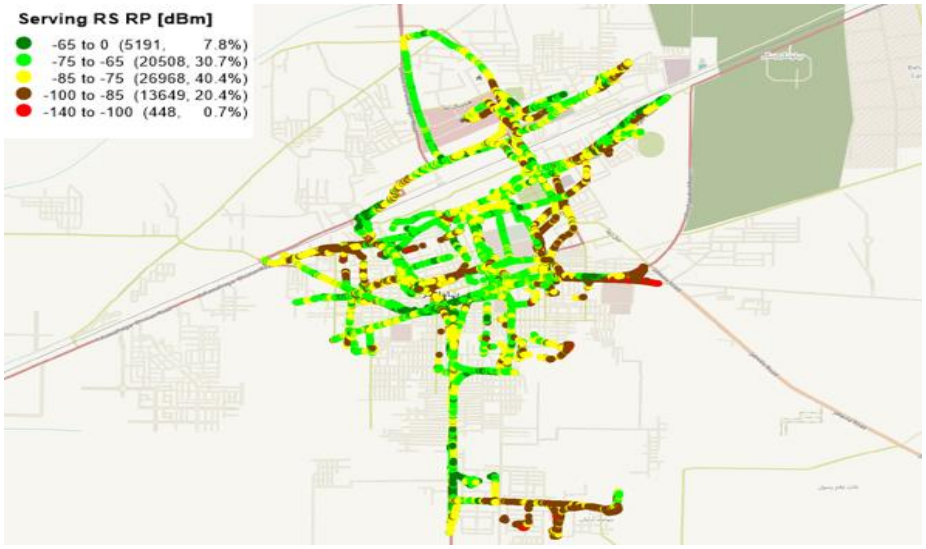
S. #.	Service			STANDING			
				1st	2nd	3rd	4th
1.	Mobile Network Coverage			Ufone, ZonG, Jazz	Telenor	-	-
2.	Mobile Broadband	Auto Mode	Download	Jazz	ZonG	Ufone	Telenor
			Upload	ZonG	Jazz	Ufone	Telenor
		Ookla	Download	ZonG	Jazz	Telenor	Ufone
			Upload	ZonG	Jazz	Ufone	Telenor
		Web Page Loading Time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

Table 14.1: CMOs Overall Standing in QoS Survey

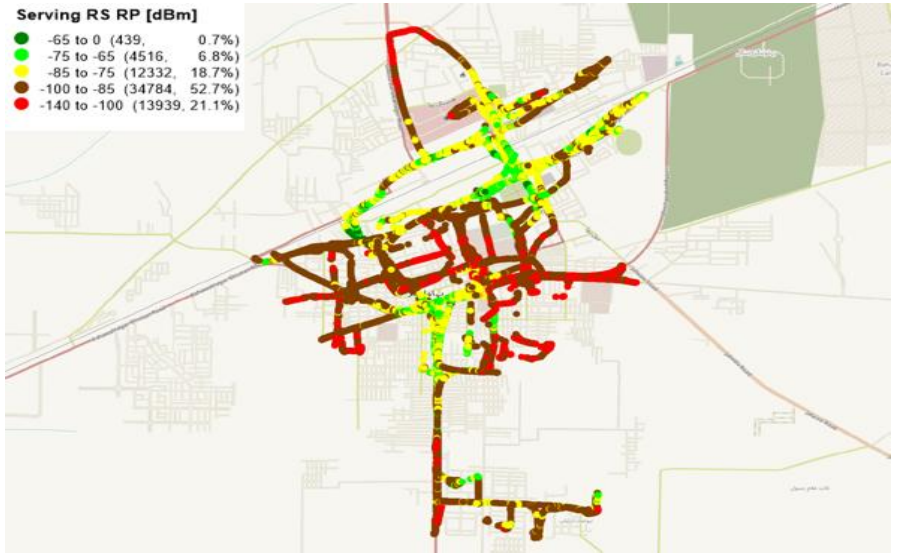
AUTOMODE

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

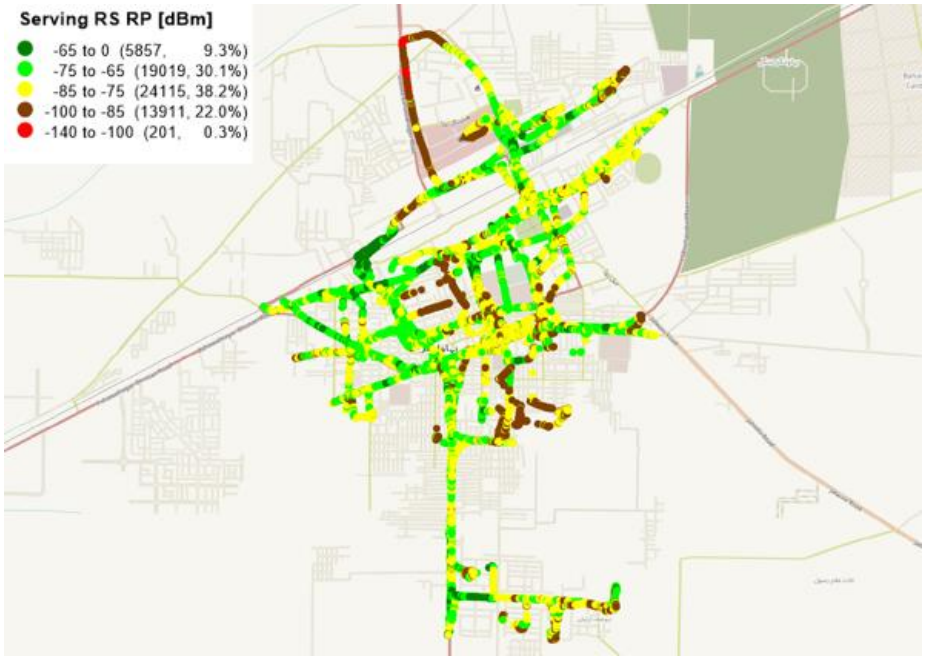
JAZZ NETWORK COVERAGE – BAHAWALNAGAR



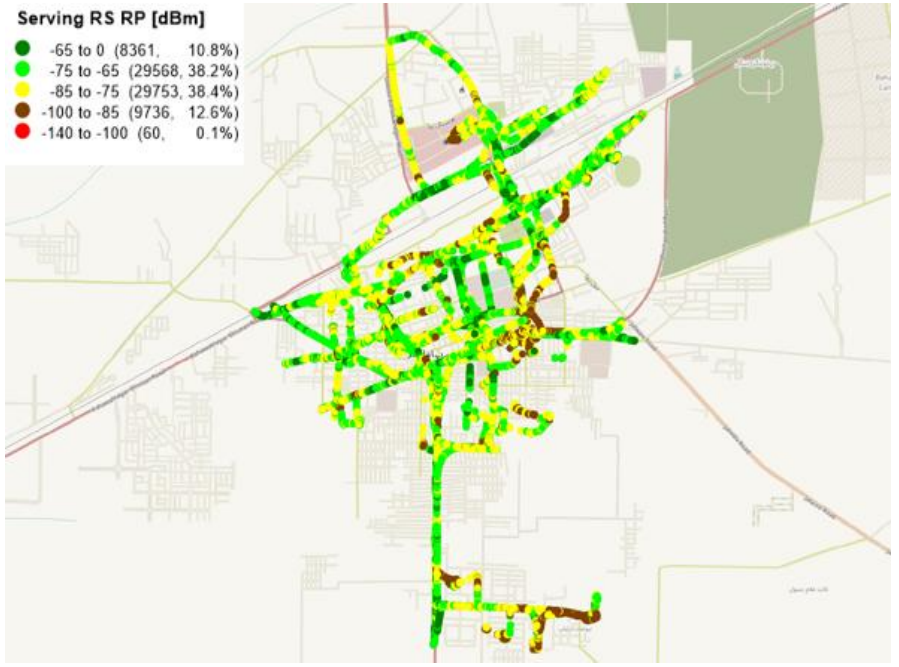
TELENOR NETWORK COVERAGE – BAHAWALNAGAR



UFONE NETWORK COVERAGE – BAHAWALNAGAR

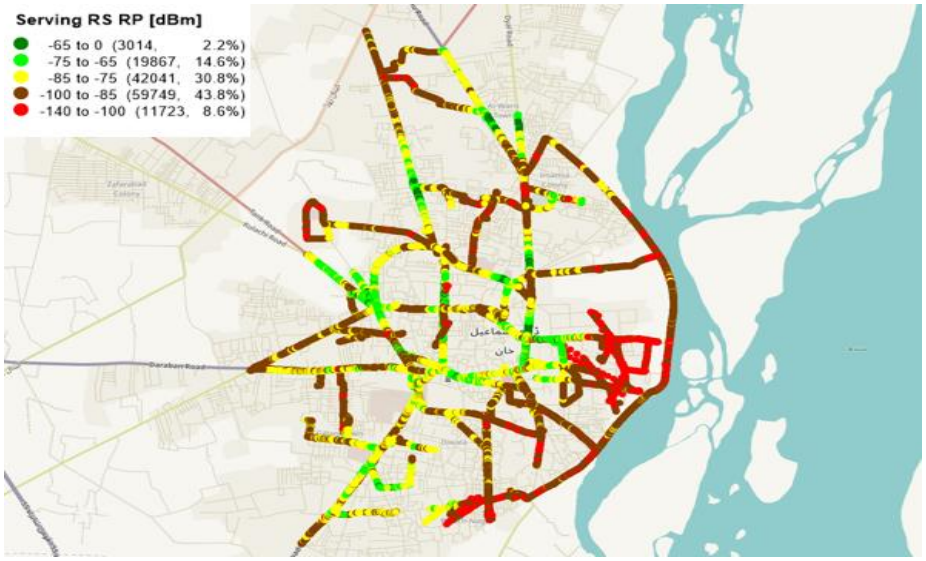


ZONG NETWORK COVERAGE – BAHAWALNAGAR

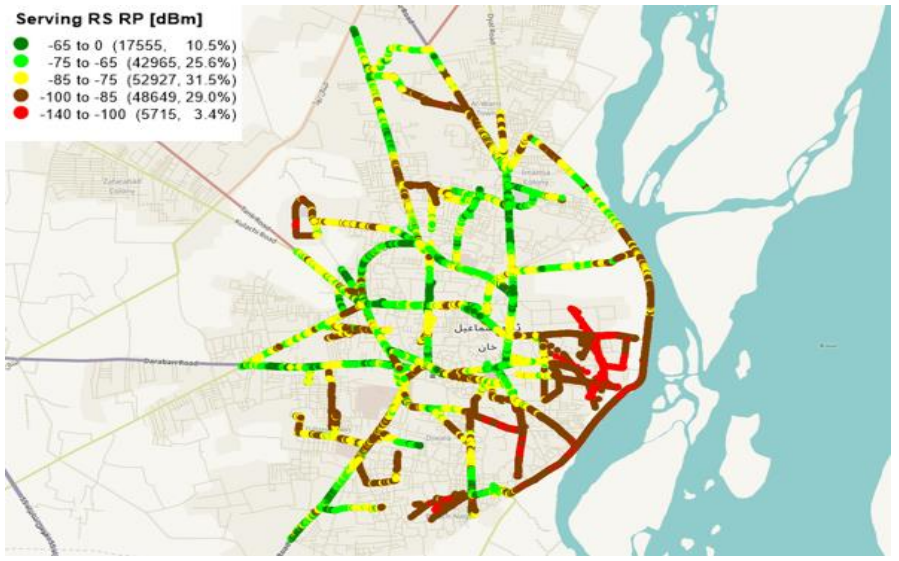


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – D.I KHAN



TELENOR NETWORK COVERAGE – D.I KHAN



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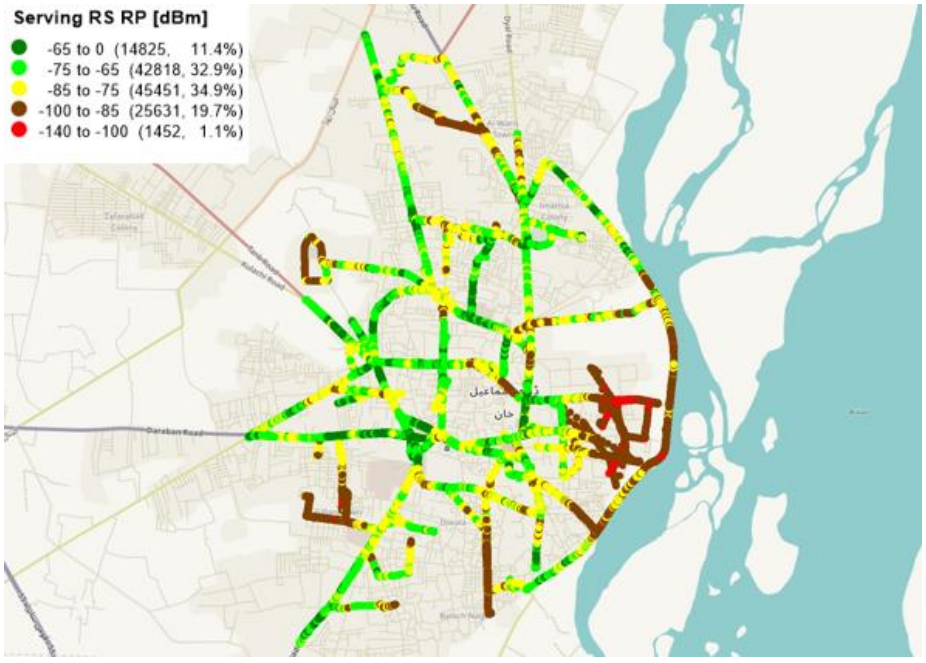

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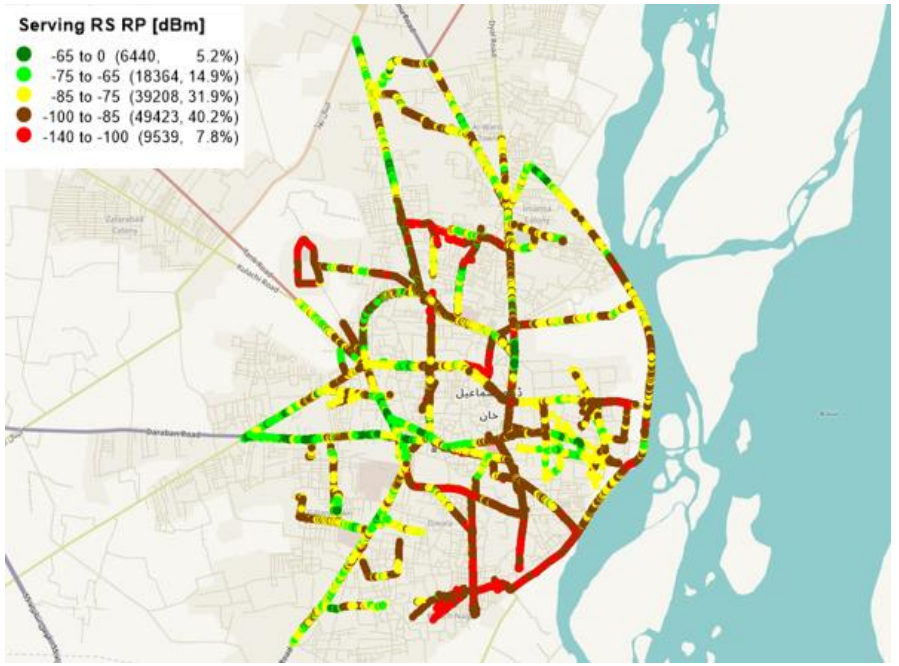
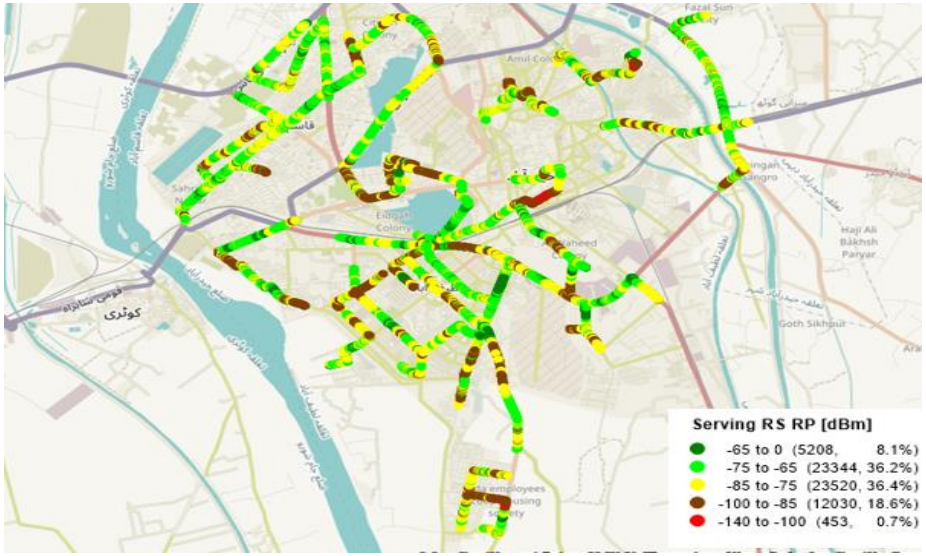
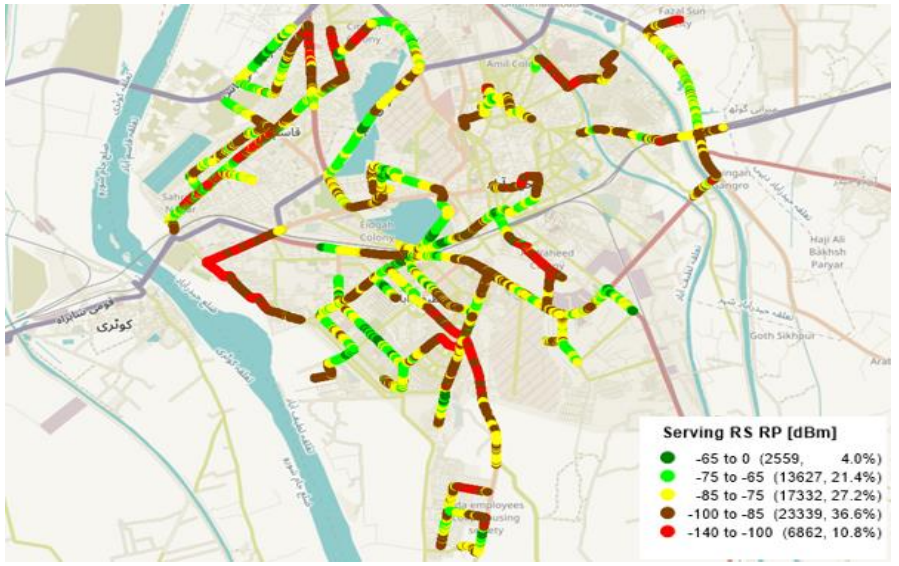


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – HYDERABAD



TELENOR NETWORK COVERAGE – HYDERABAD



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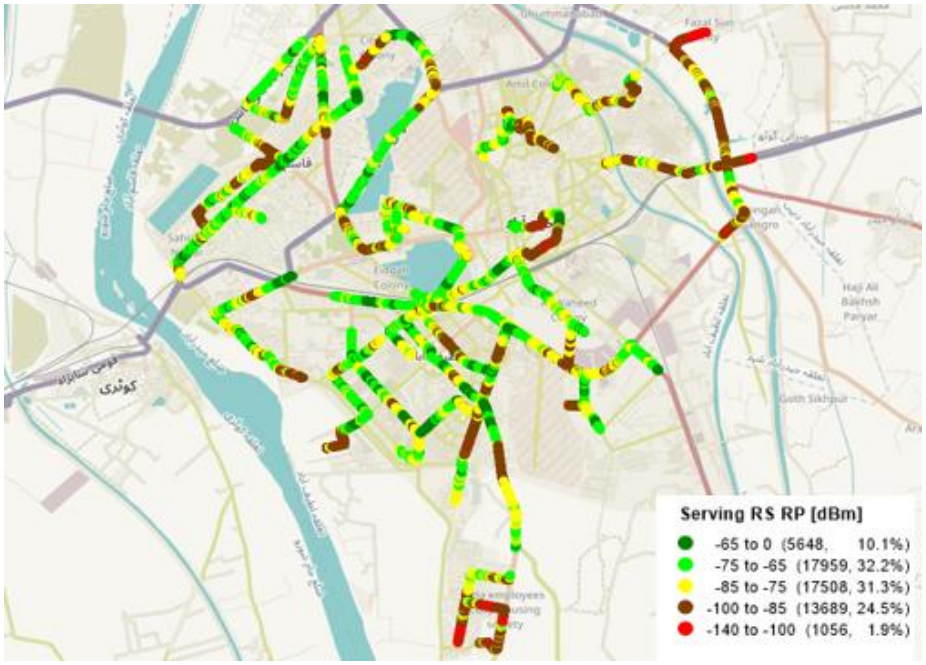
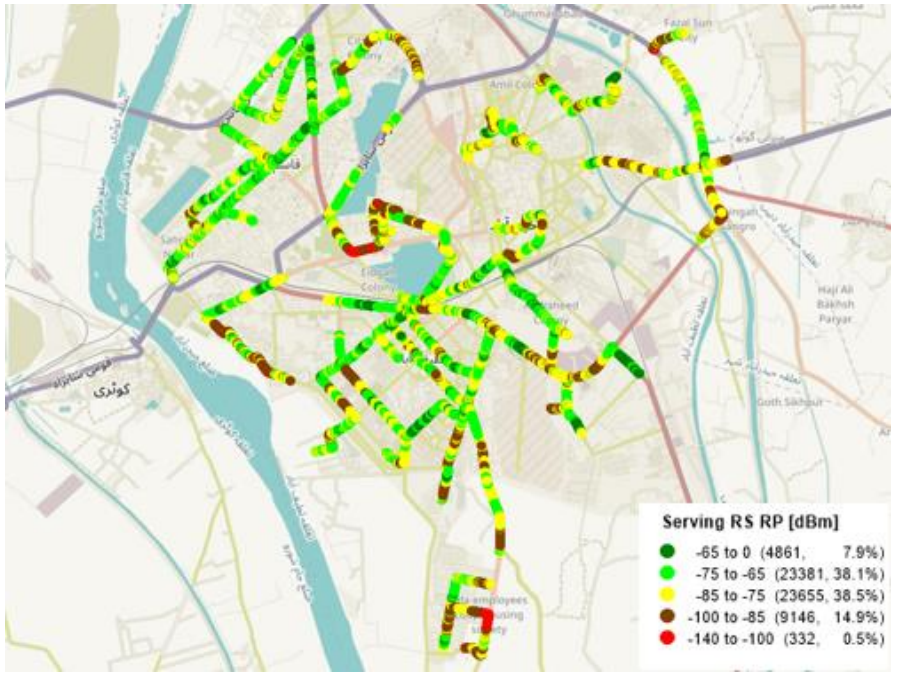
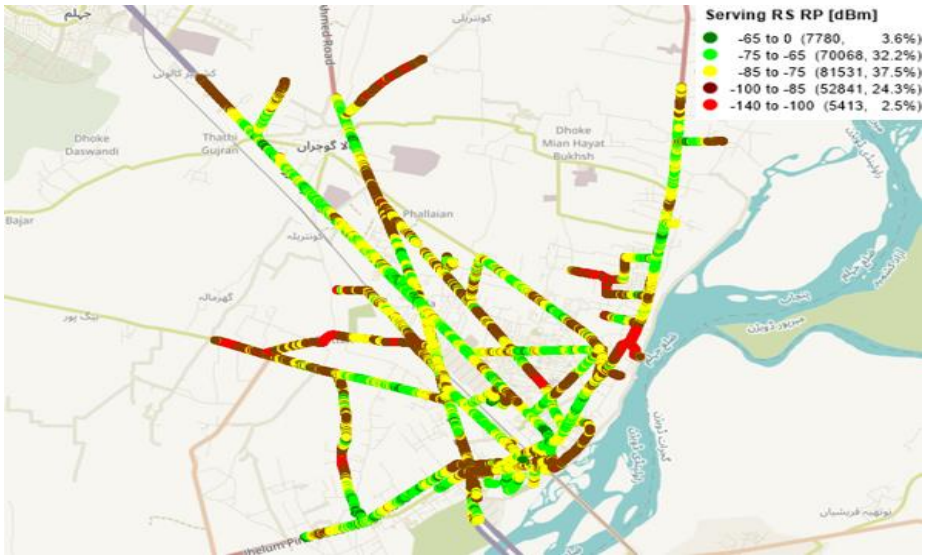


ZONG NETWORK COVERAGE – HYDERABAD

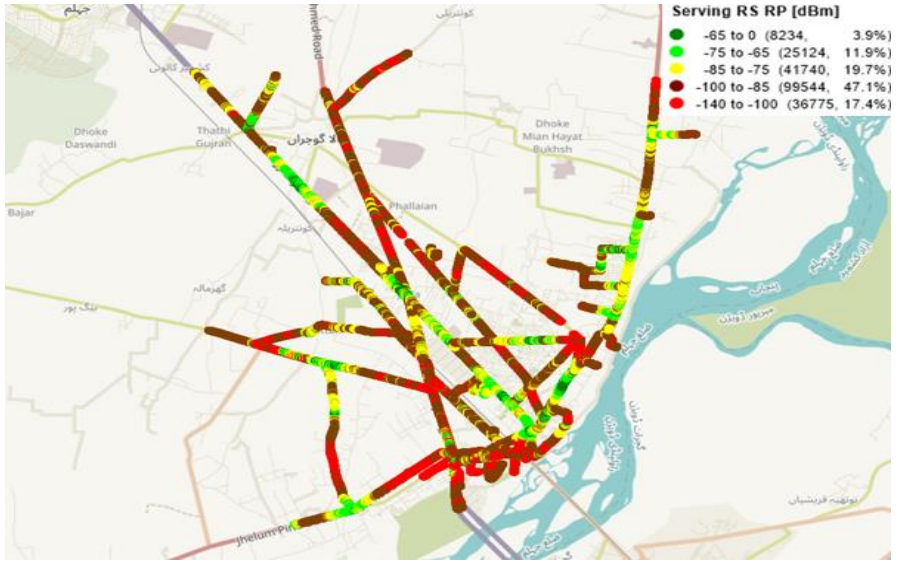


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – JHELUM



TELENOR NETWORK COVERAGE – JHELUM



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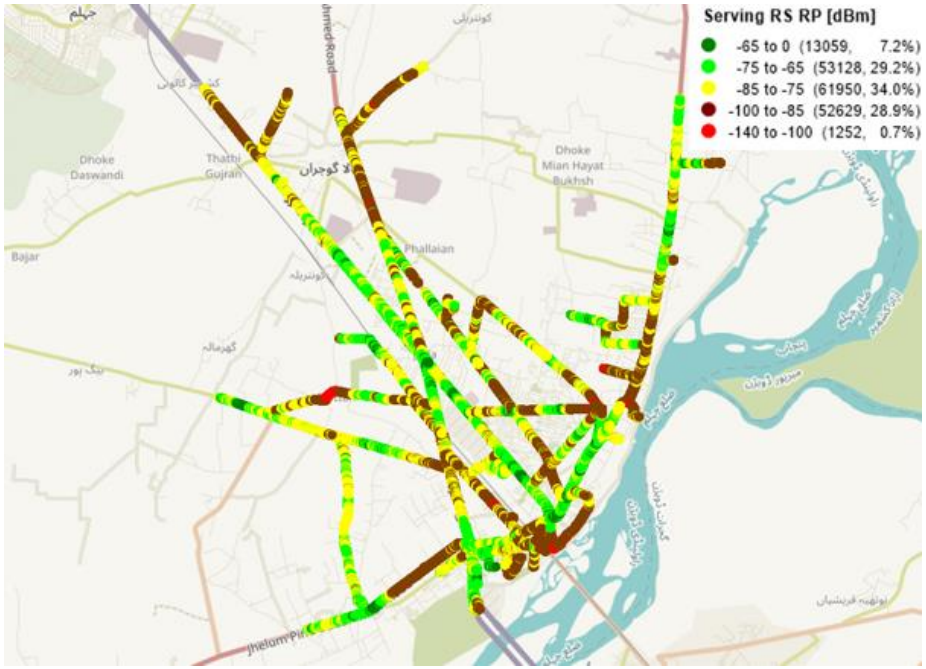

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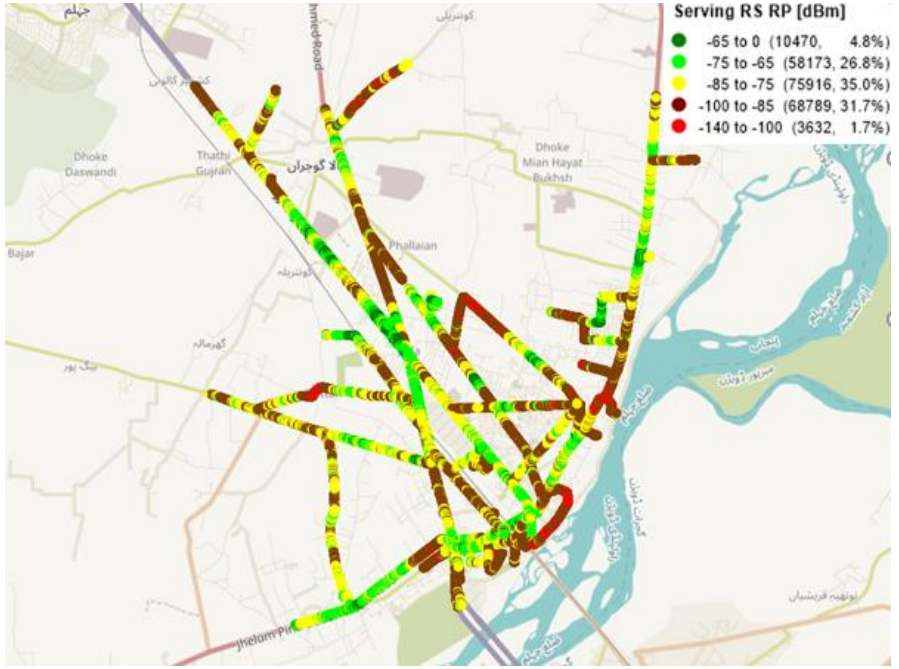
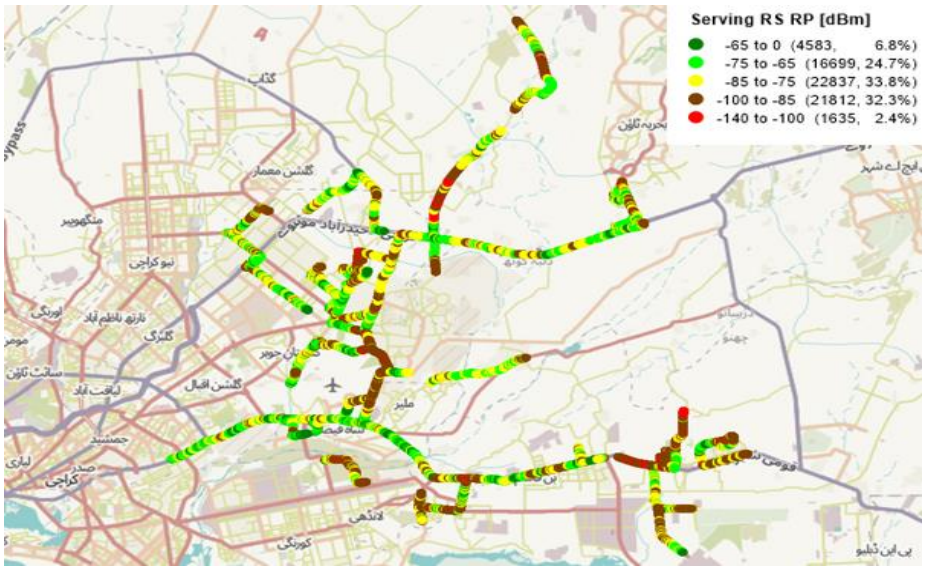


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

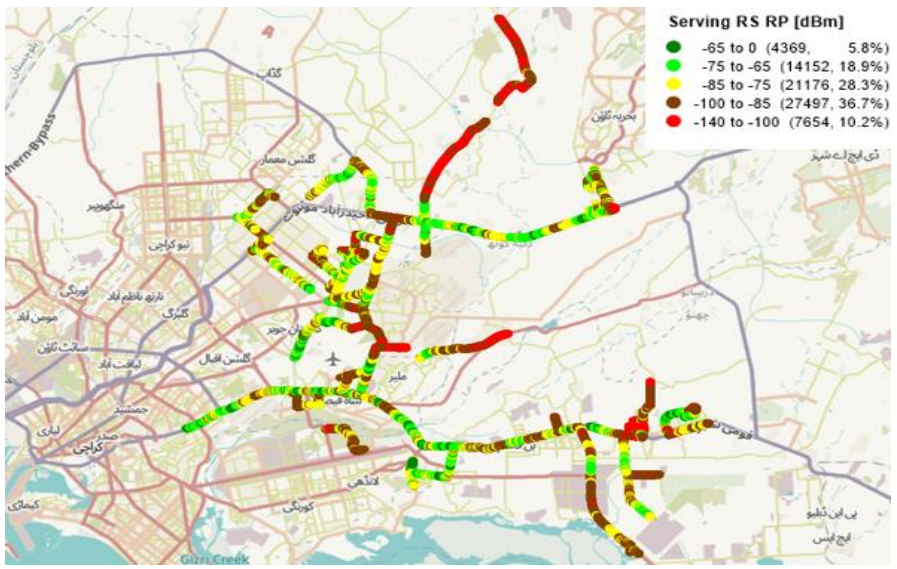
ZONG 3G NETWORK COVERAGE – JHELUM

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – KARACHI MALIR



TELENOR NETWORK COVERAGE – KARACHI MALIR



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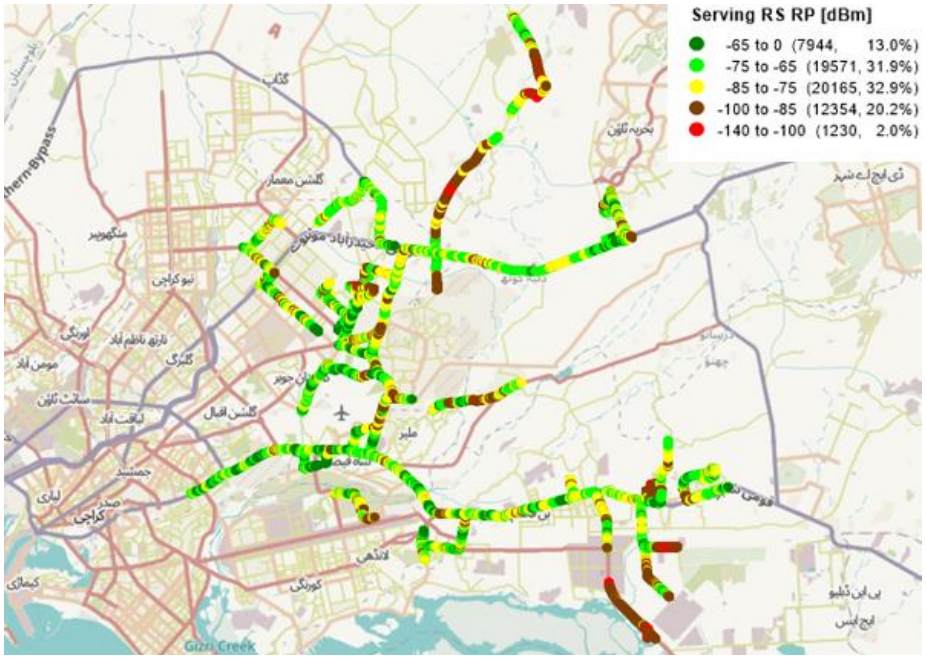

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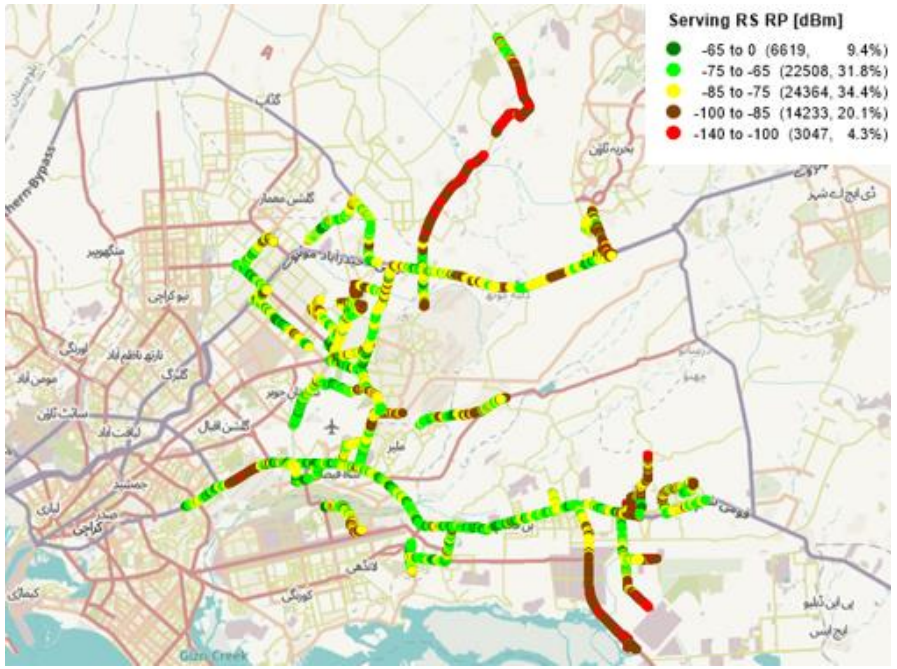
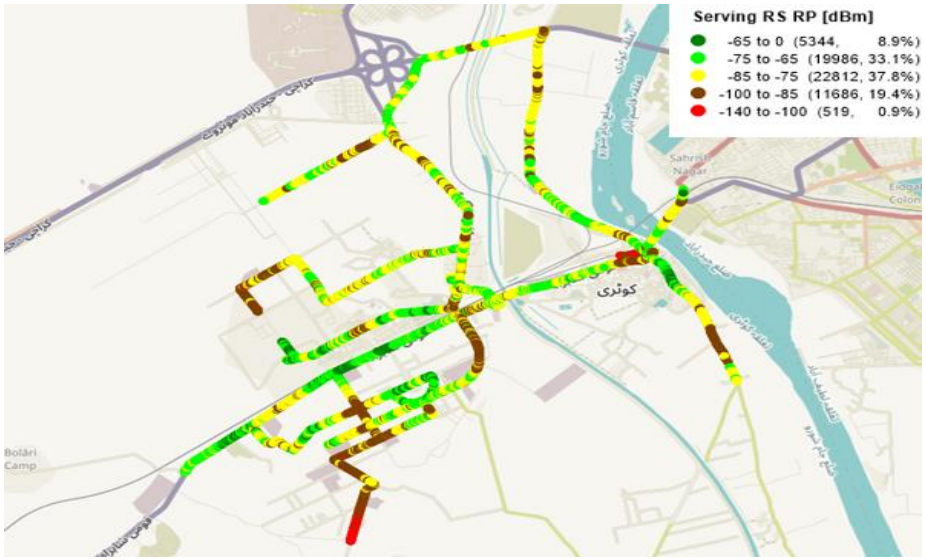


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – KOTRI



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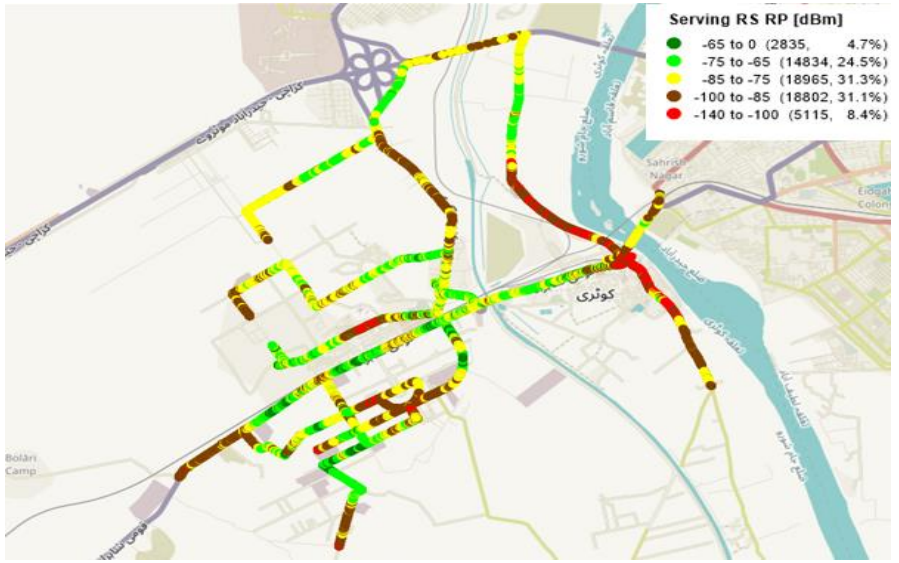

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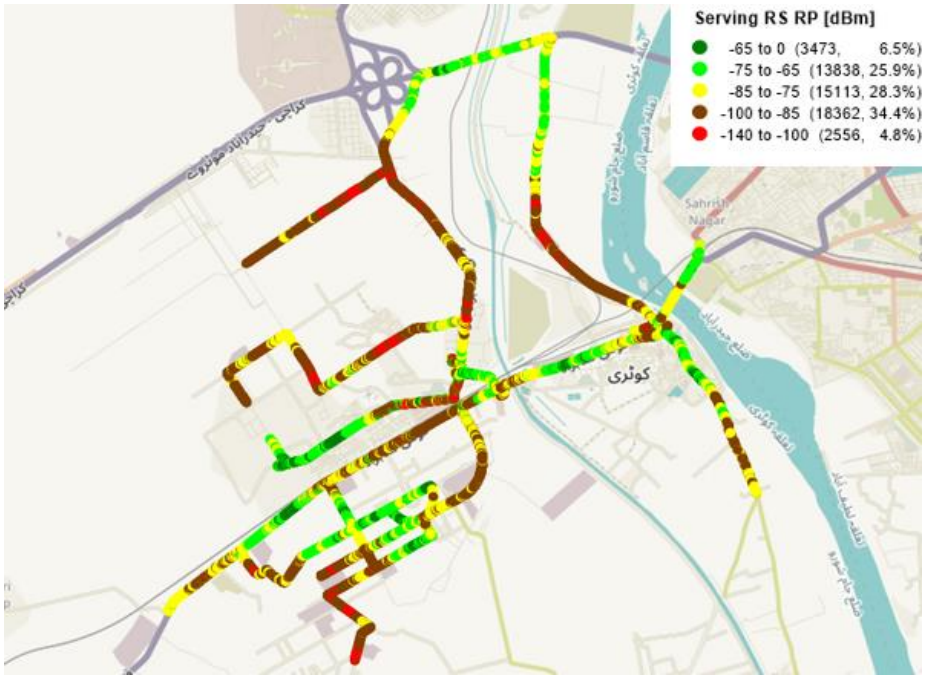

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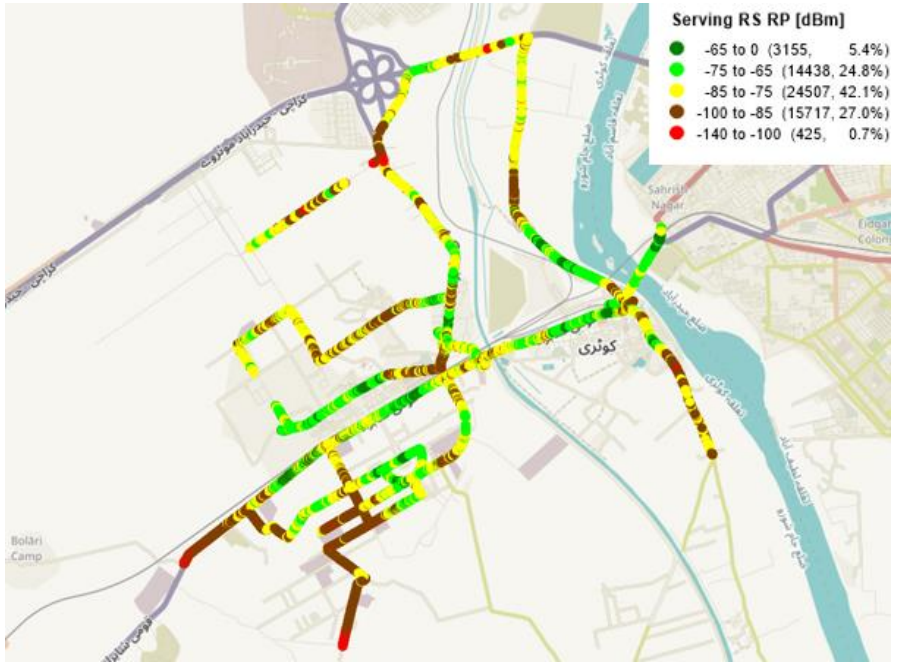
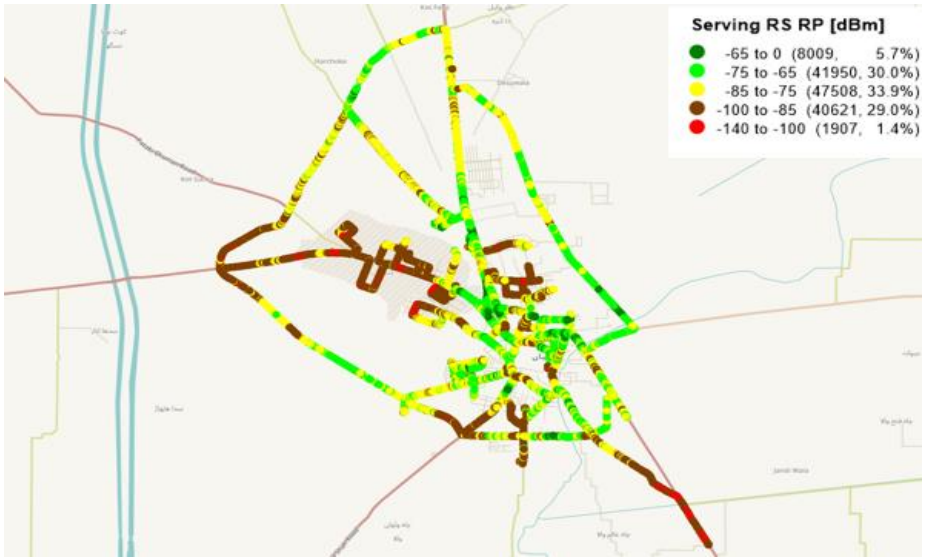
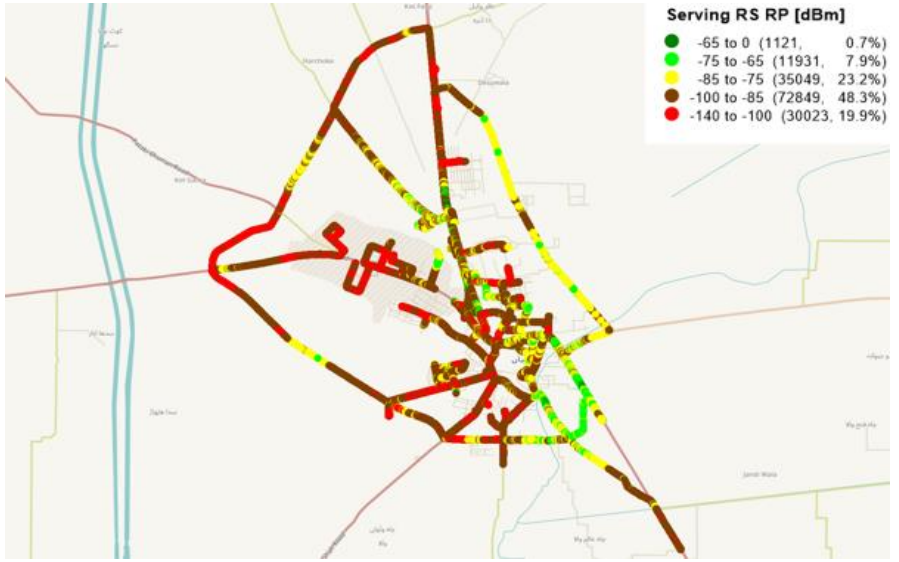


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

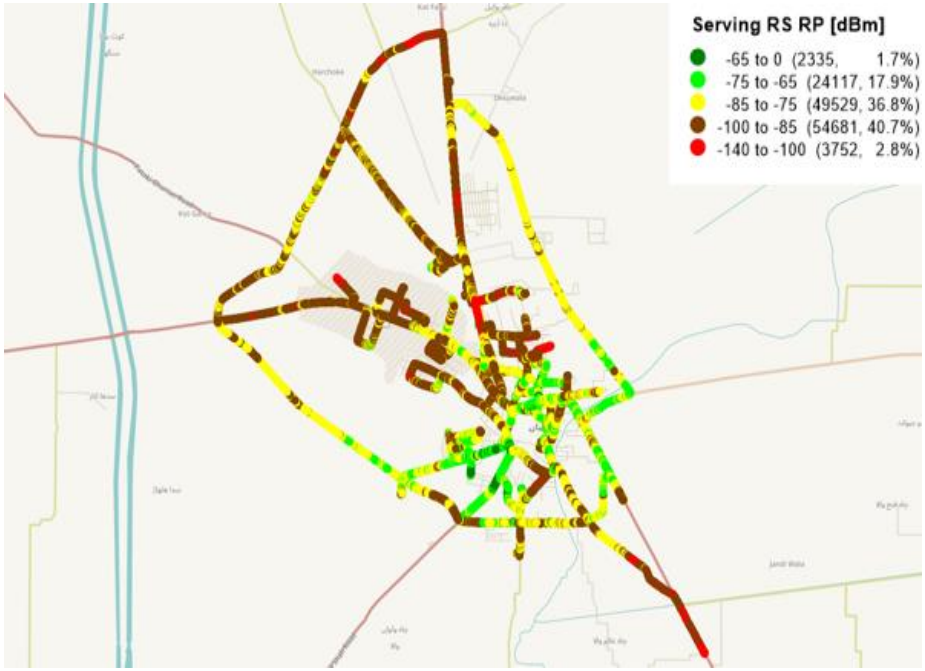
JAZZ NETWORK COVERAGE –CHUNIAN



TELENOR NETWORK COVERAGE –CHUNIAN



UFONE NETWORK COVERAGE –CHUNIAN



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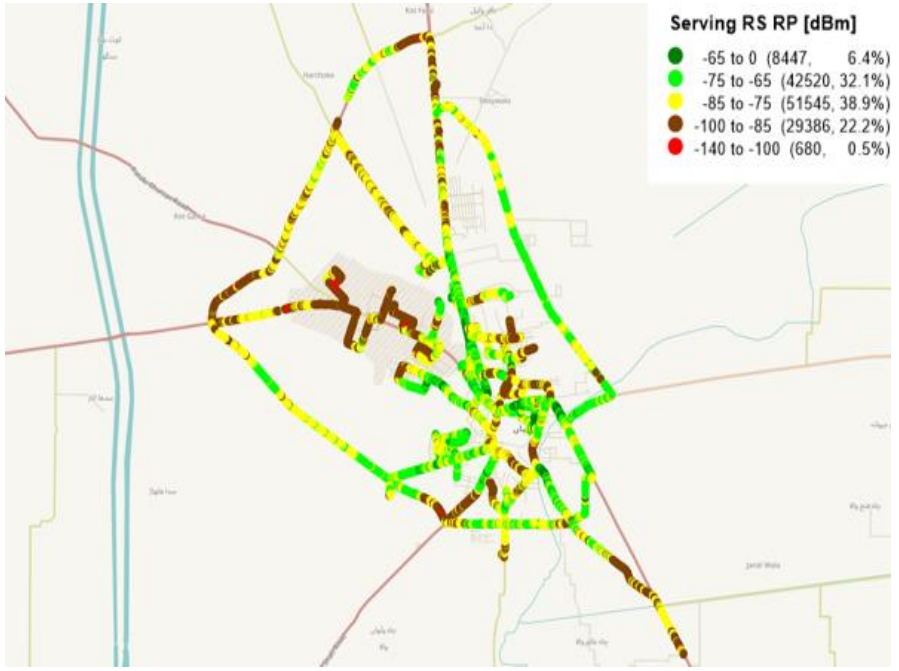
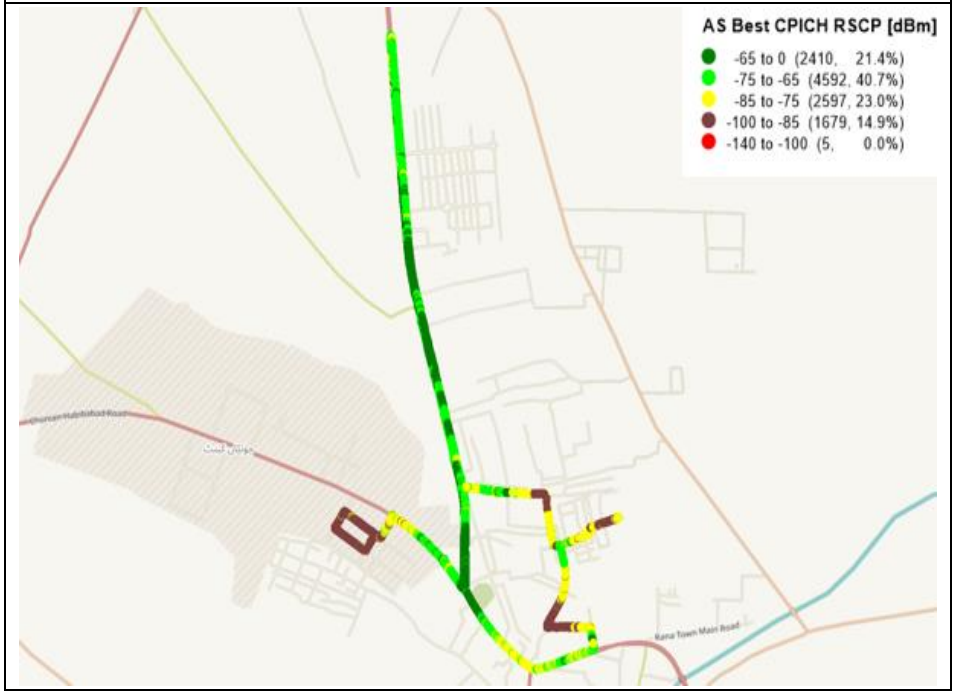


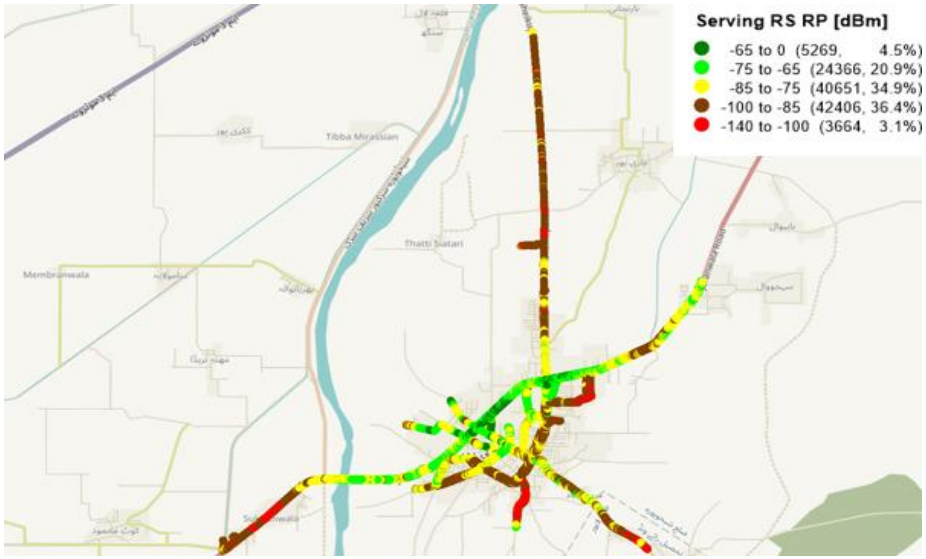
AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

UFONE 3G NETWORK COVERAGE – LAHORE CHUNIAN



AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE –SHARAQPUR



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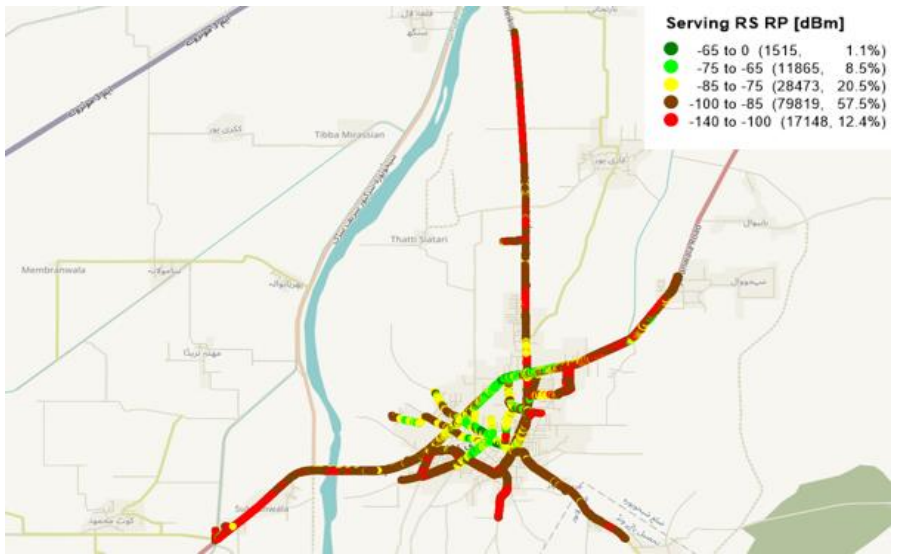

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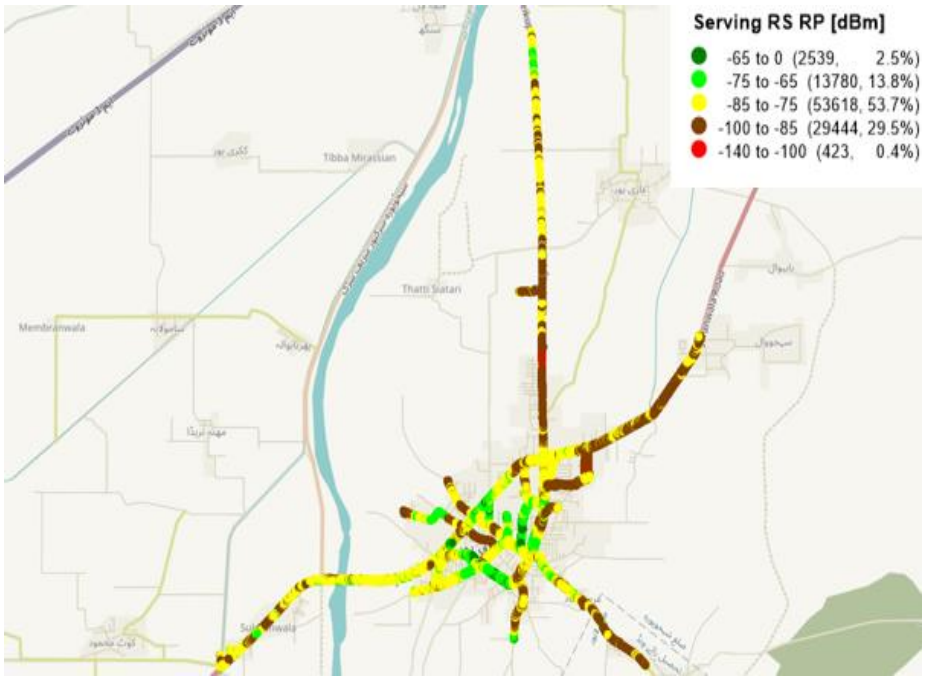

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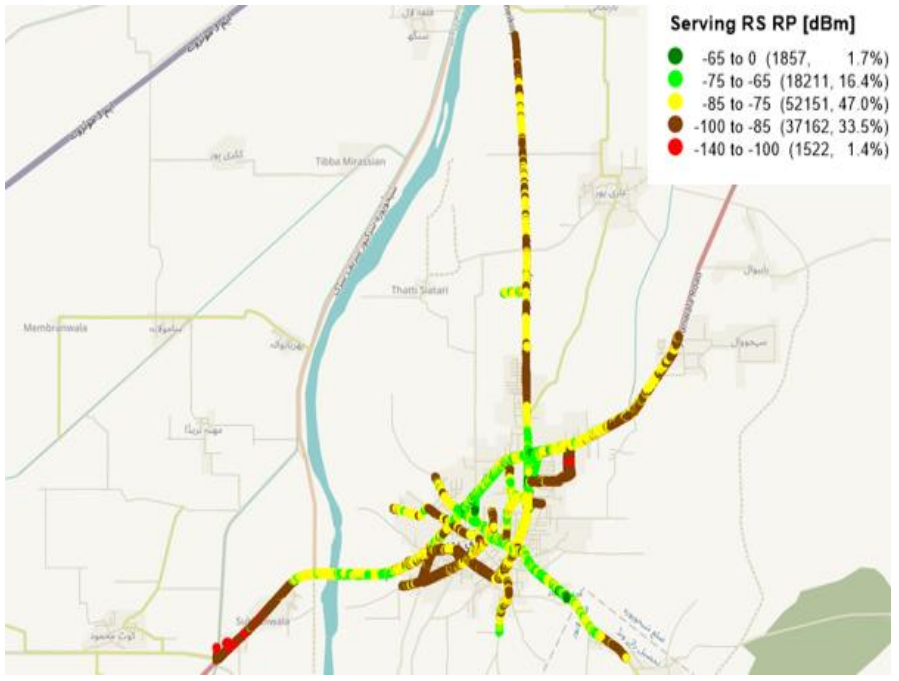
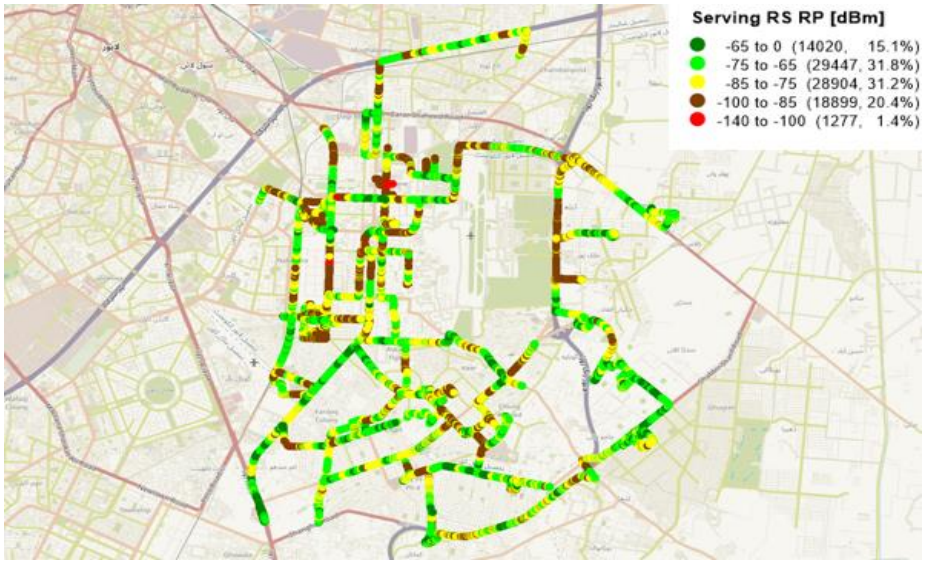
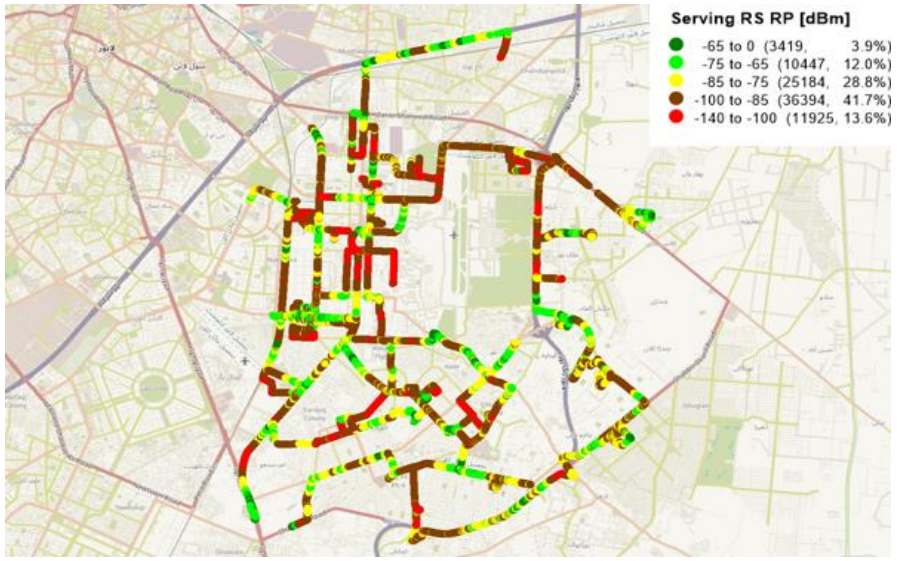


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – LAHORE



TELENOR NETWORK COVERAGE – LAHORE



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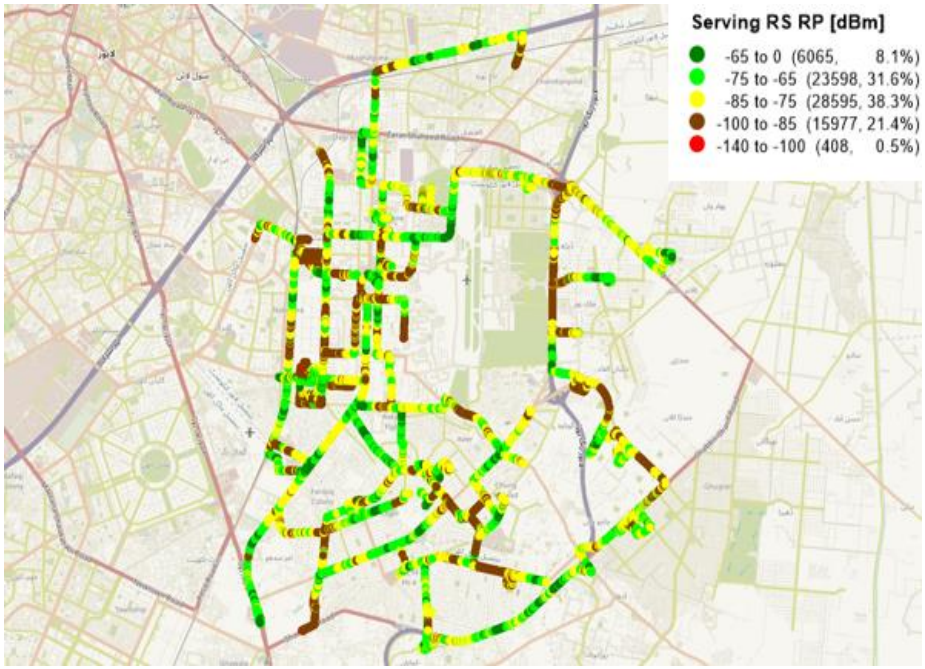

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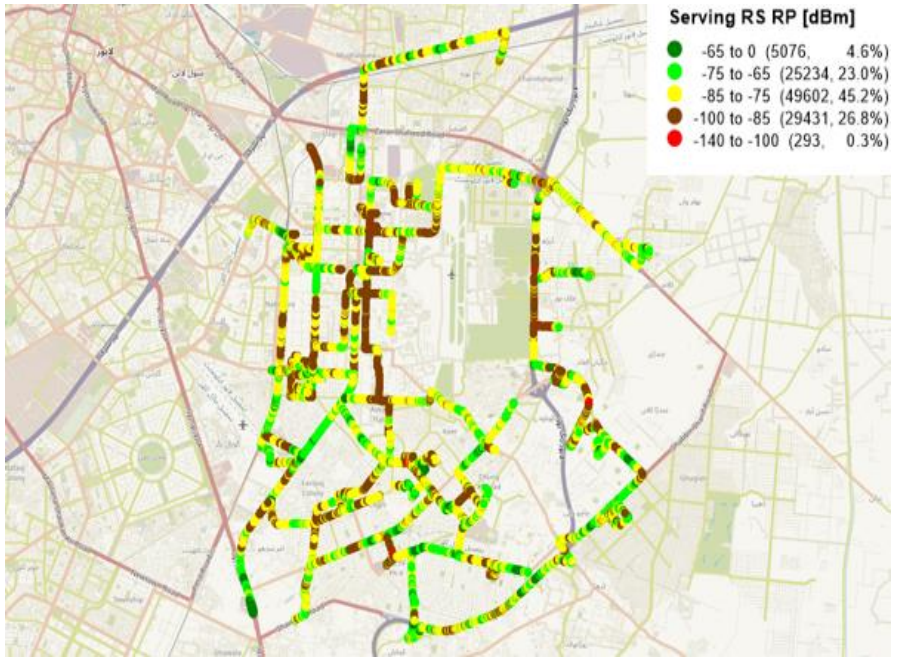
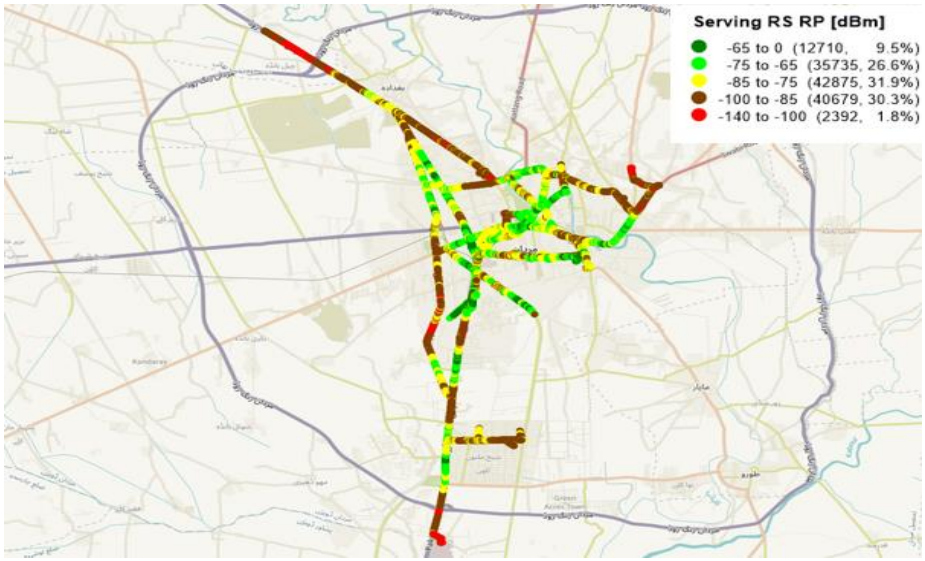
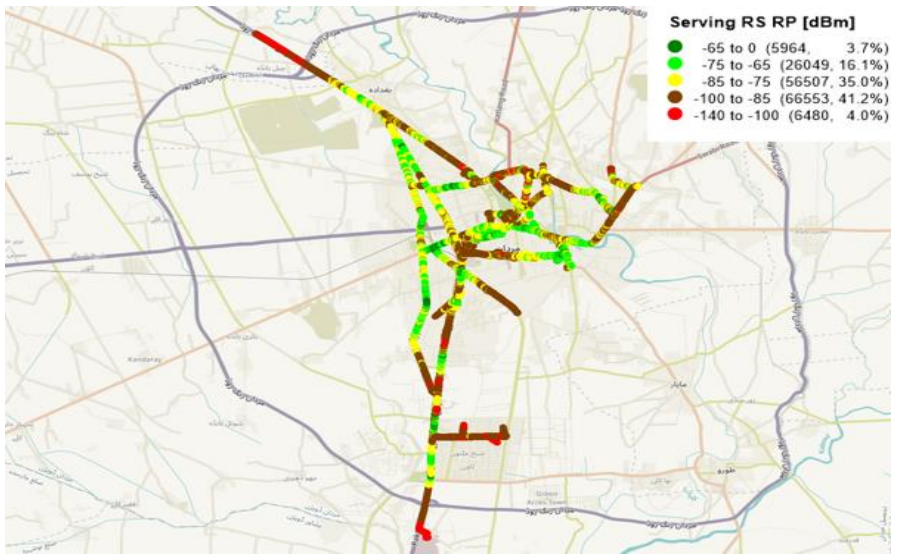


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – MARDAN



TELENOR NETWORK COVERAGE – MARDAN



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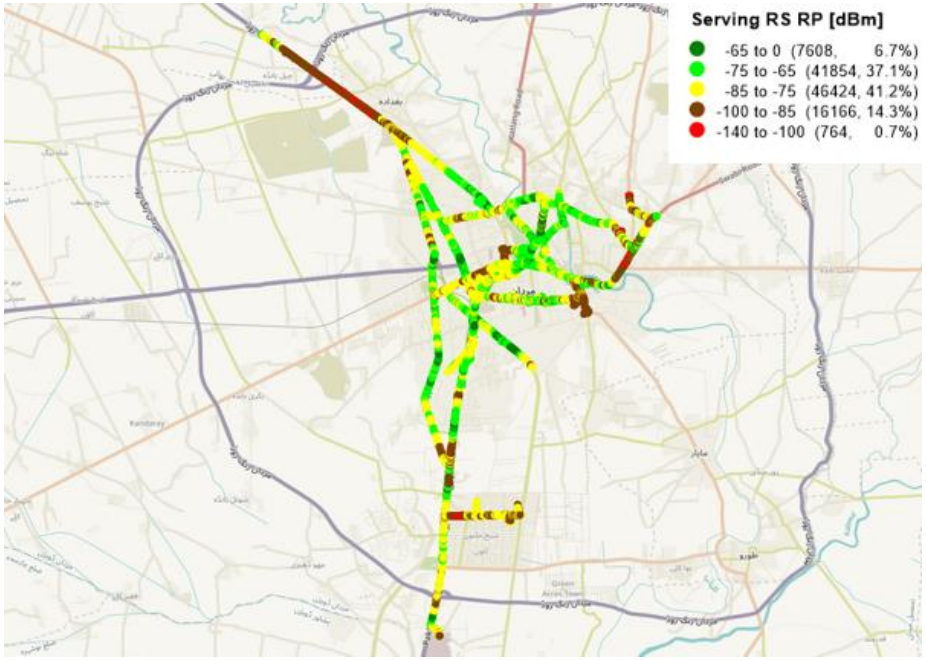
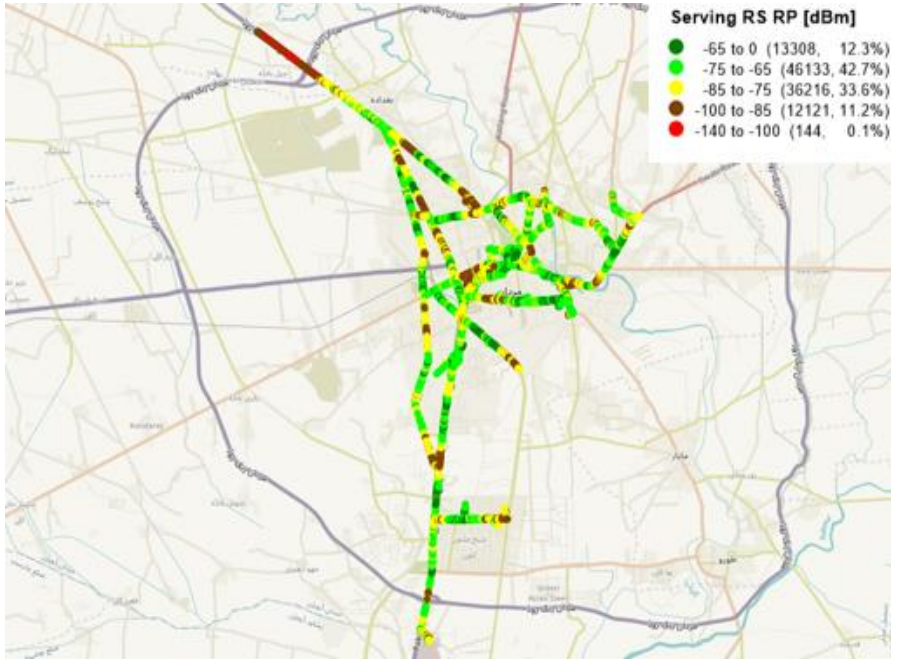
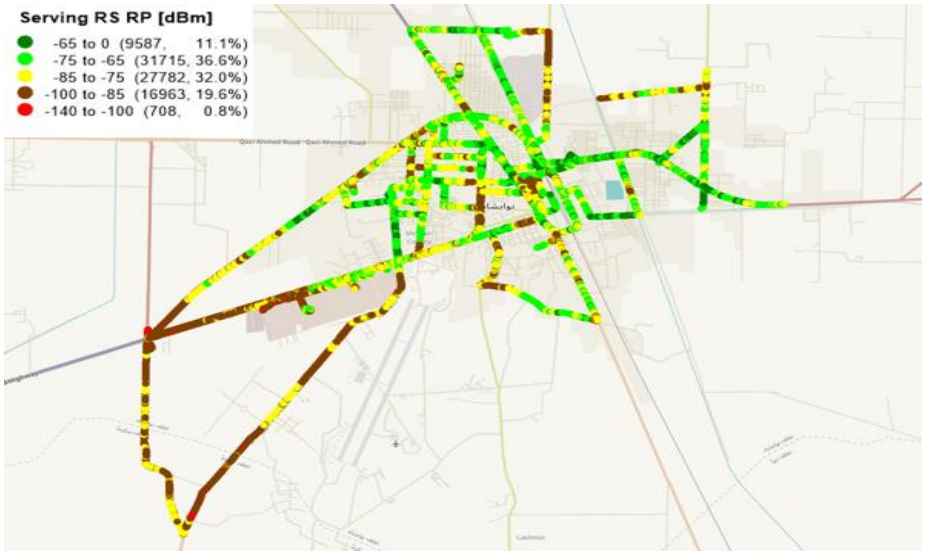


ZONG NETWORK COVERAGE – MARDAN

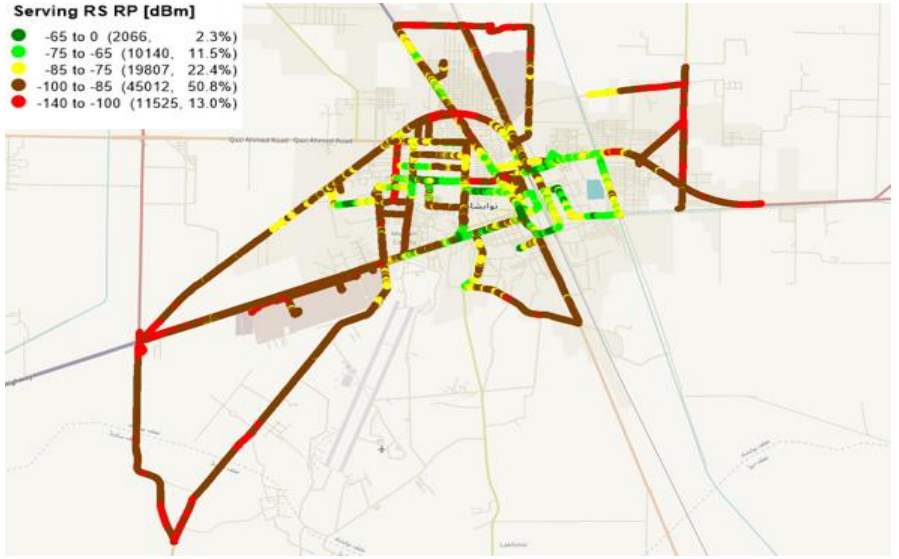


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – NAWABSHAH



TELENOR NETWORK COVERAGE – NAWABSHAH



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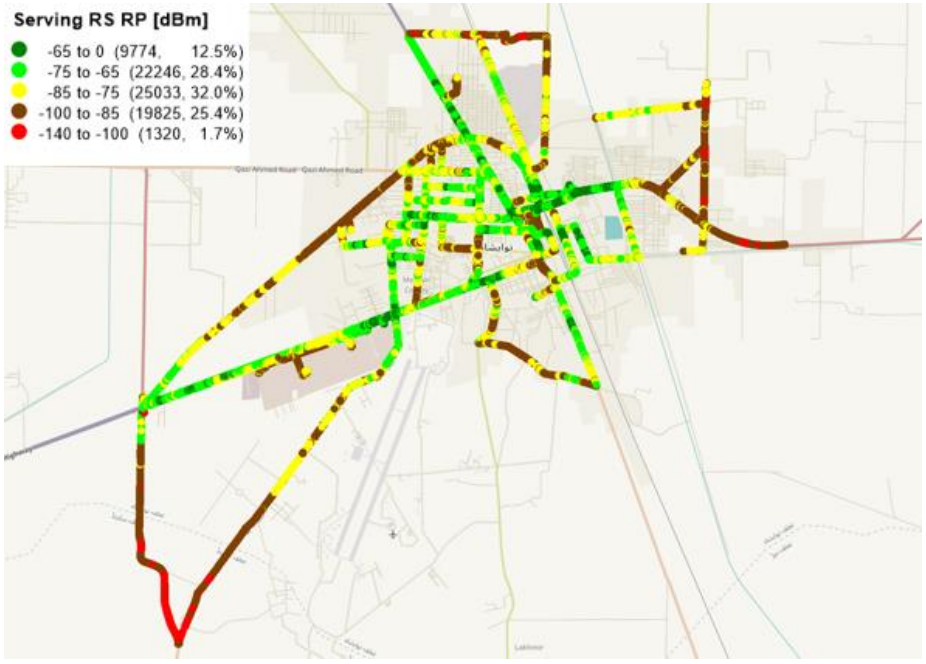

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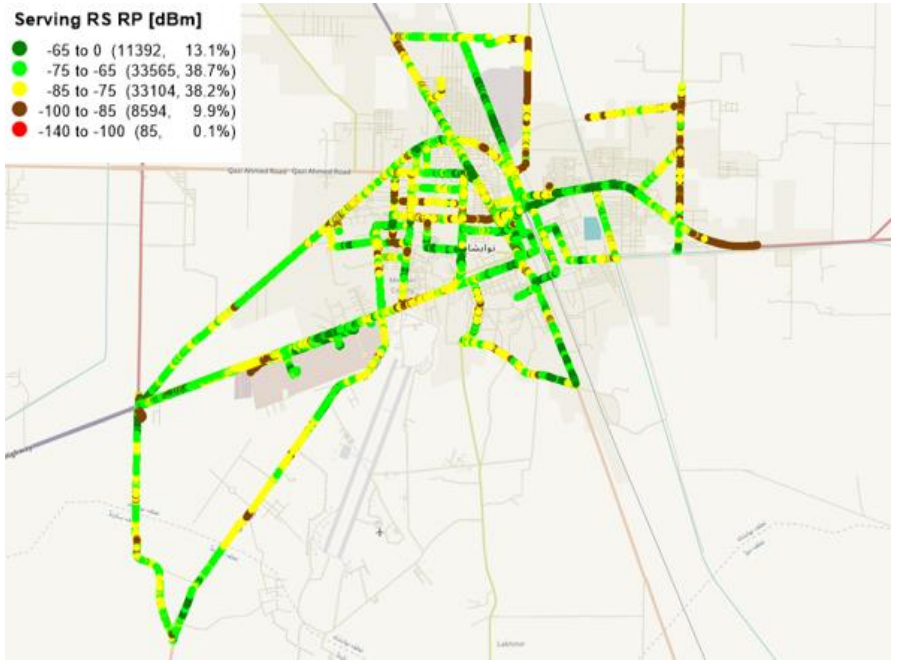
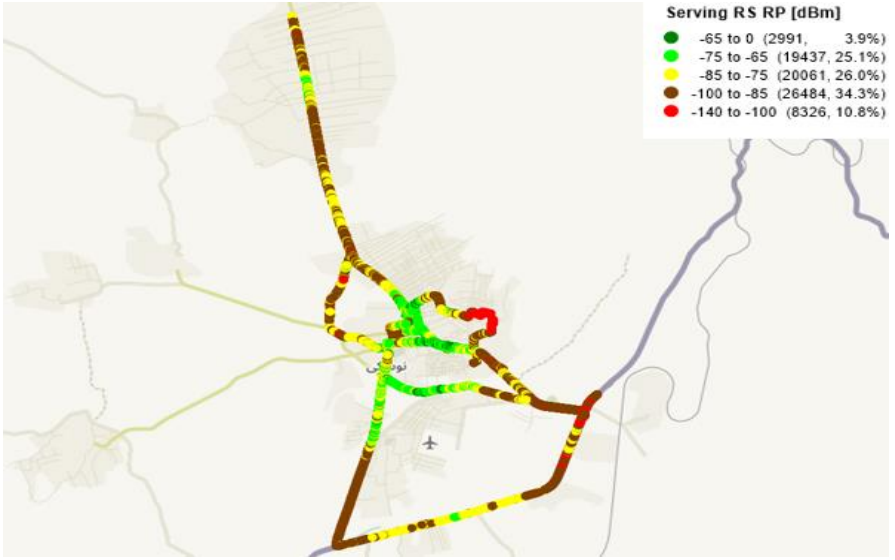


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

JAZZ NETWORK COVERAGE – NUSHKI	TELENOR NETWORK COVERAGE – NUSHKI
N/A	
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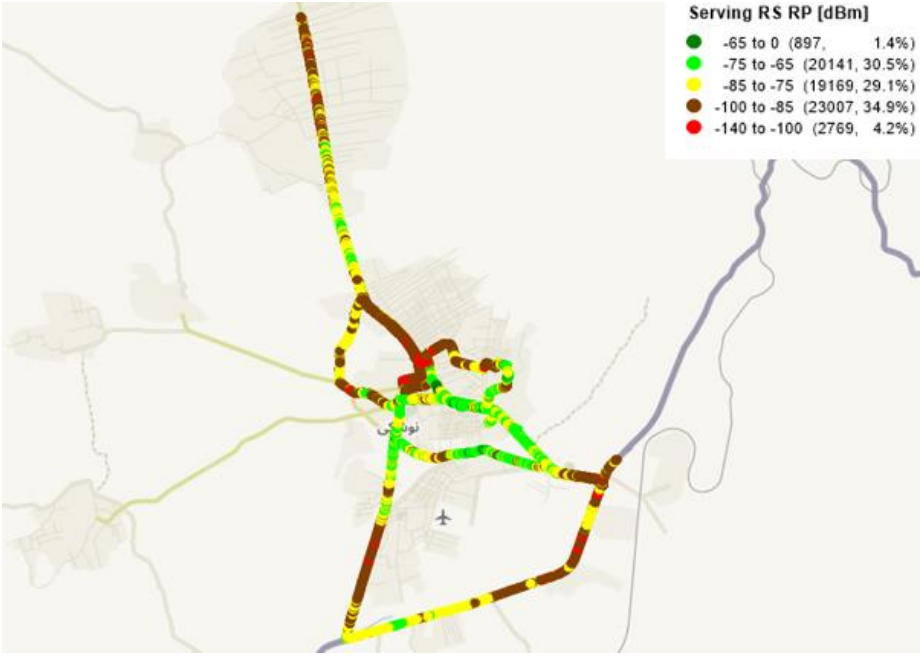
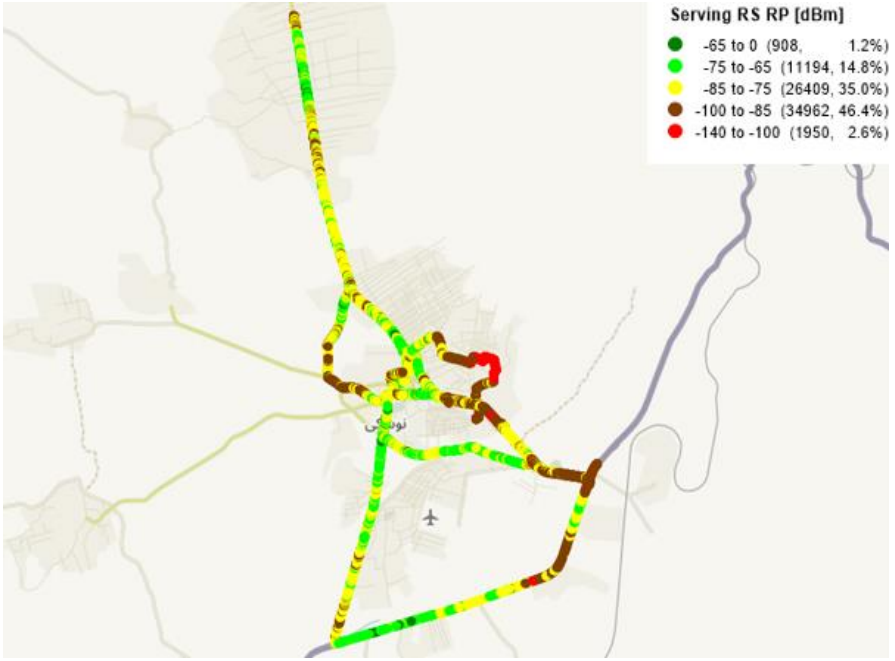
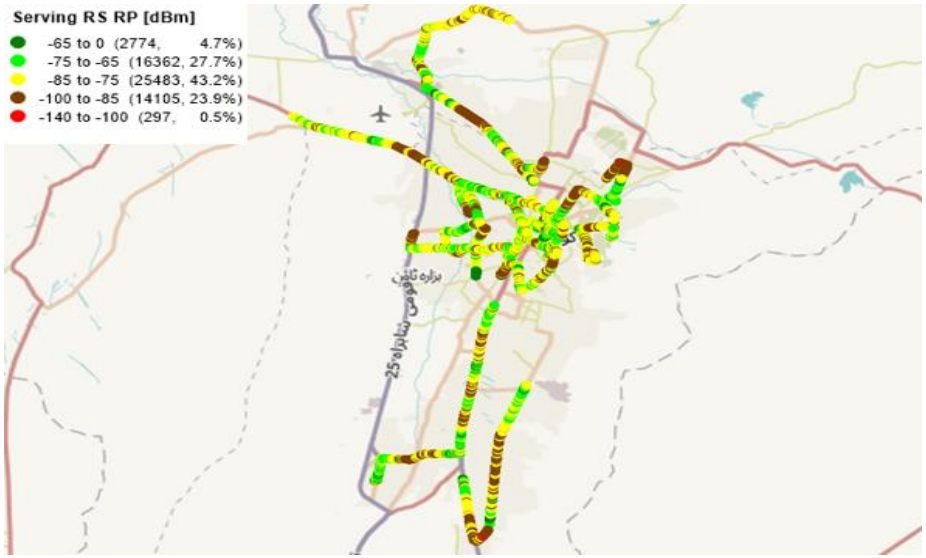
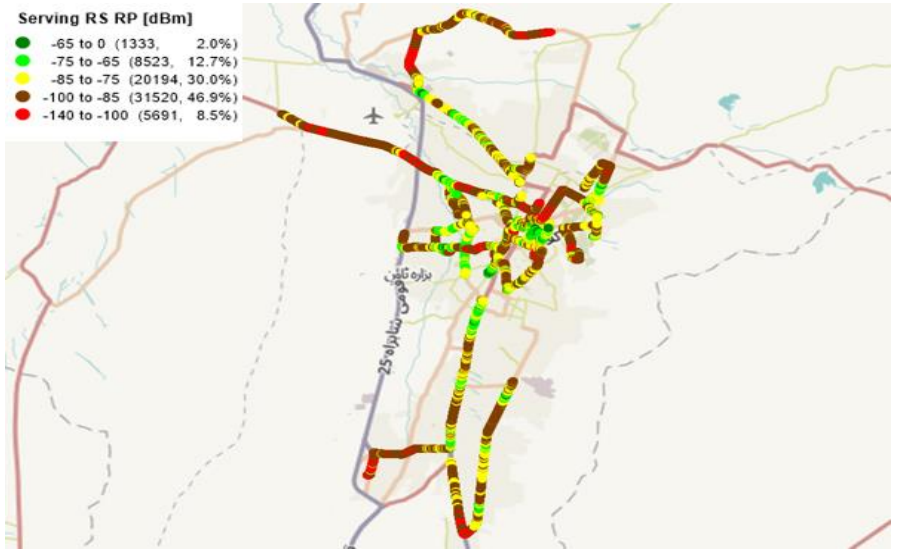
	

AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

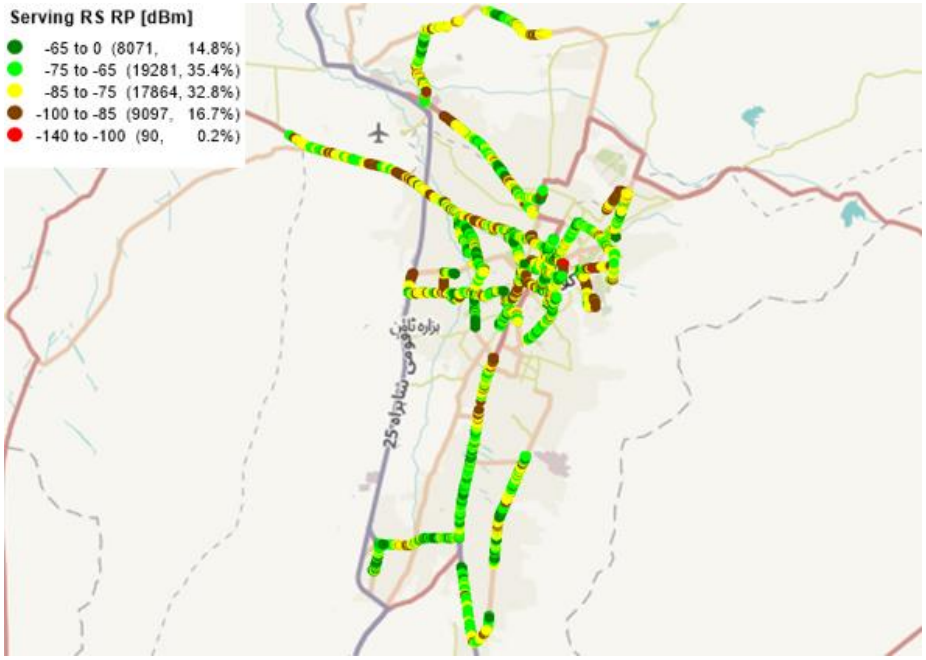
JAZZ NETWORK COVERAGE – QUETTA



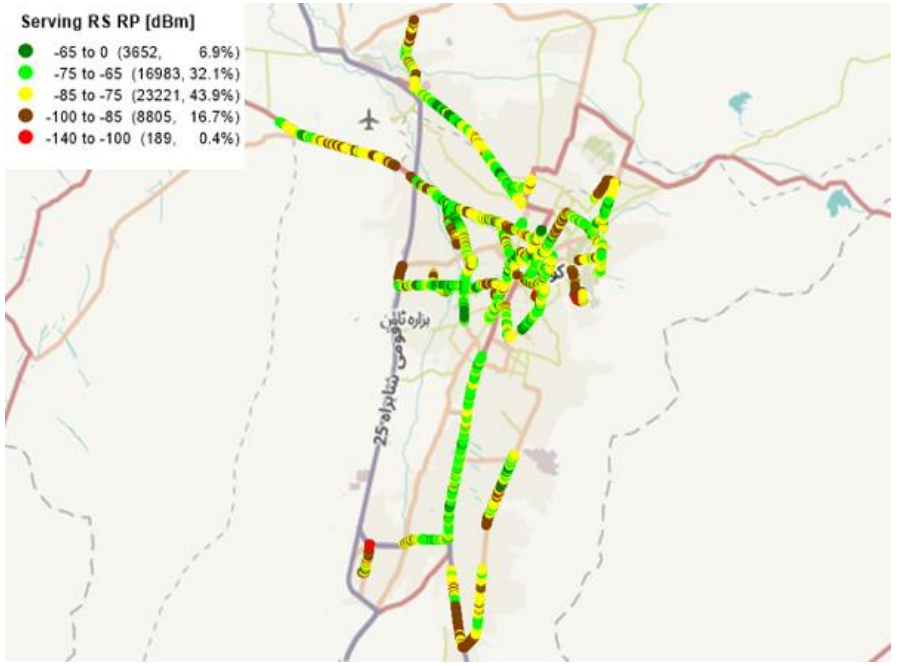
TELENOR NETWORK COVERAGE – QUETTA



UFONE NETWORK COVERAGE – QUETTA

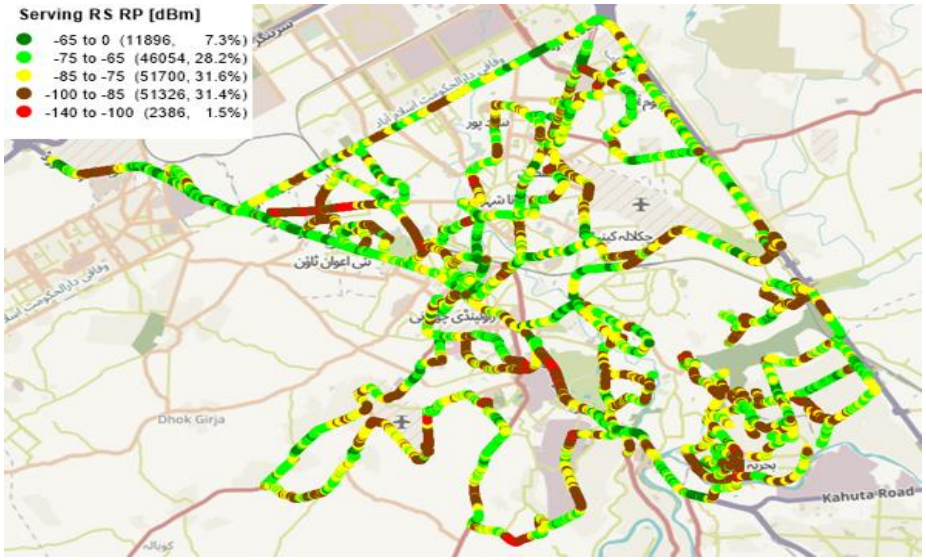


ZONG NETWORK COVERAGE – QUETTA

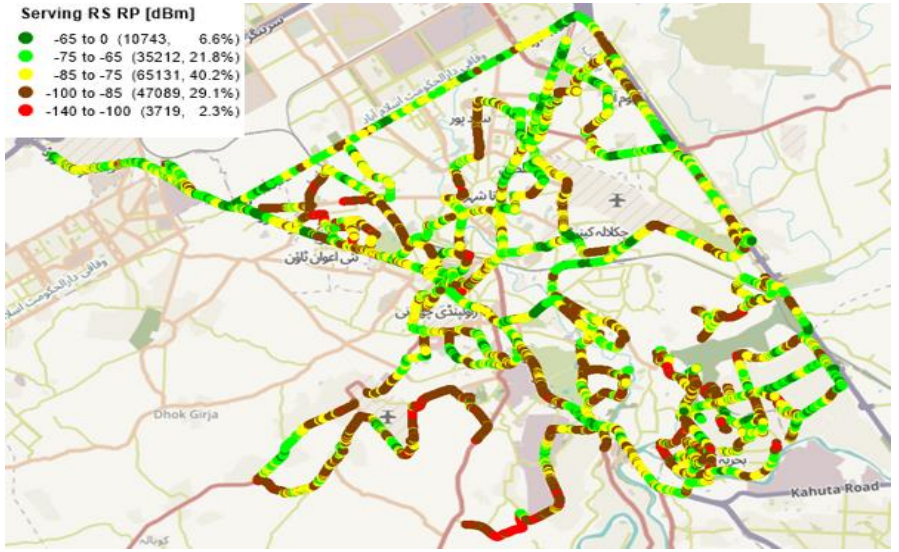


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

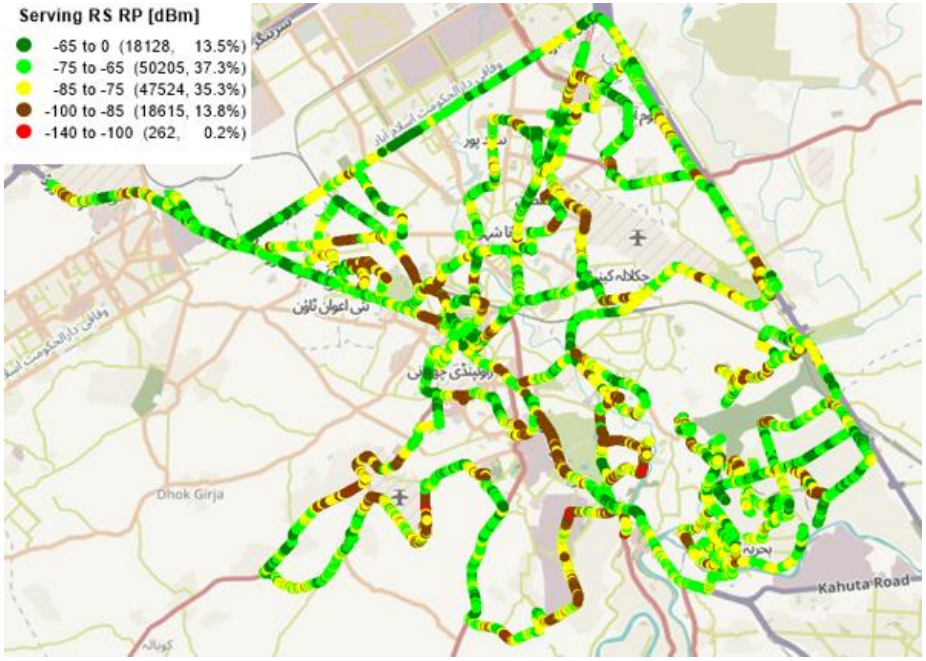
JAZZ NETWORK COVERAGE – RAWALPINDI



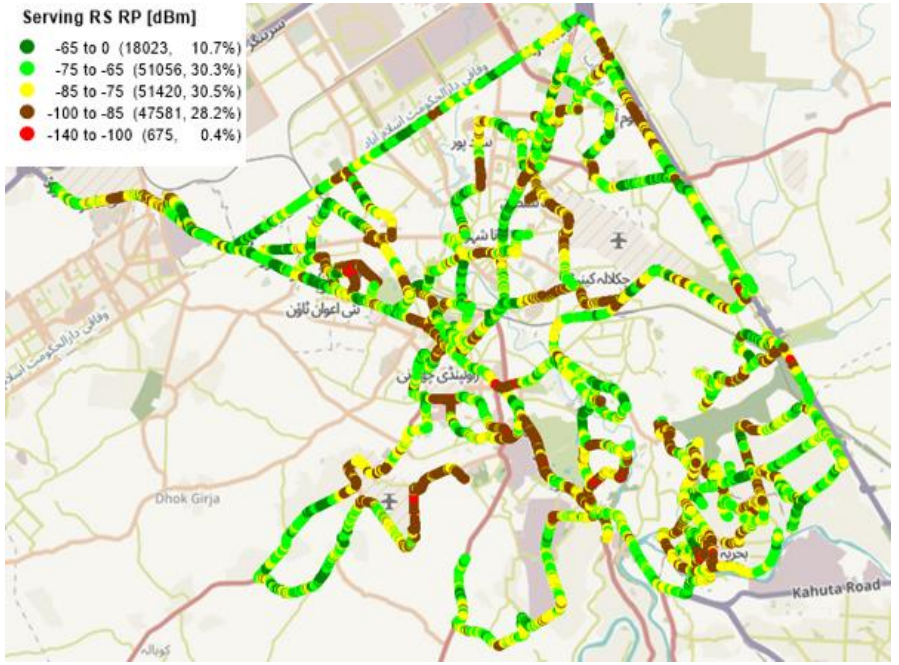
TELENOR NETWORK COVERAGE – RAWALPINDI



UFONE NETWORK COVERAGE – RAWALPINDI

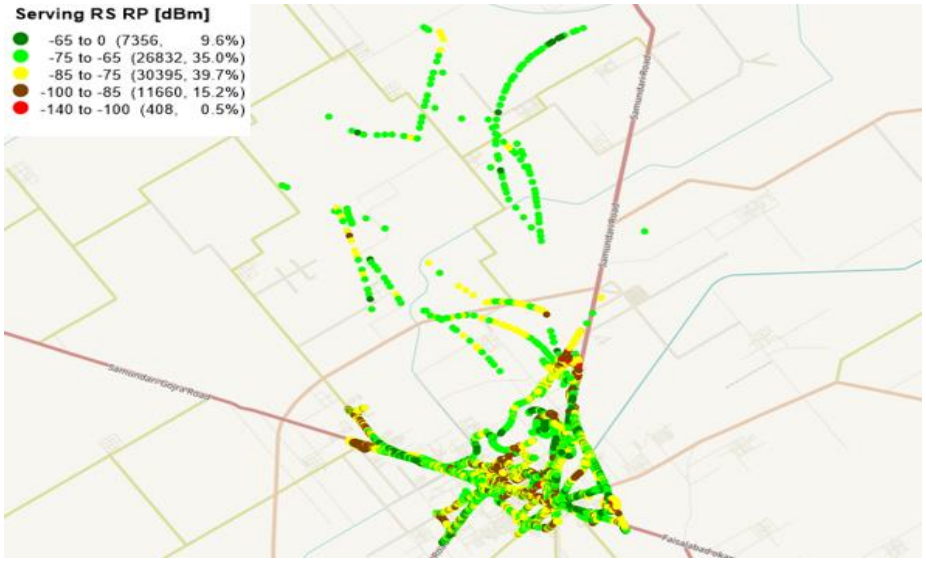


ZONG NETWORK COVERAGE – RAWALPINDI

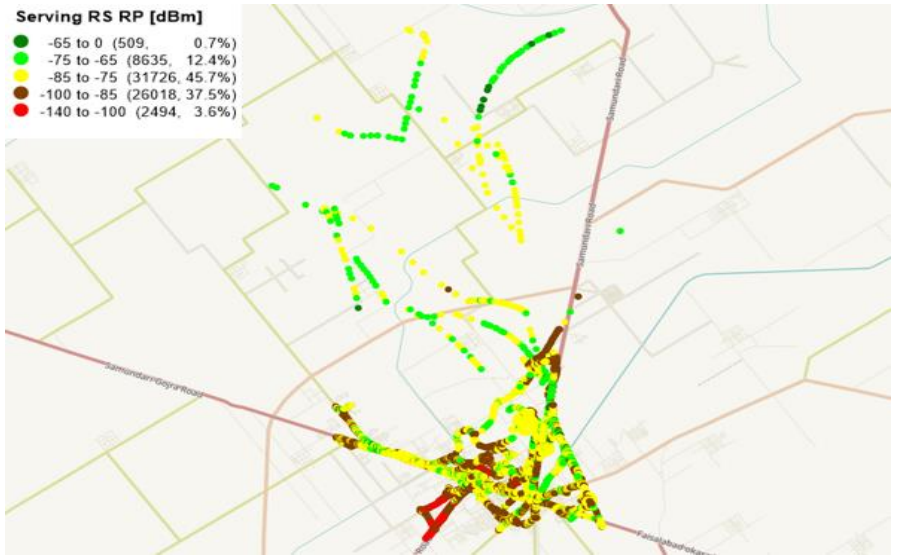


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

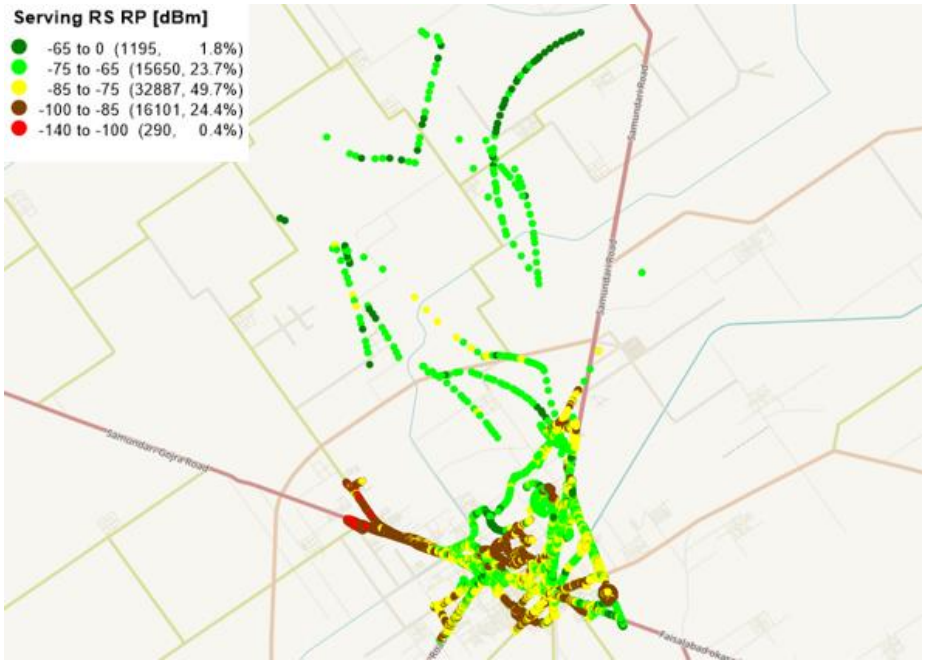
JAZZ NETWORK COVERAGE – SAMUNDARI



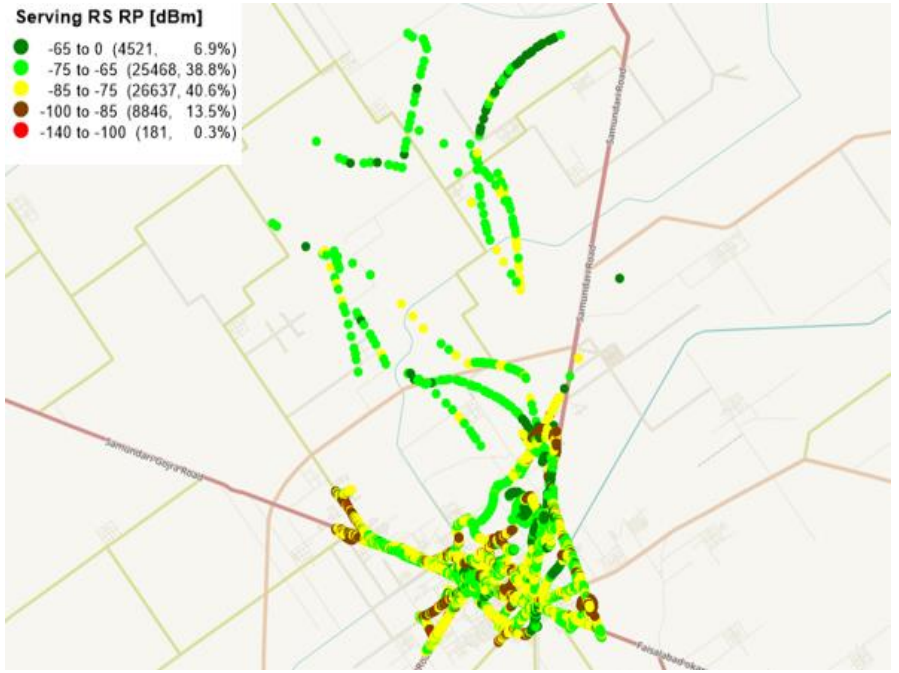
TELENOR NETWORK COVERAGE – SAMUNDARI



UFONE NETWORK COVERAGE – SAMUNDARI

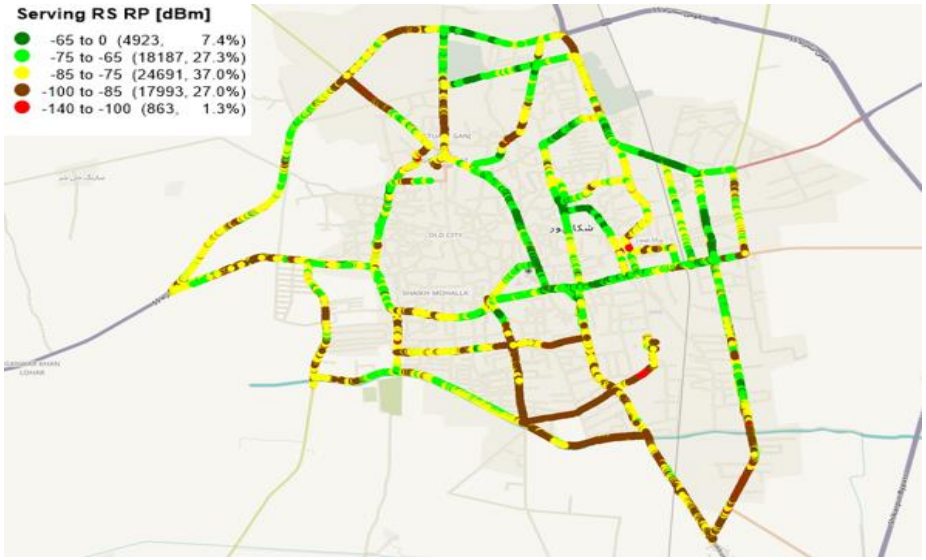


ZONG NETWORK COVERAGE – SAMUNDARI

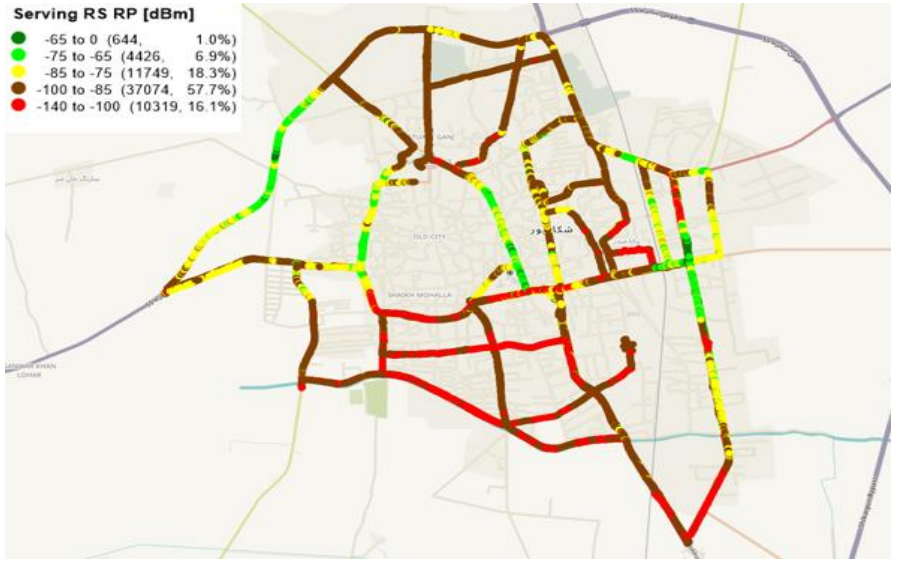


AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSRP)

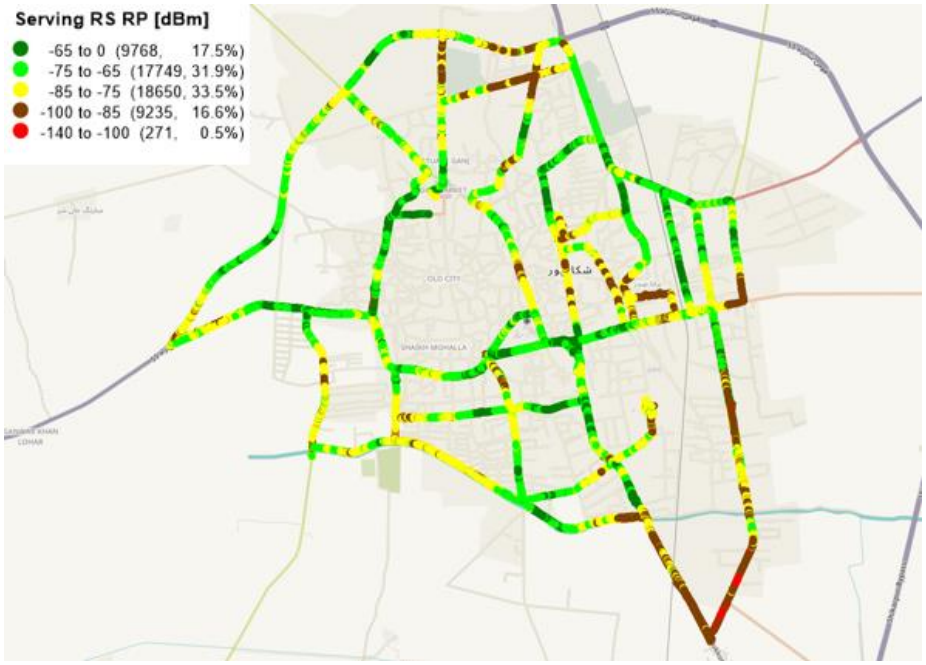
JAZZ NETWORK COVERAGE – SHIKARPUR



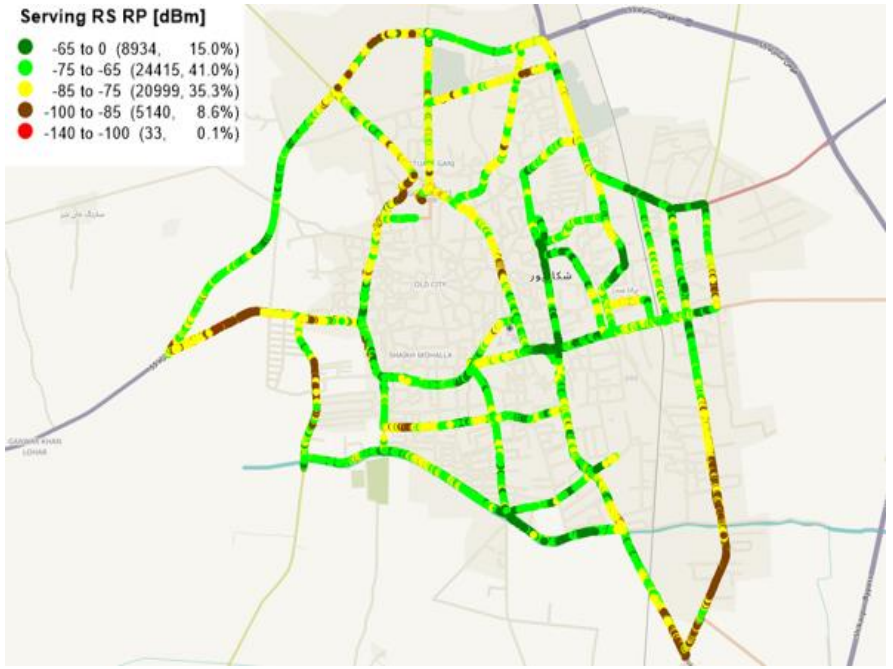
TELENOR NETWORK COVERAGE – SHIKARPUR



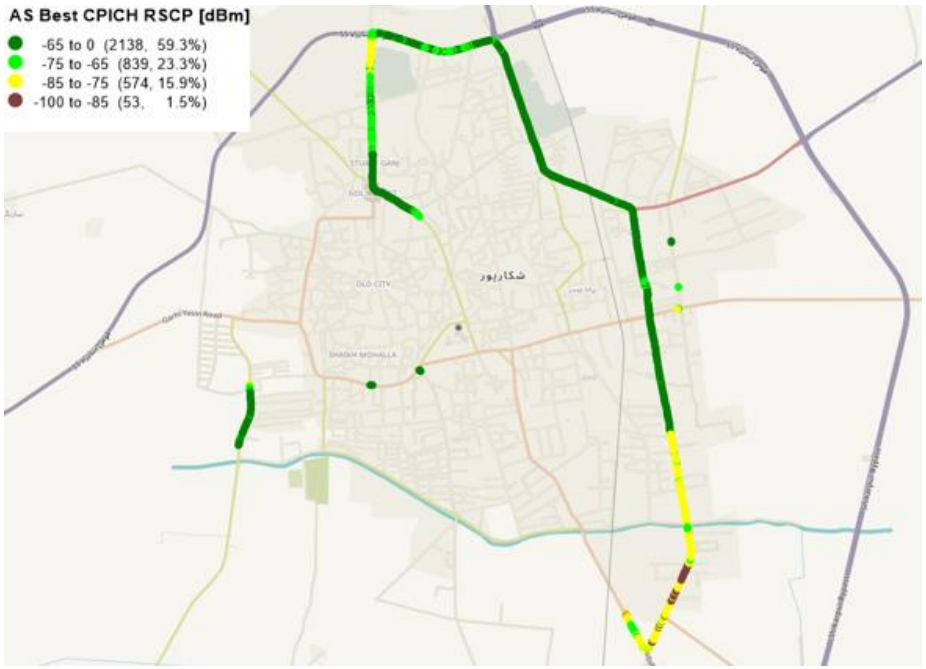
UFONE NETWORK COVERAGE – SHIKARPUR



ZONG NETWORK COVERAGE – SHIKARPUR



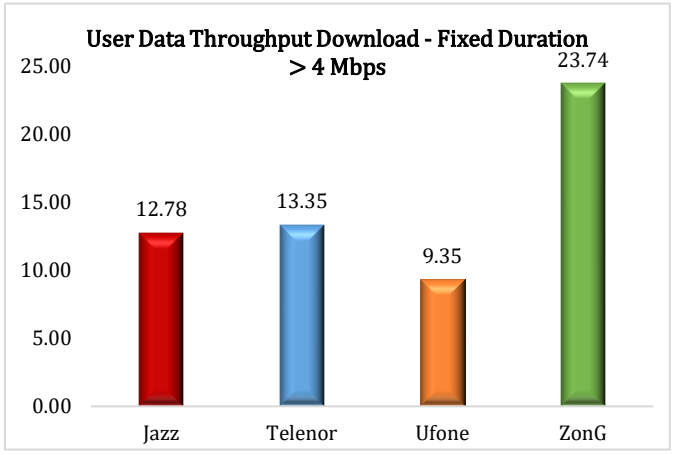
AUTOMODE MOBILE COVERAGE – SIGNAL STRENGTH (RSCP)

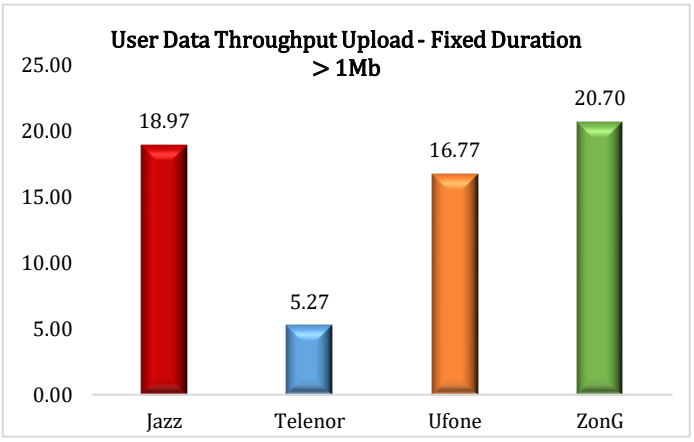
UFONE 3G NETWORK COVERAGE – SHIKARPUR	ZONG 3G NETWORK COVERAGE – SHIKARPUR
	

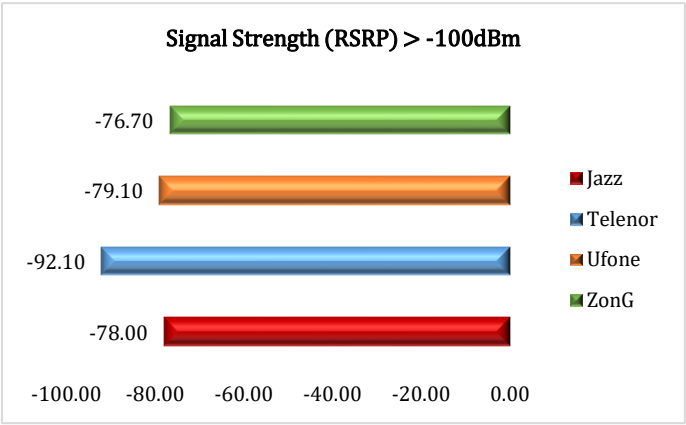
Annex -A1(Data QoS Results)

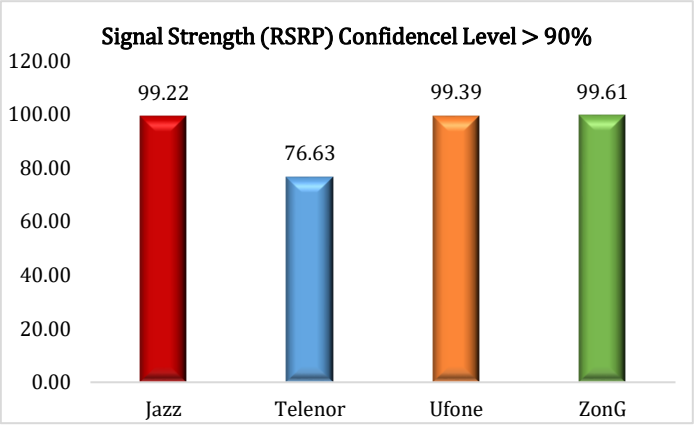
AUTOMODE

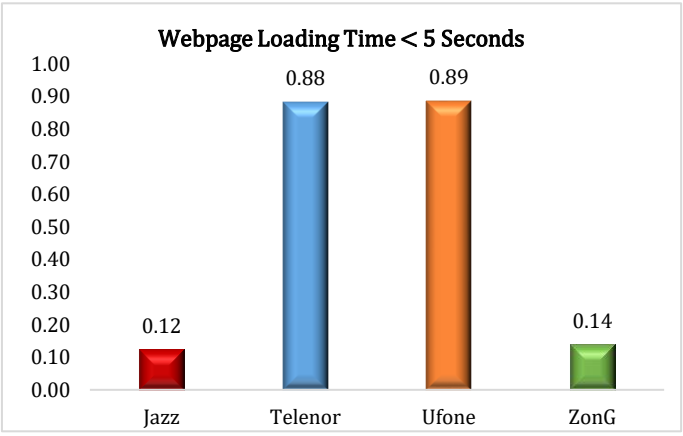
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – BAHAWALNAGAR











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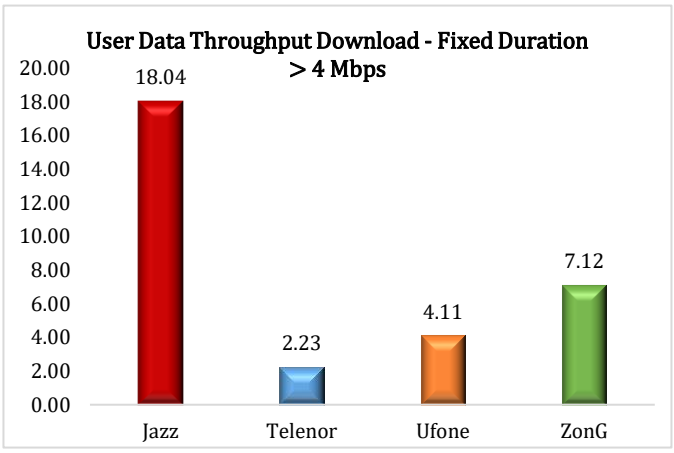
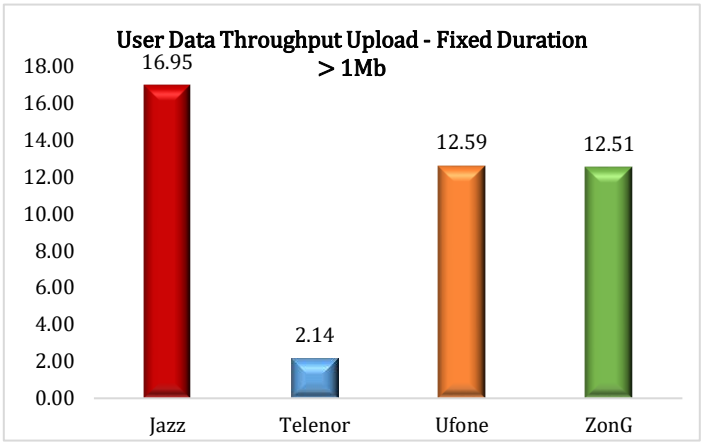
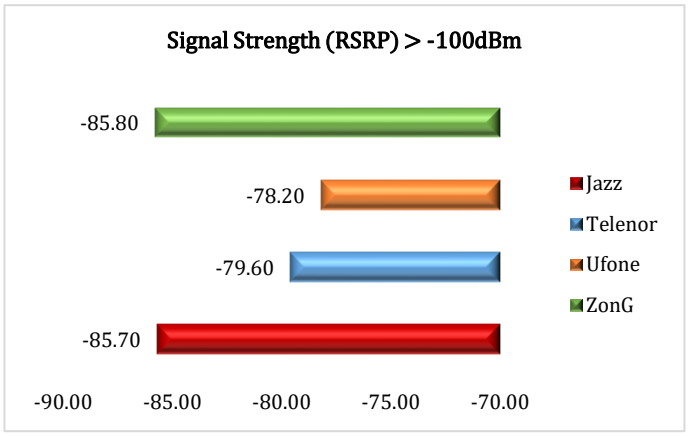
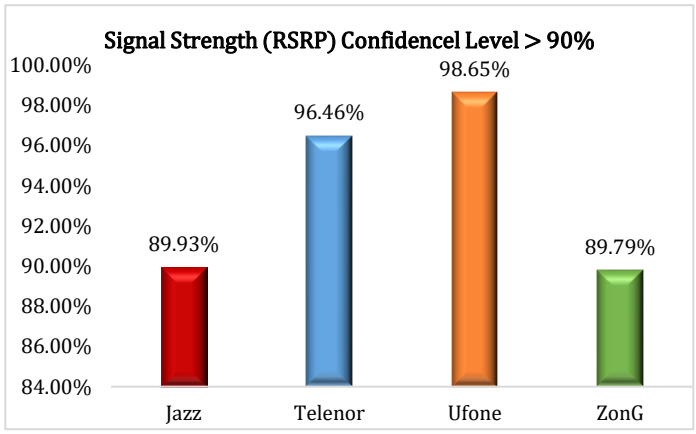
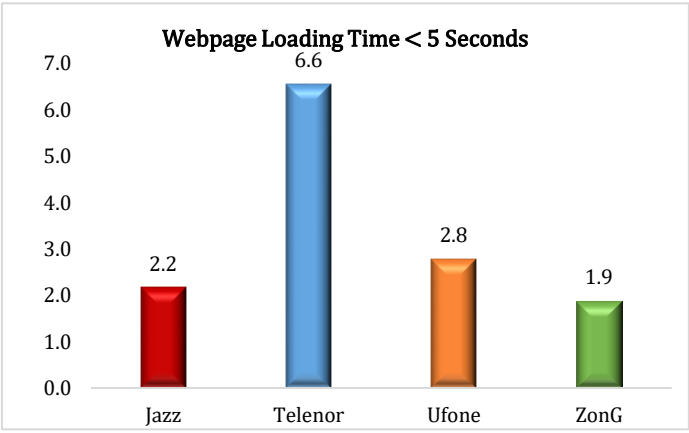
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – D.I KHAN











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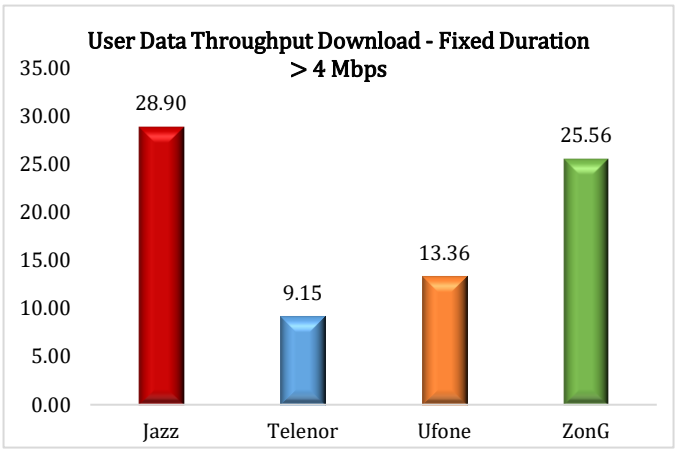
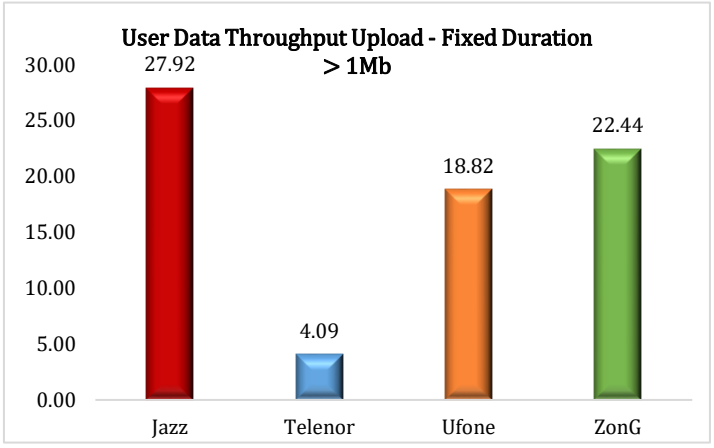
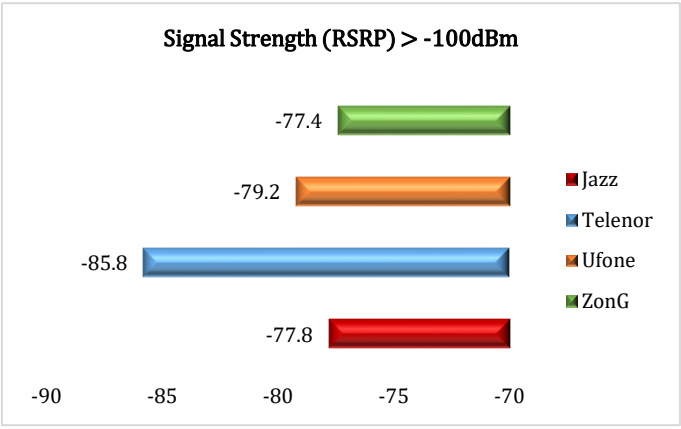
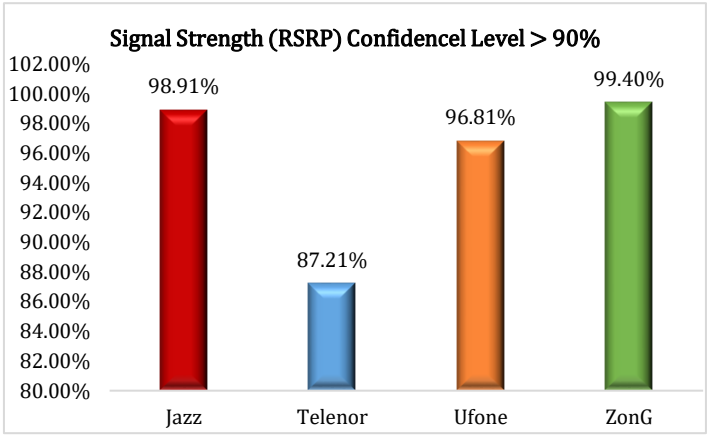
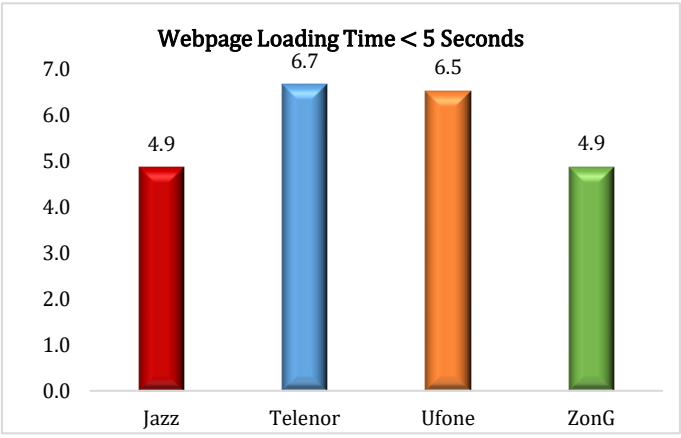
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – HYDERABAD











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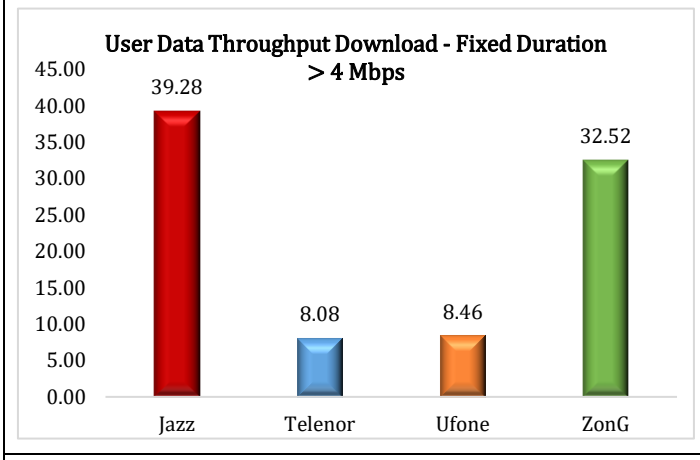
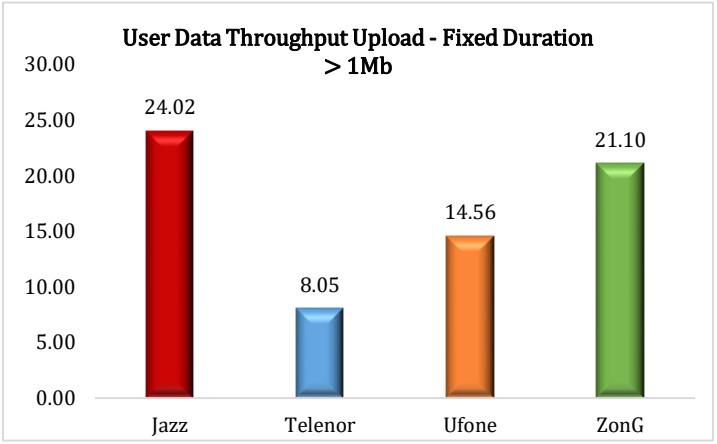
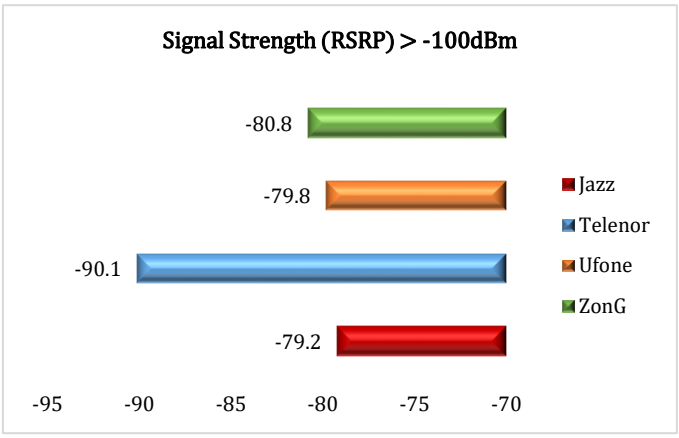
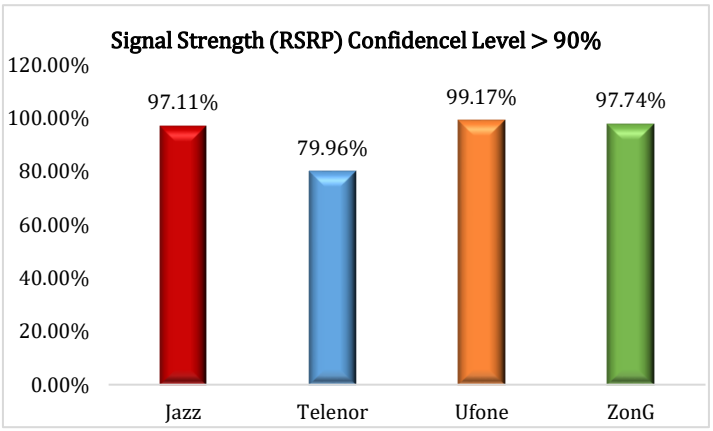
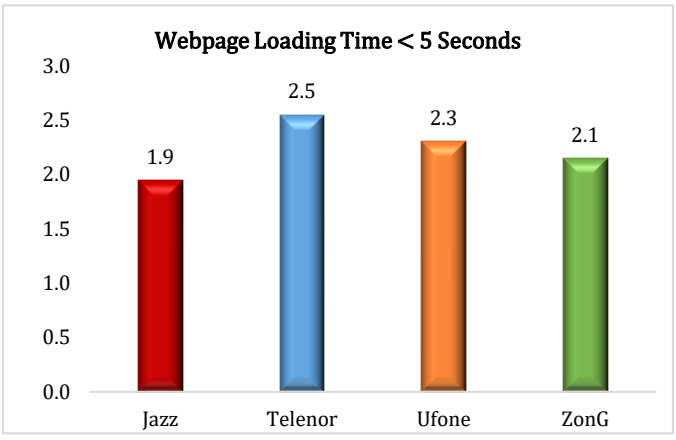
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – JHELUM











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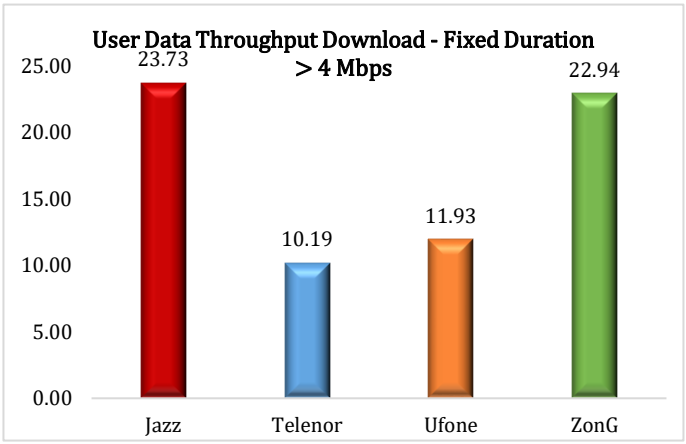
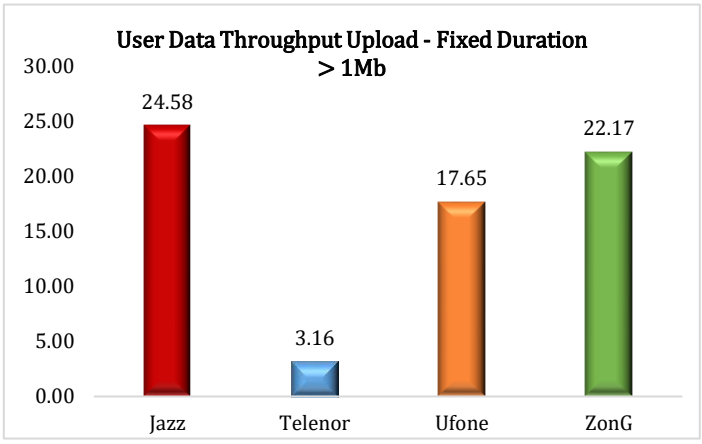
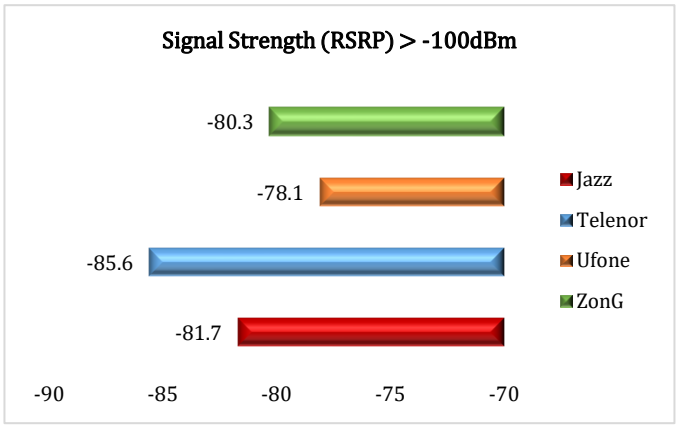
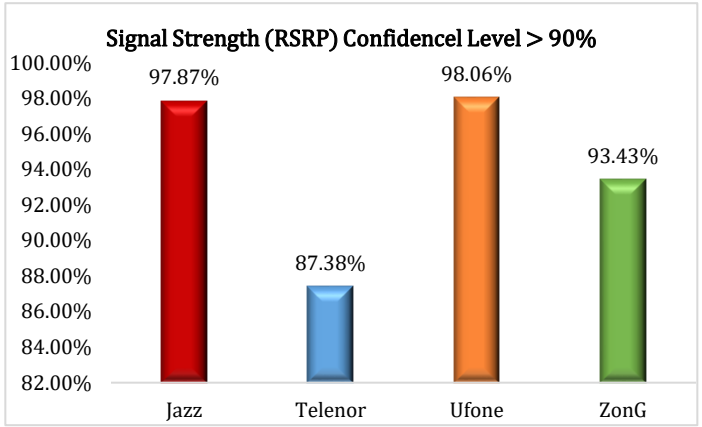
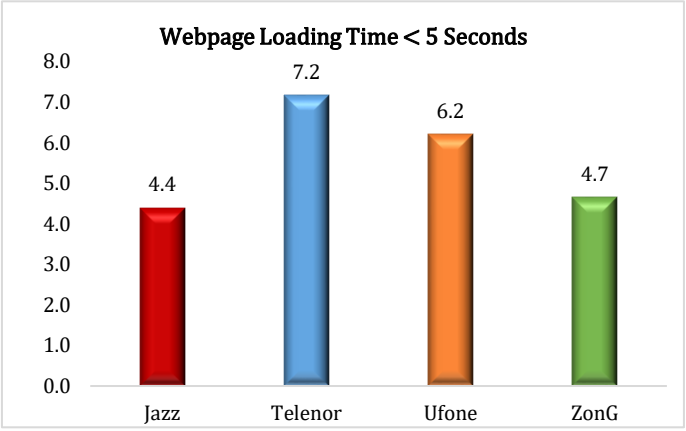
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KARACHI MALIR











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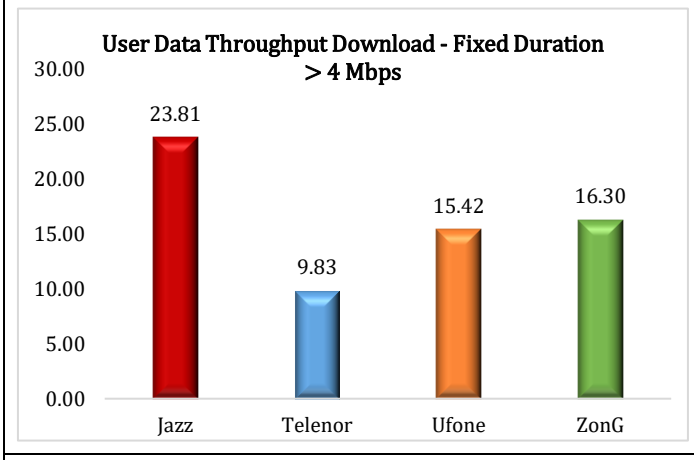
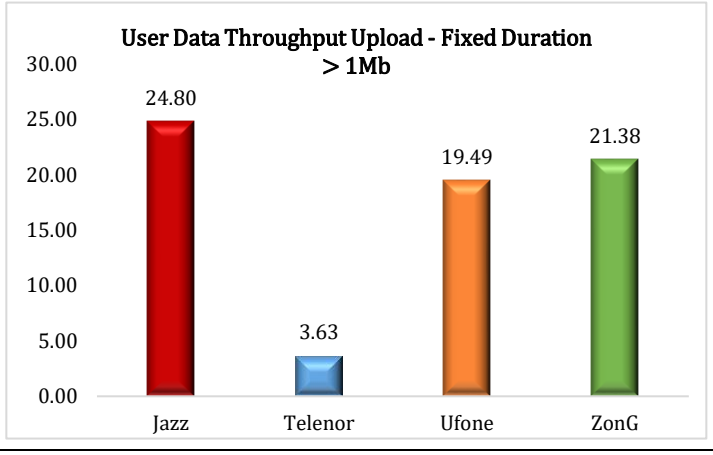
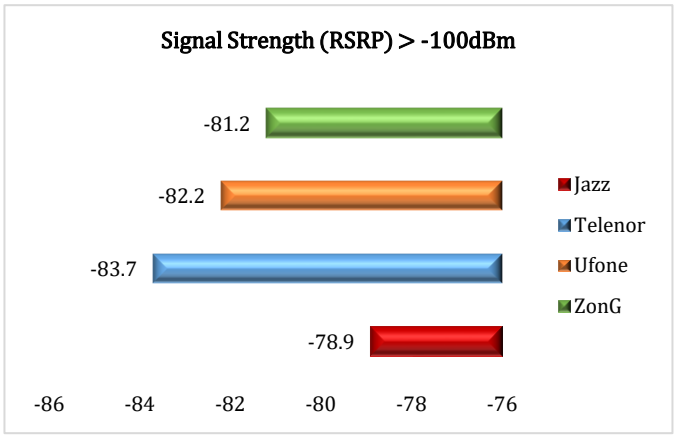
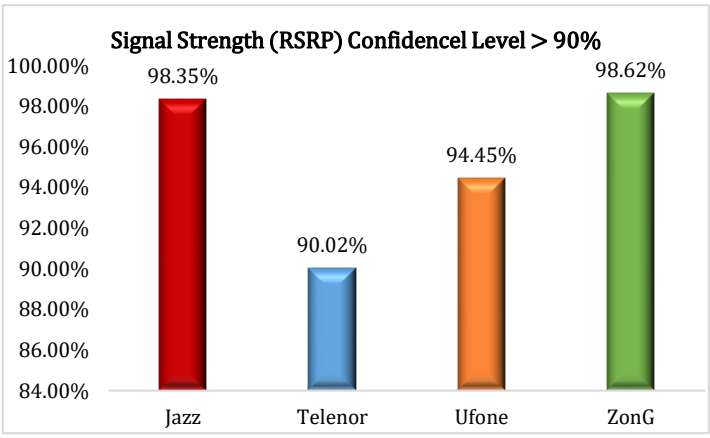
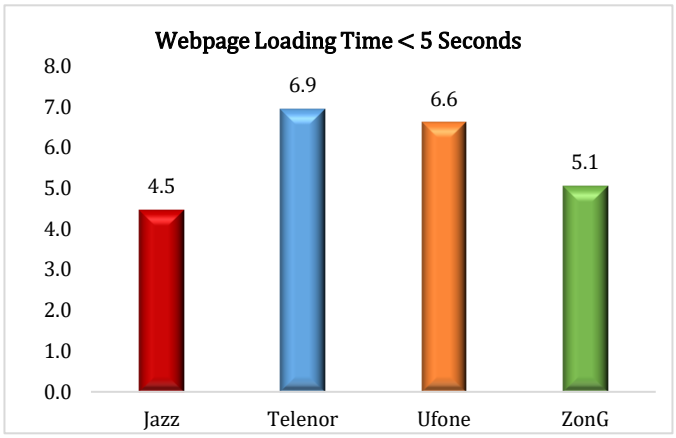
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – KOTRI











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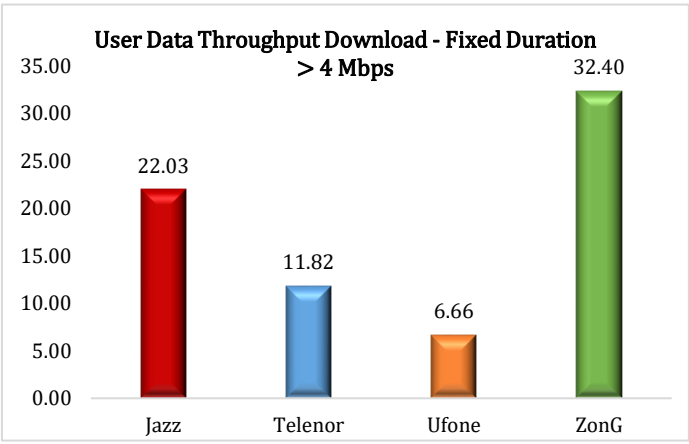
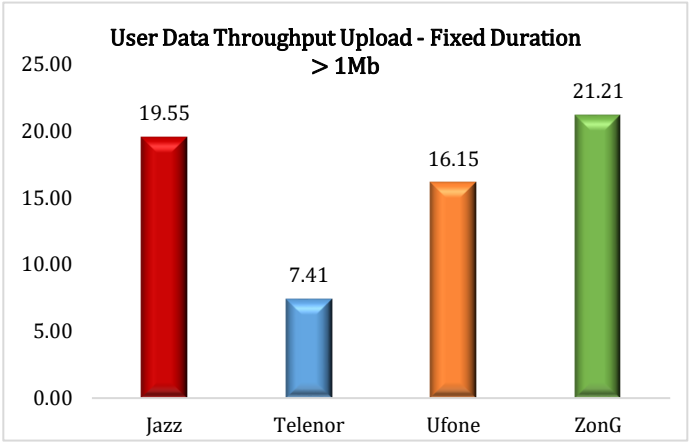
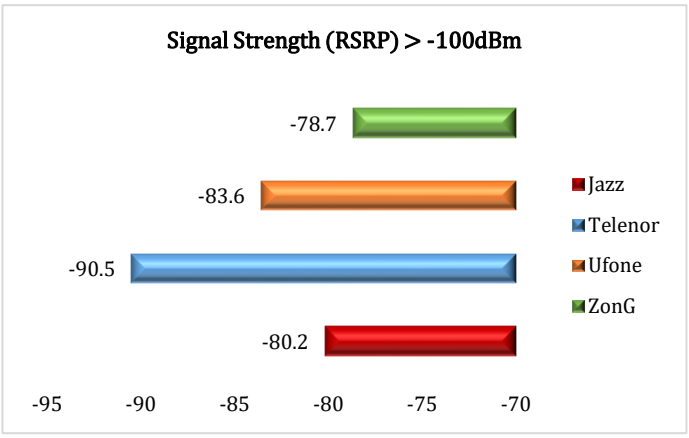
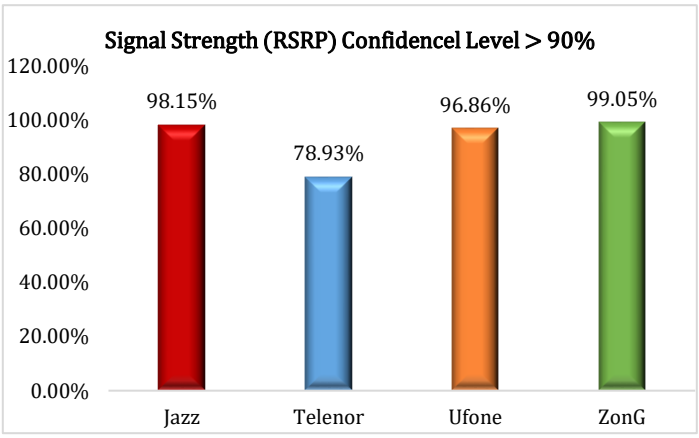
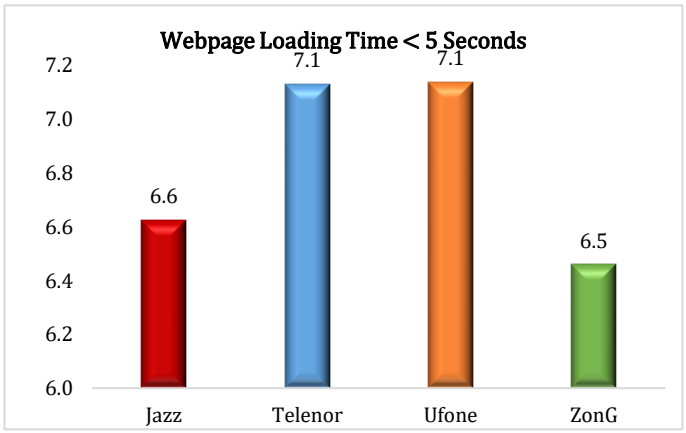
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) –CHUNIAN











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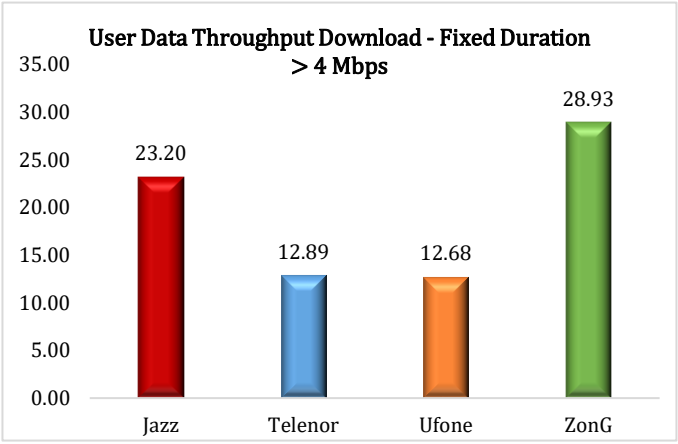
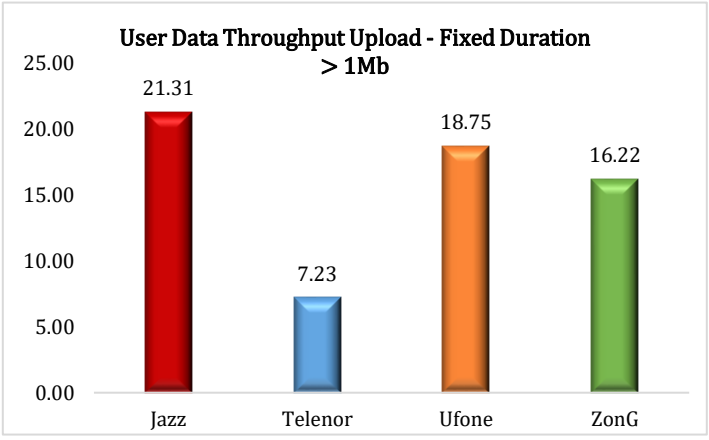
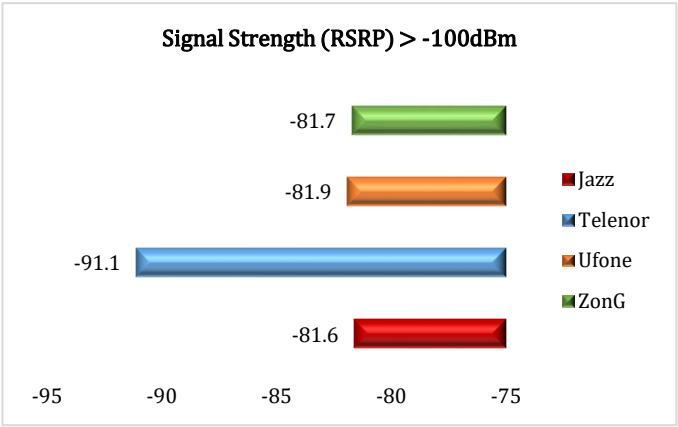
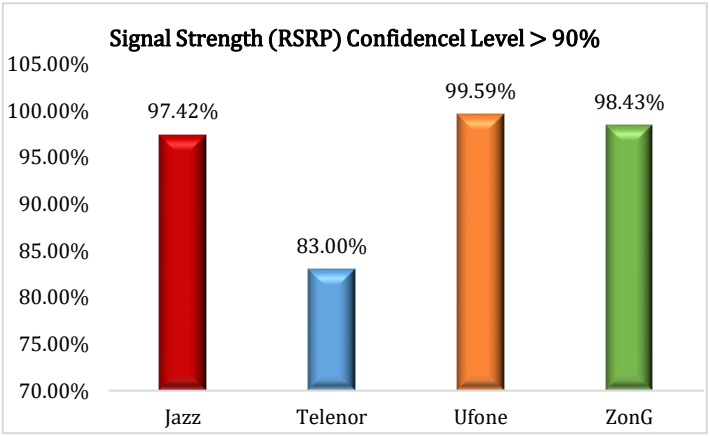
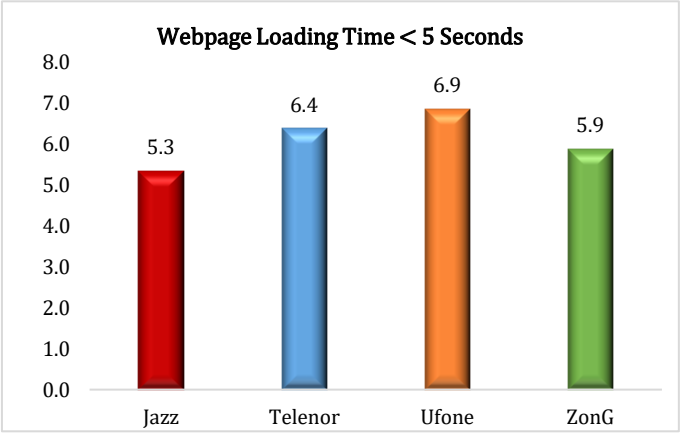
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) –SHARAQPUR











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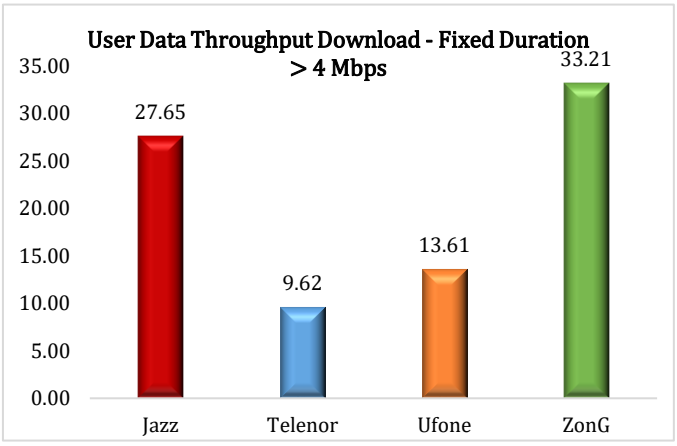
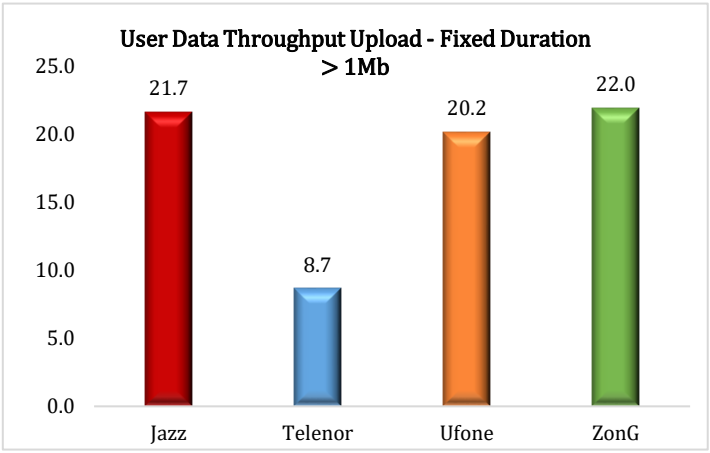
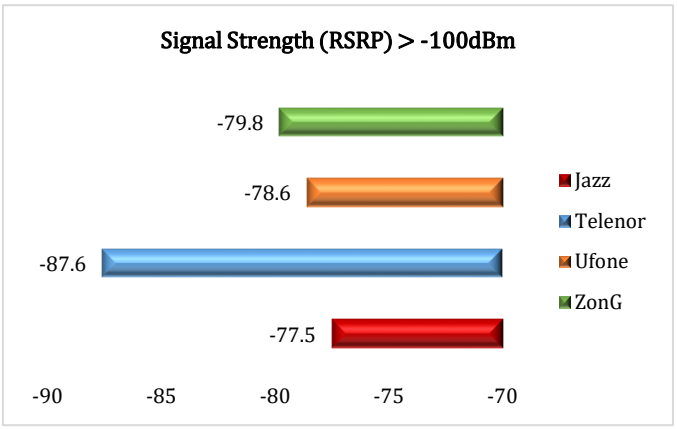
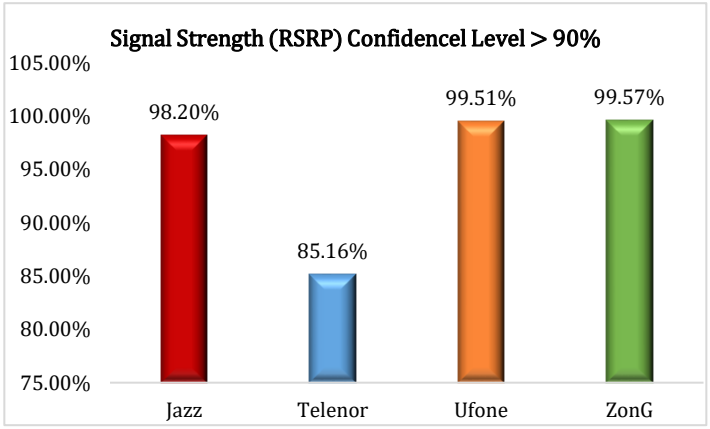
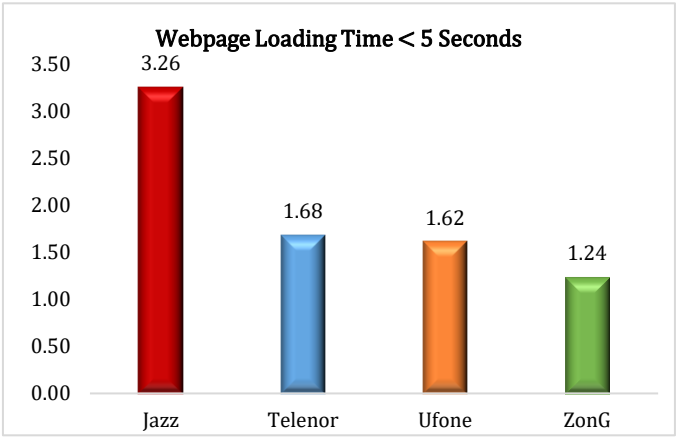
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – LAHORE











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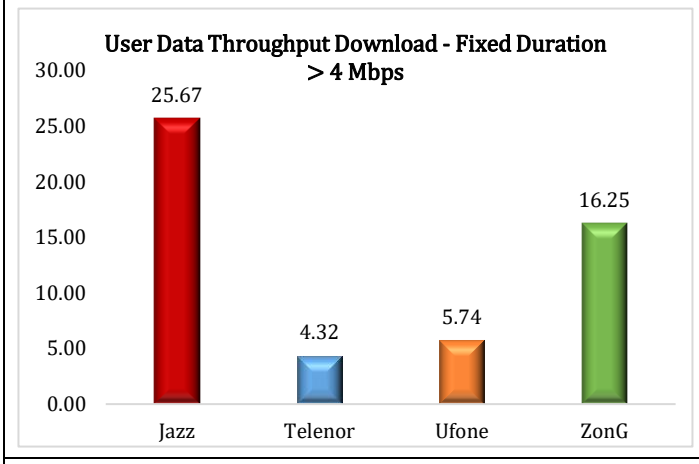
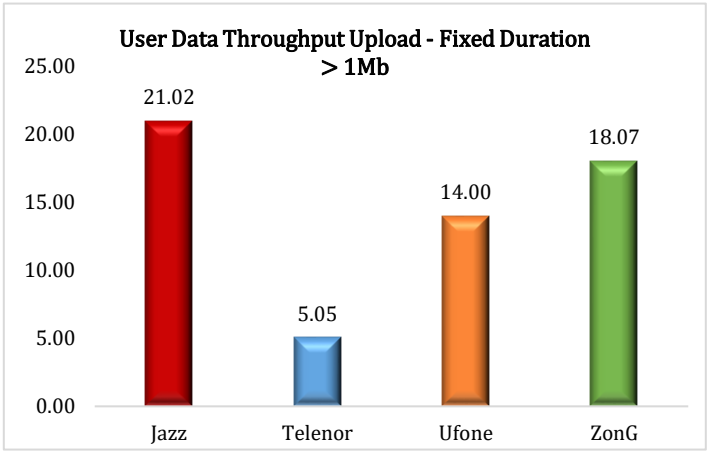
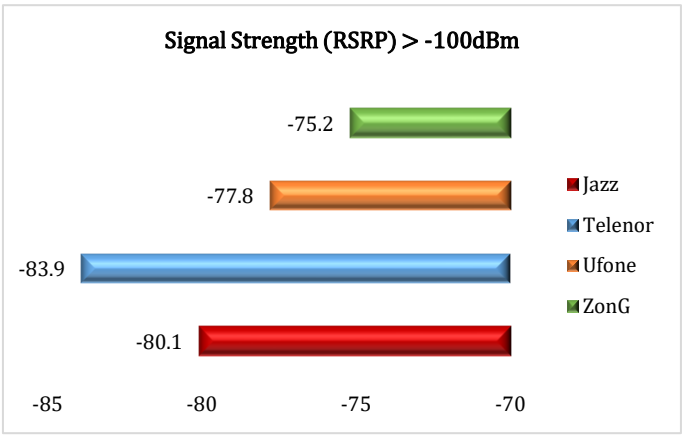
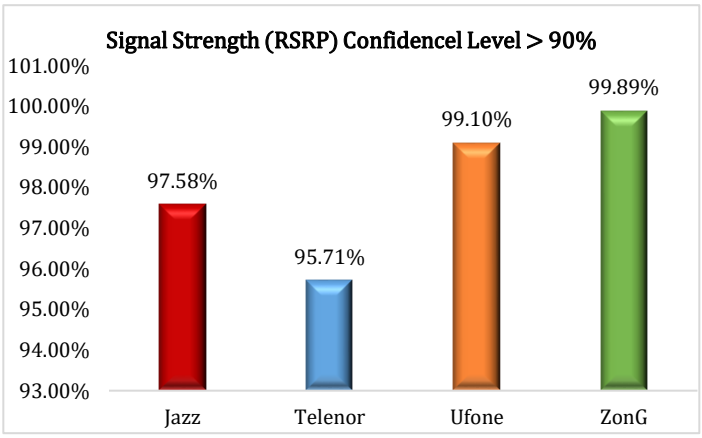
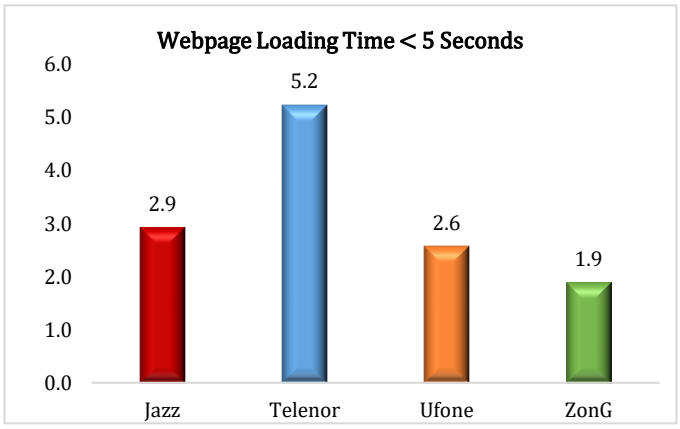
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – MARDAN











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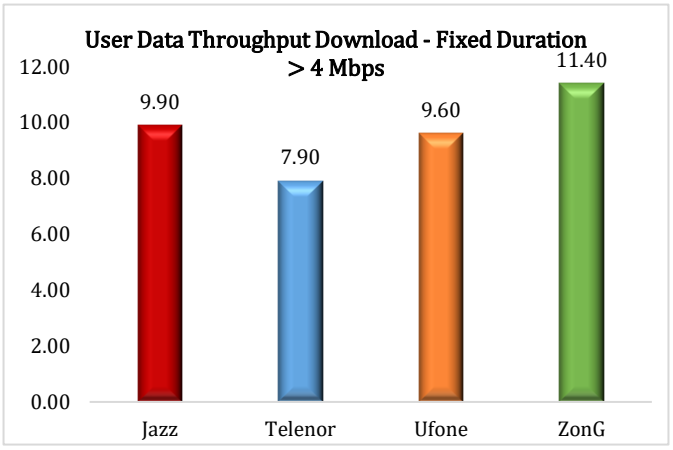
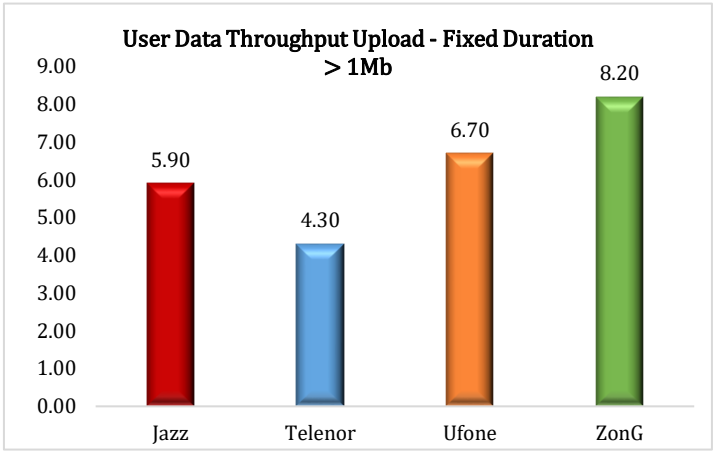
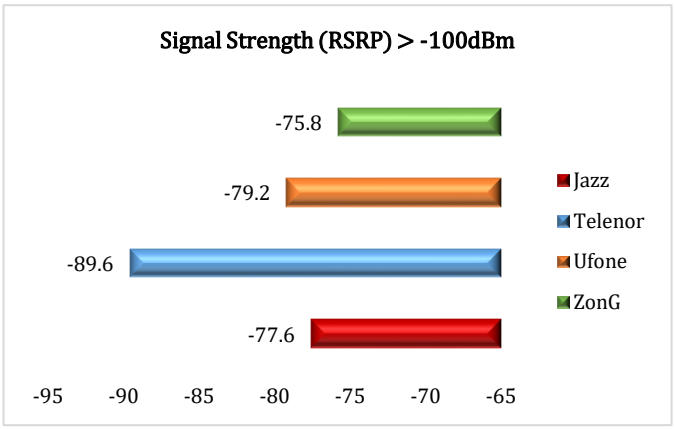
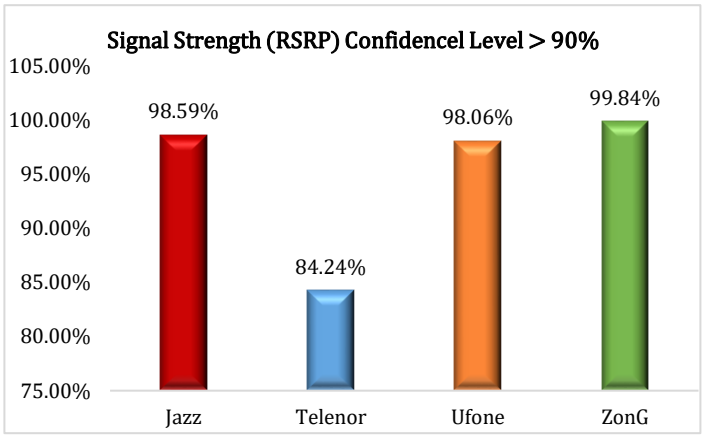
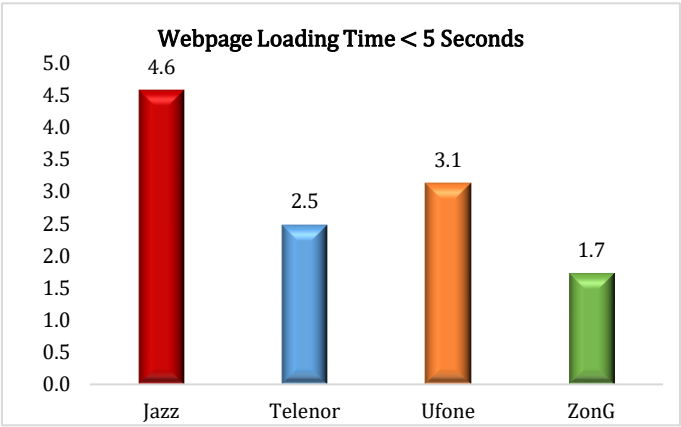
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – NAWABSHAH











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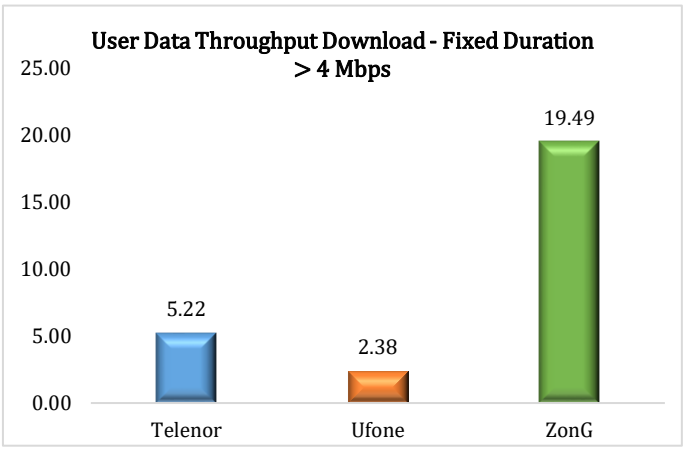
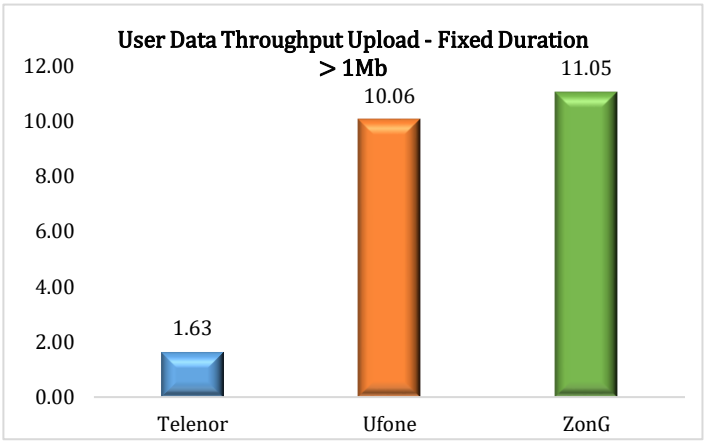
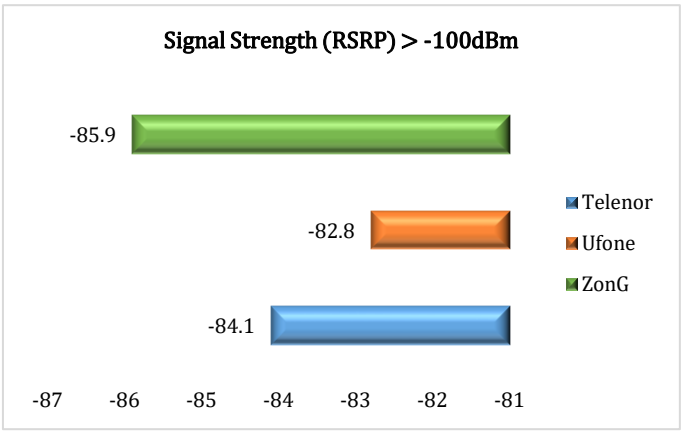
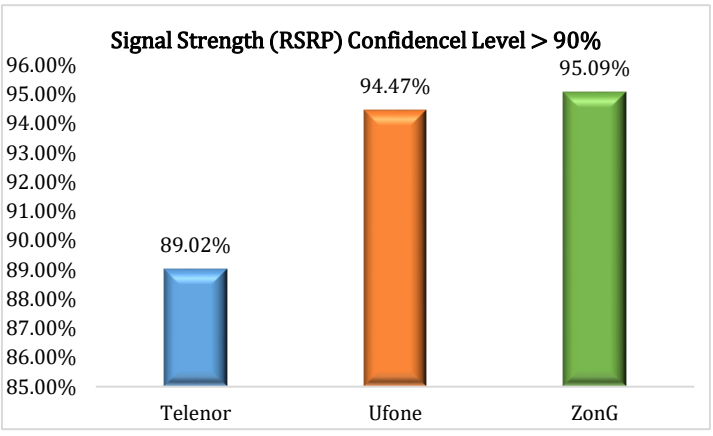
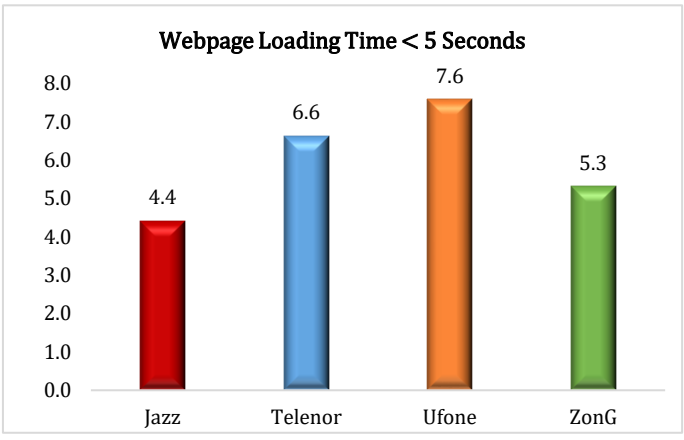
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – NUSHKI











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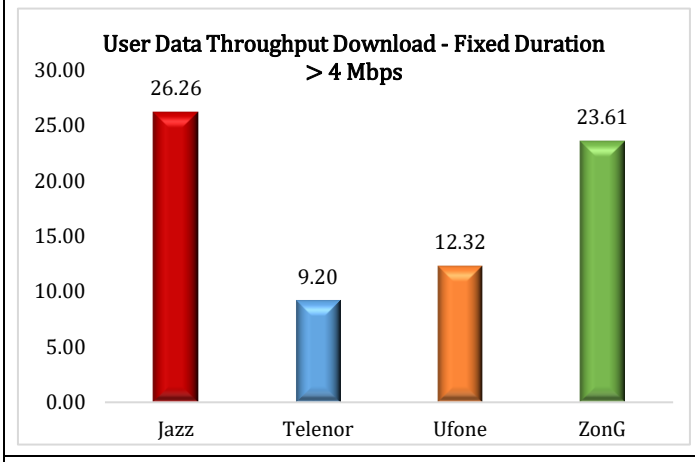
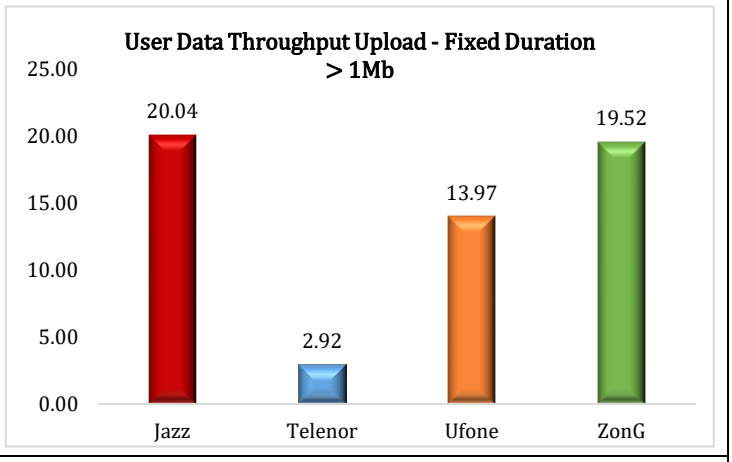
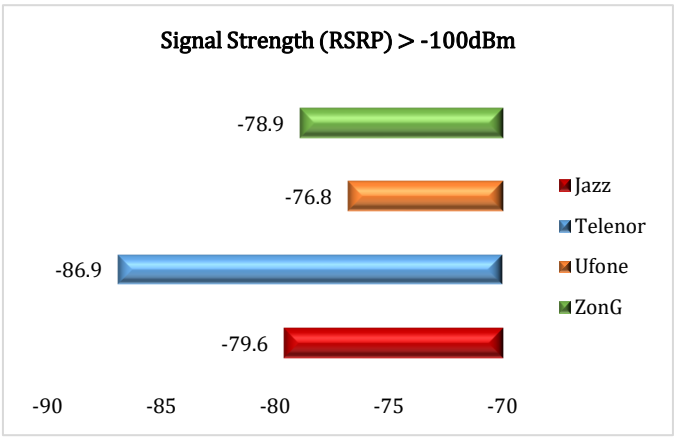
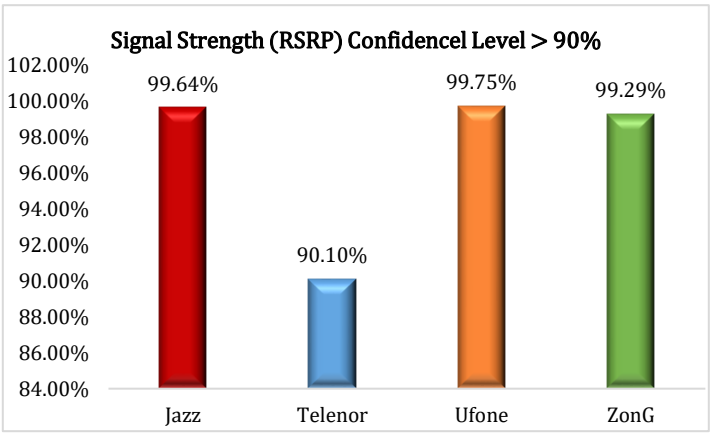
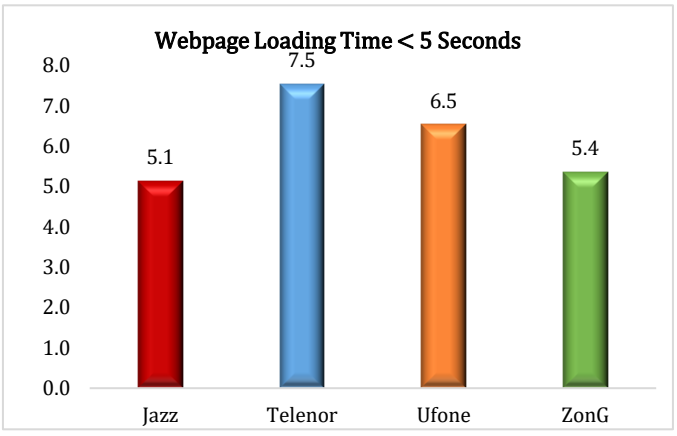
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – QUETTA











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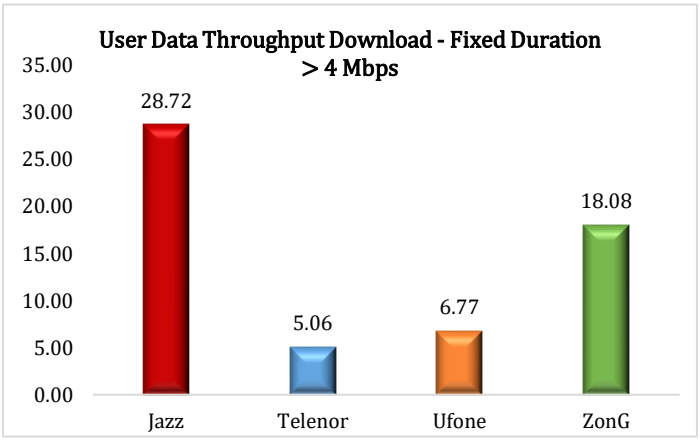
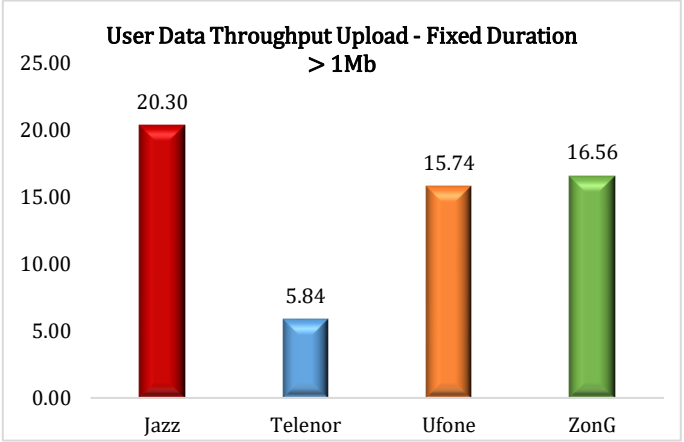
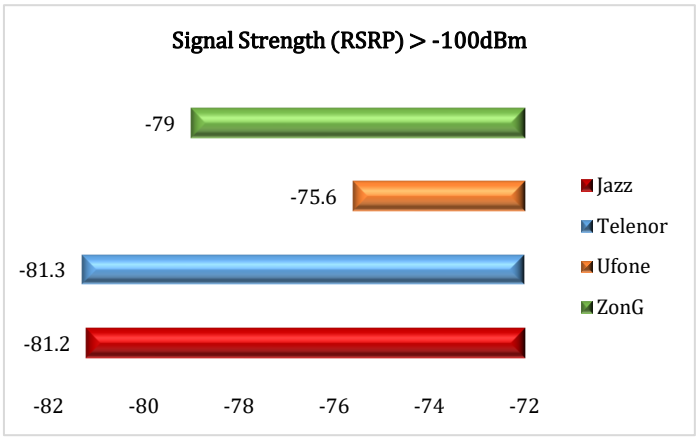
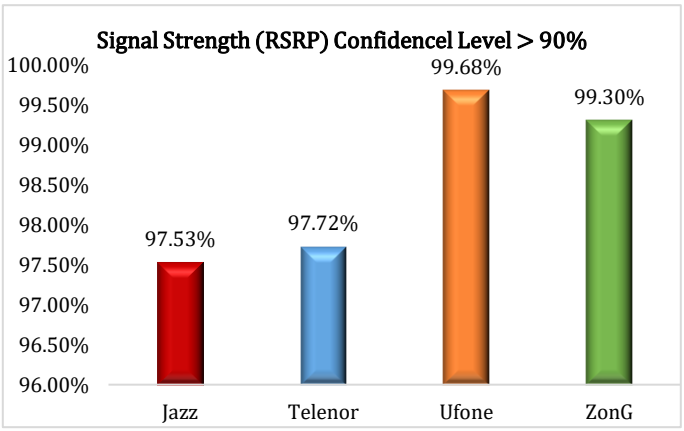
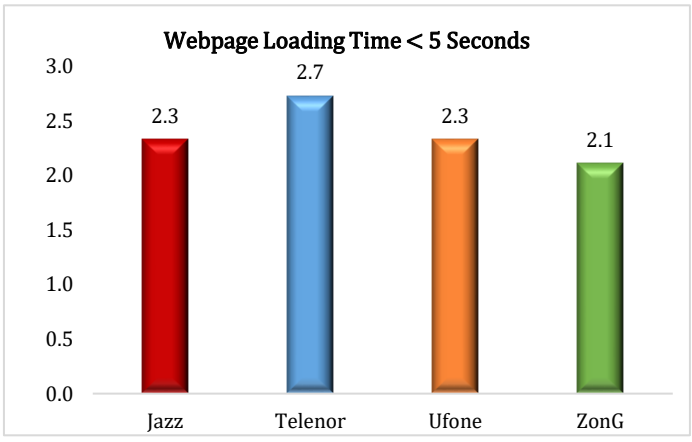
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – RAWALPINDI











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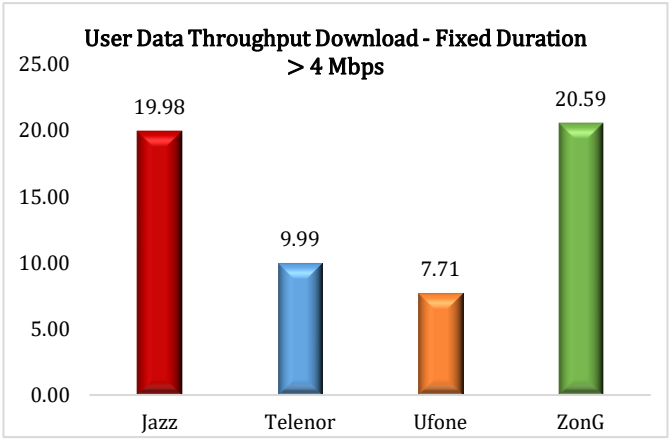
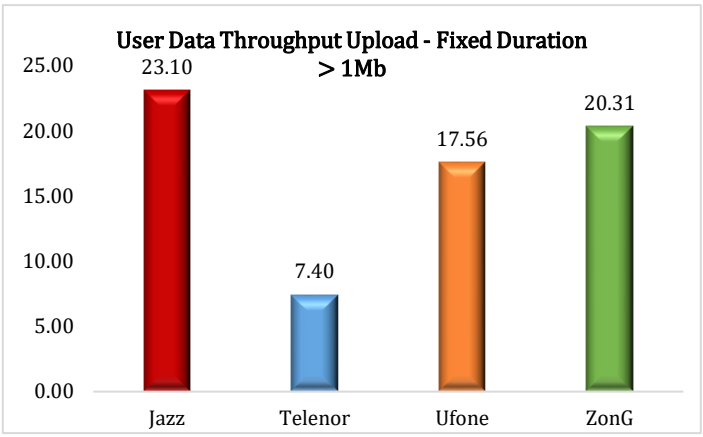
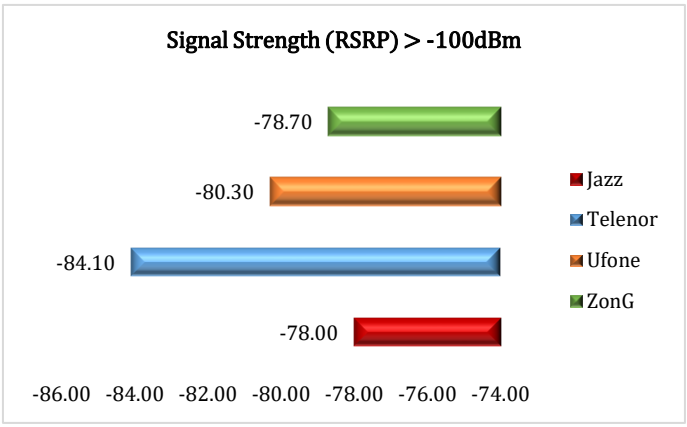
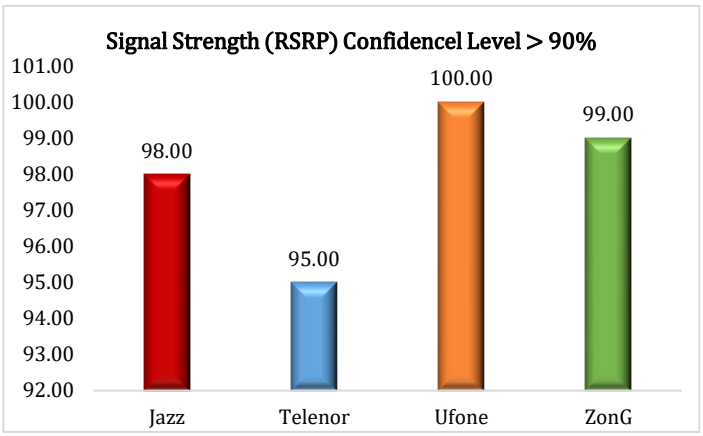
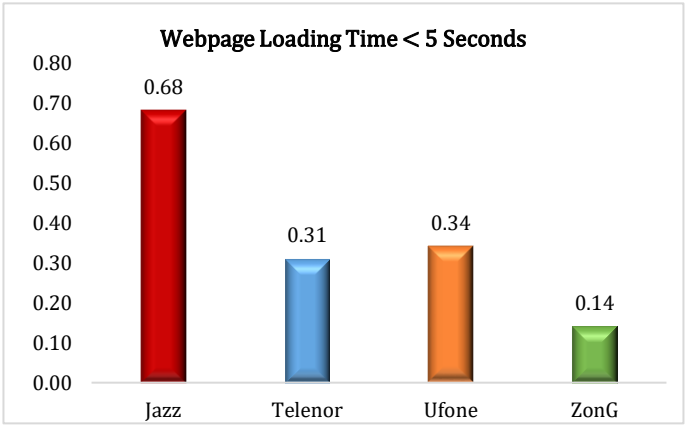
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SAMUNDARI











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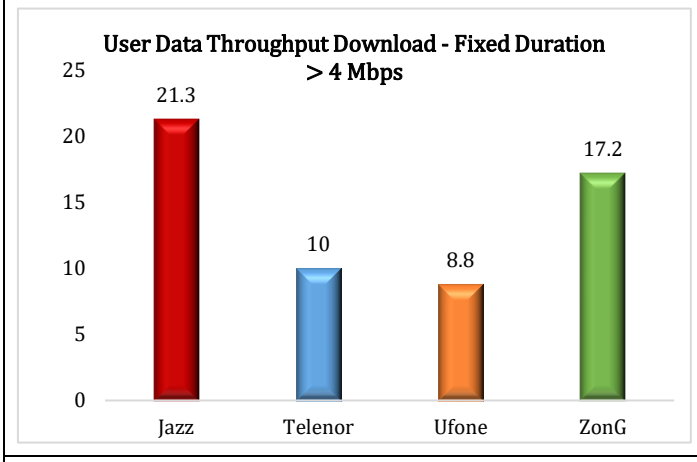
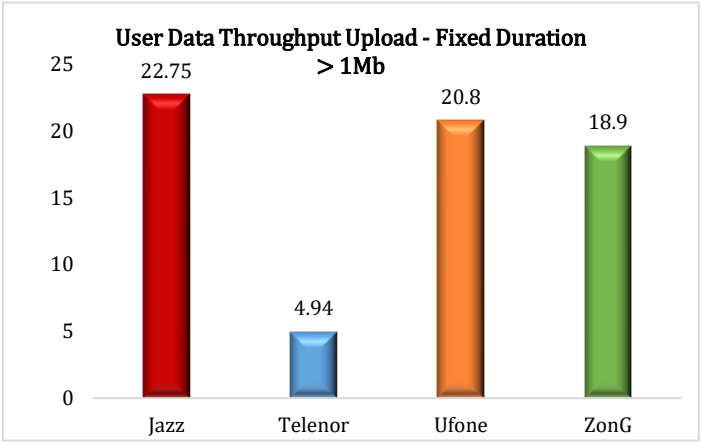
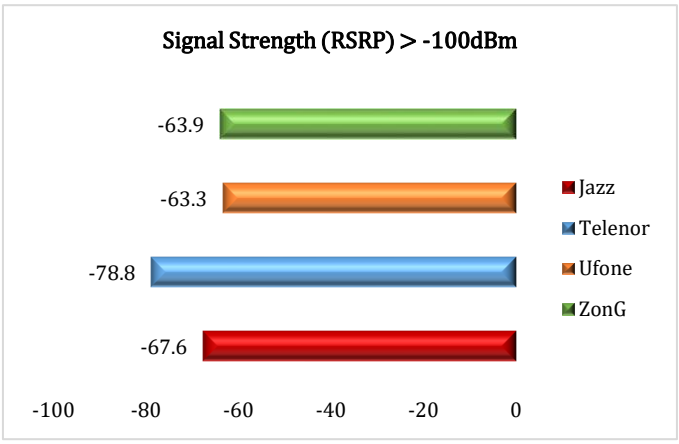
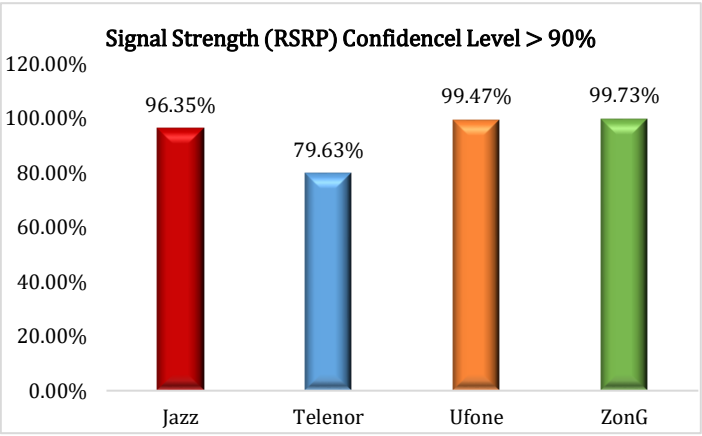
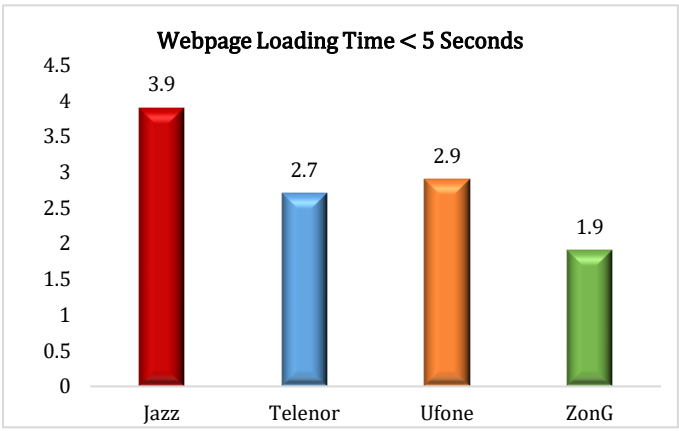
QUALITY OF SERVICE SURVEY RESULTS (AUTOMODE) – SHIKARPUR











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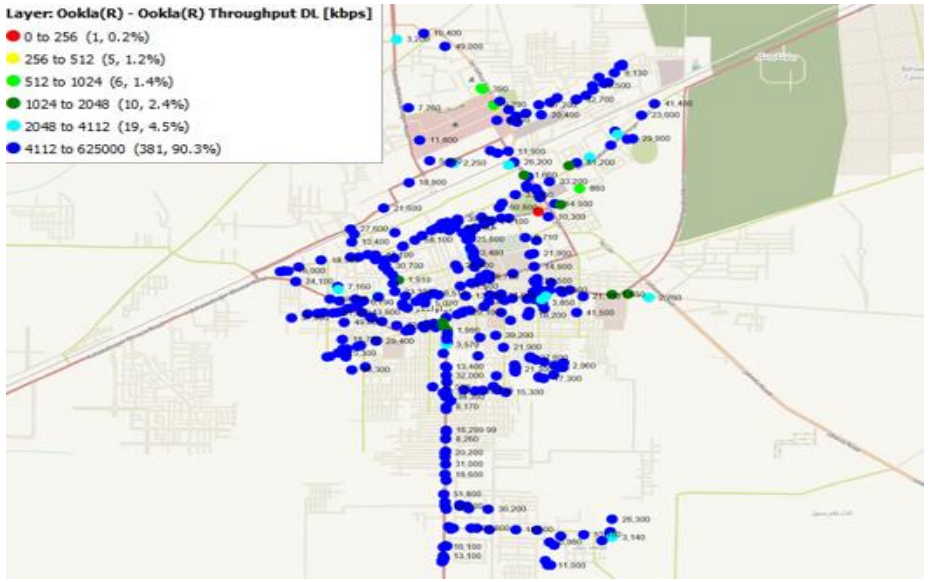
Annex -B(Coverage Maps)

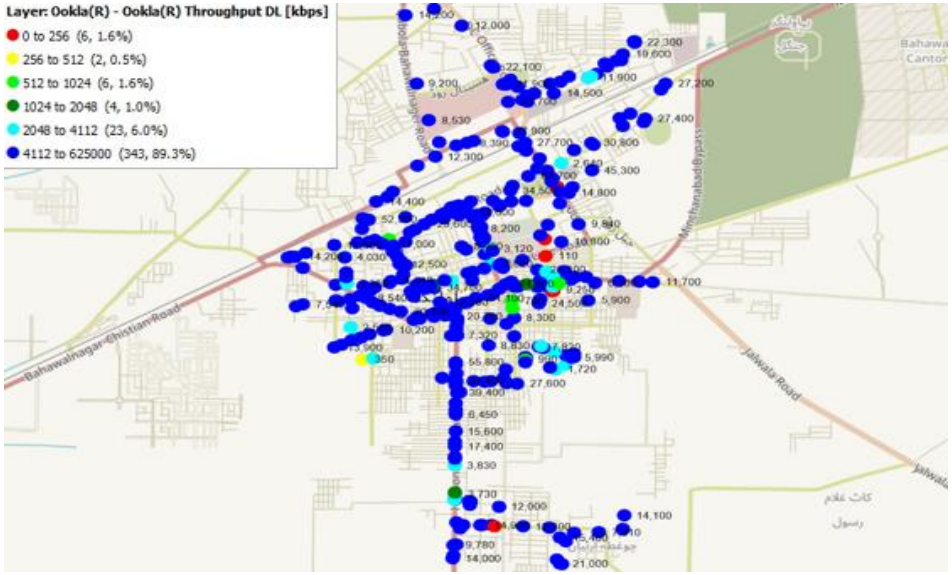
OOKLA

OOKLA SPEED TEST RESULTS

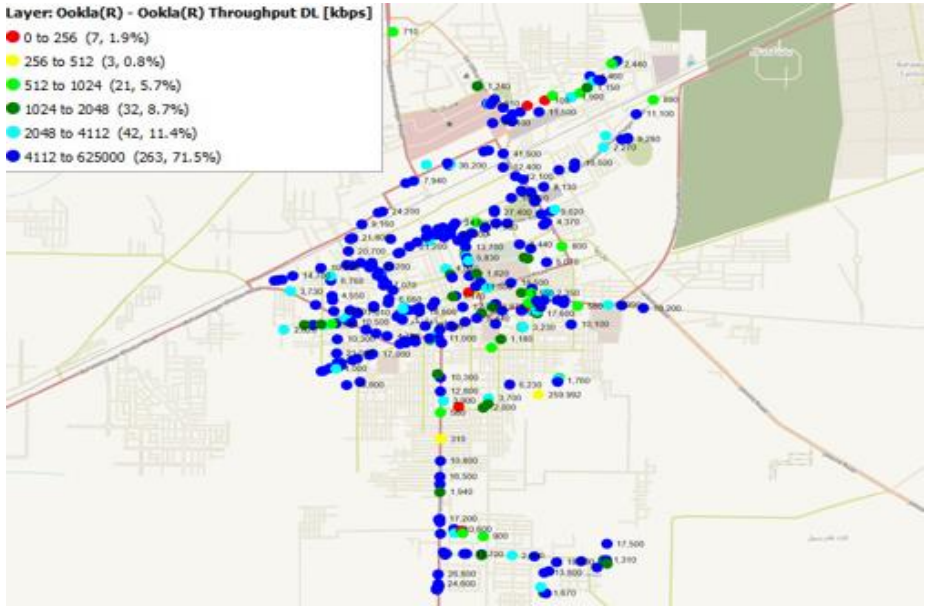
JAZZ DOWNLOAD THROUGHPUT – BAHAWALNAGAR



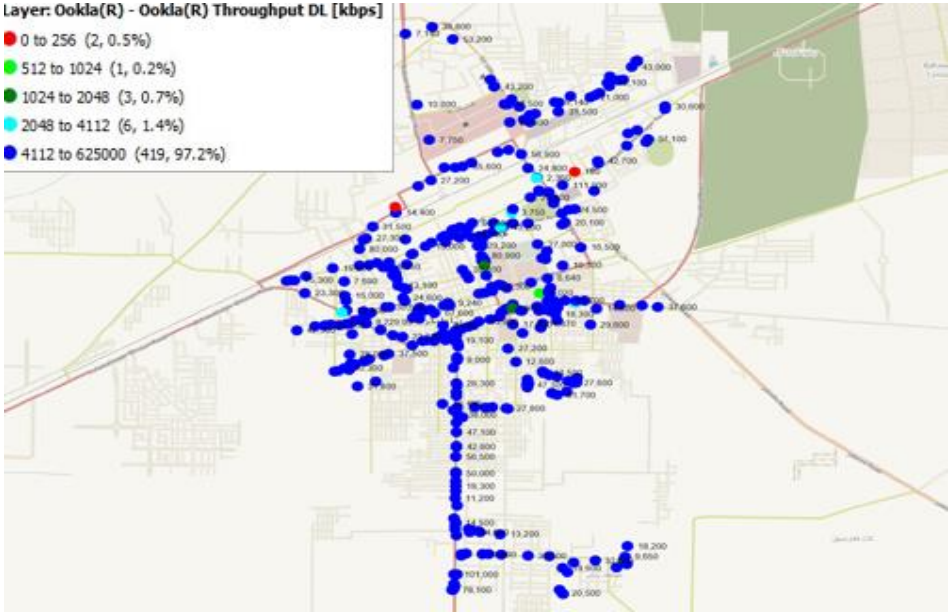
TELENOR DOWNLOAD THROUGHPUT – BAHAWALNAGAR



UFONE DOWNLOAD THROUGHPUT – BAHAWALNAGAR

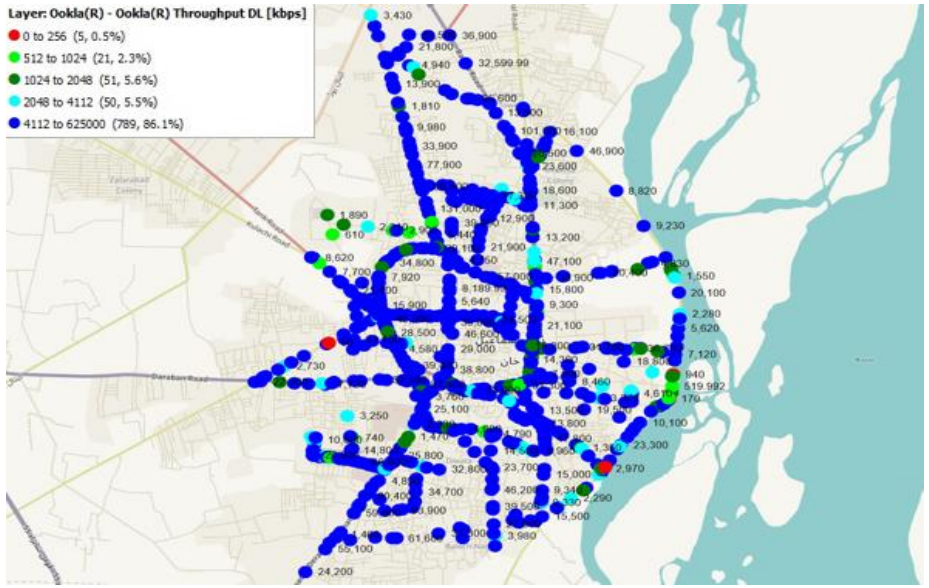


ZONG DOWNLOAD THROUGHPUT – BAHAWALNAGAR



OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – D.I KHAN



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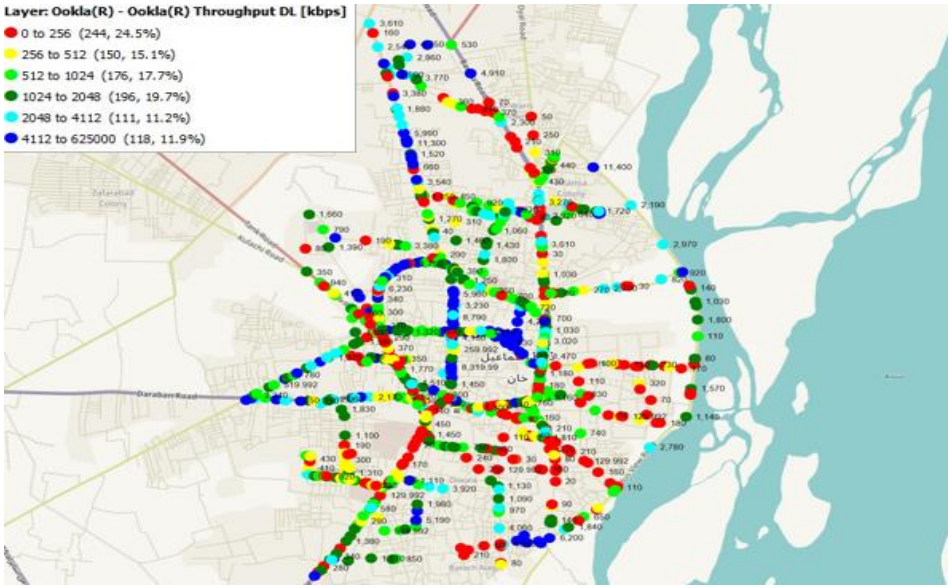

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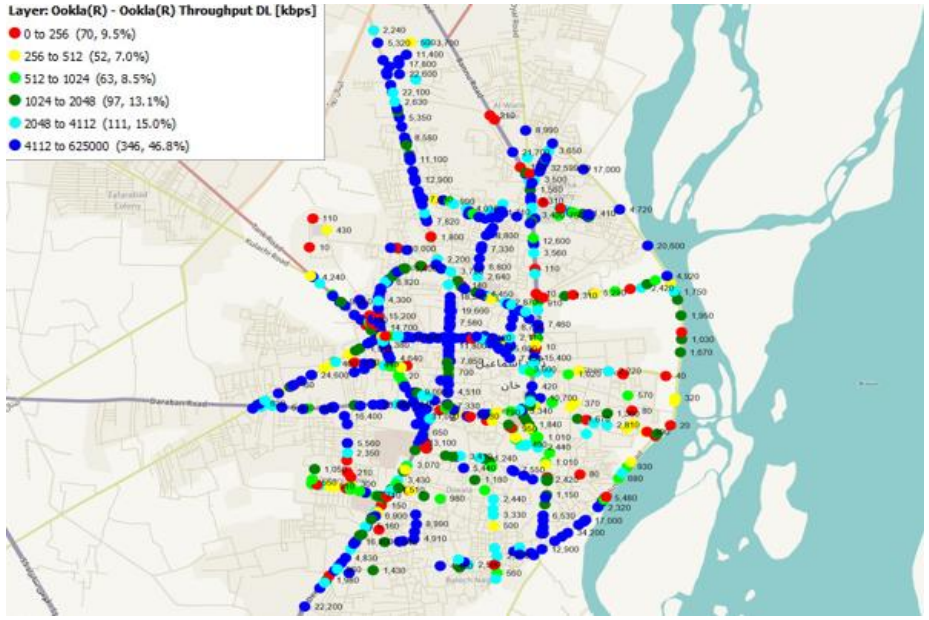

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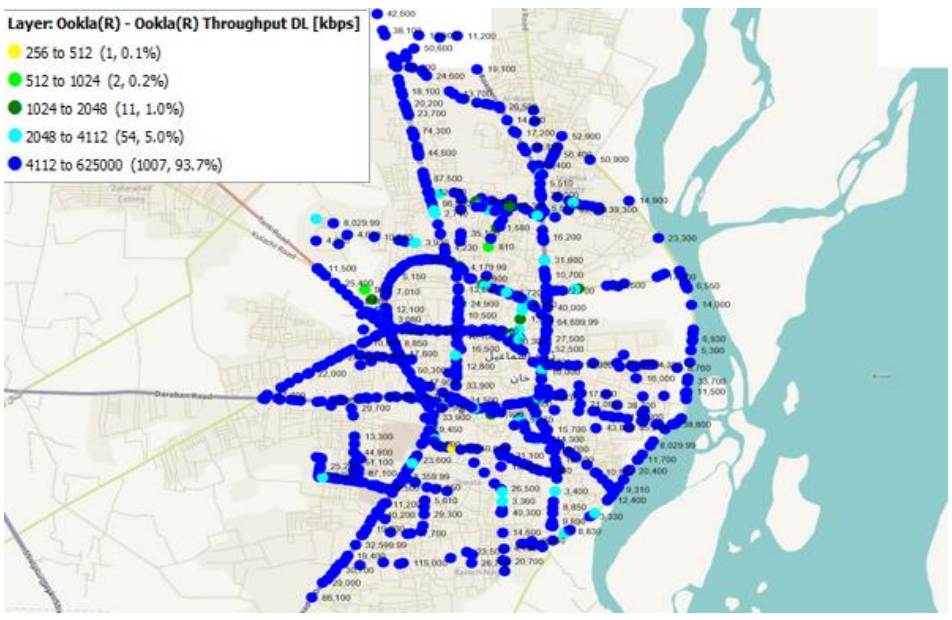
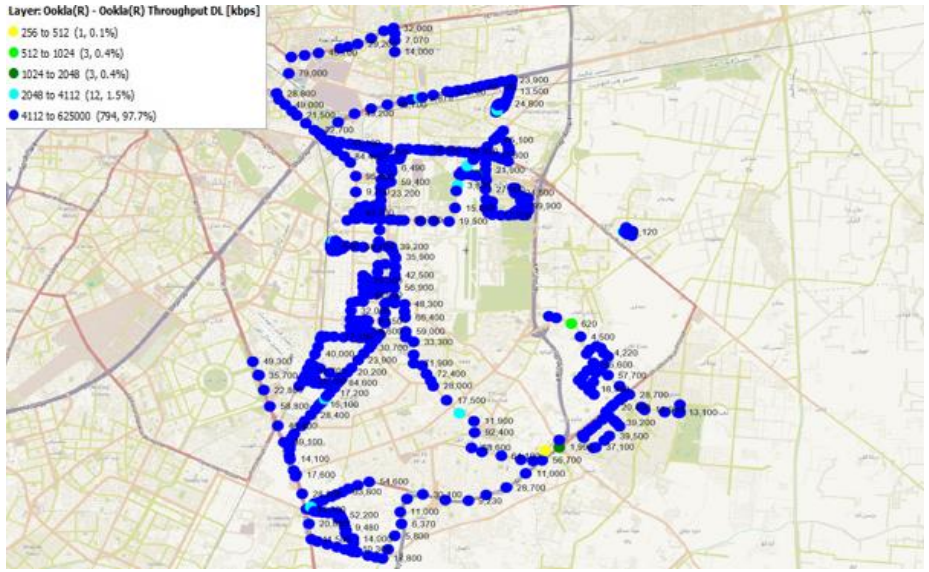
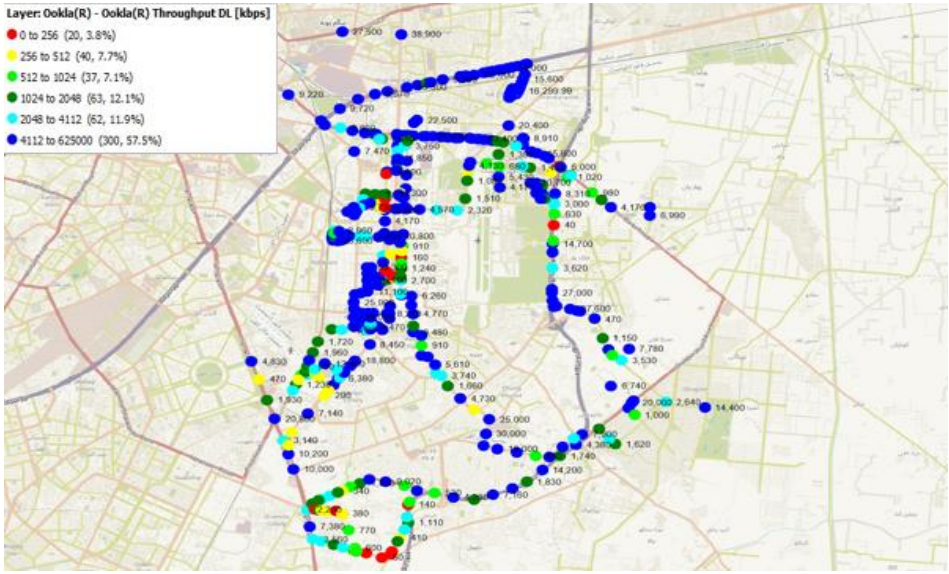


OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – LAHORE



TELENOR DOWNLOAD THROUGHPUT – LAHORE

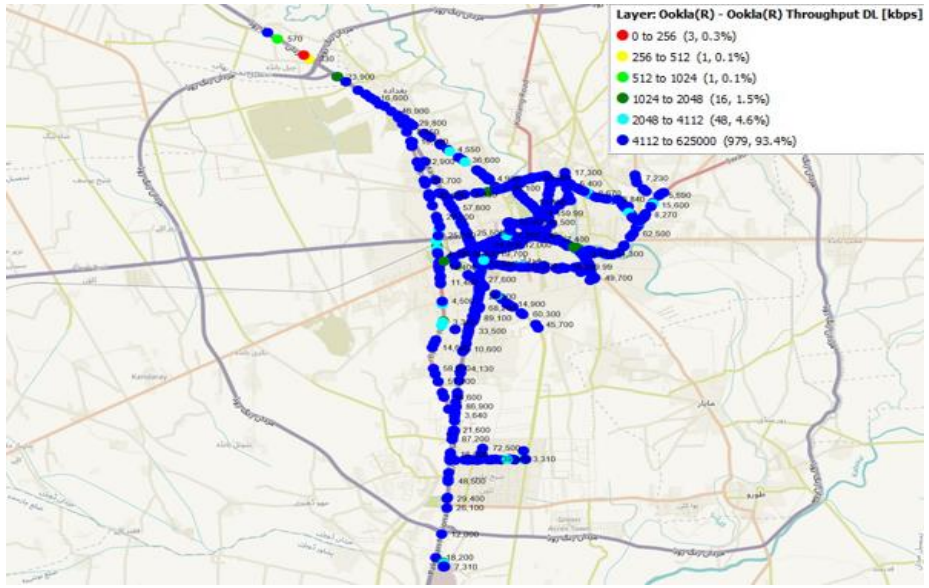


UFONE DOWNLOAD THROUGHPUT – LAHORE

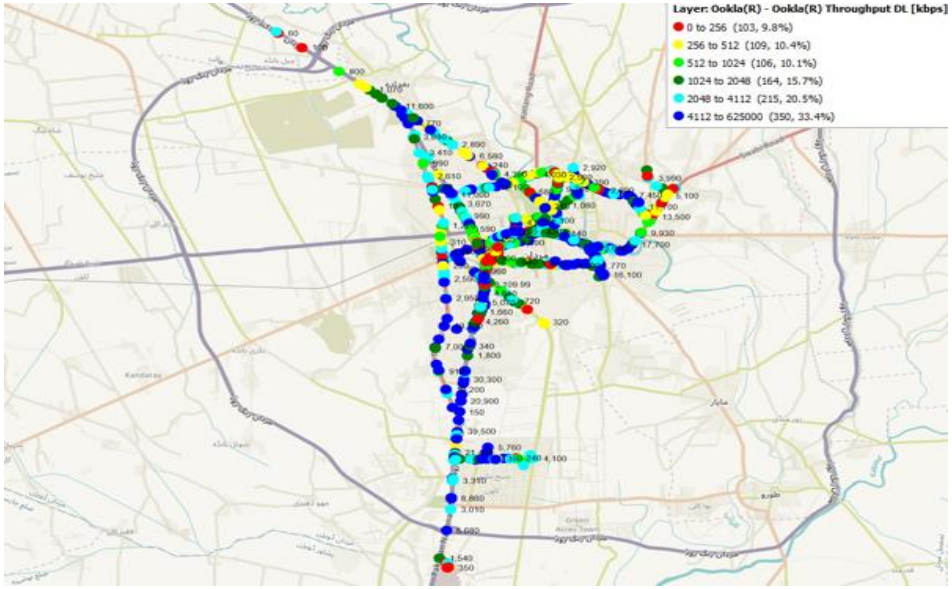
ZONG DOWNLOAD THROUGHPUT – LAHORE

OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – MARDAN



TELENOR DOWNLOAD THROUGHPUT – MARDAN



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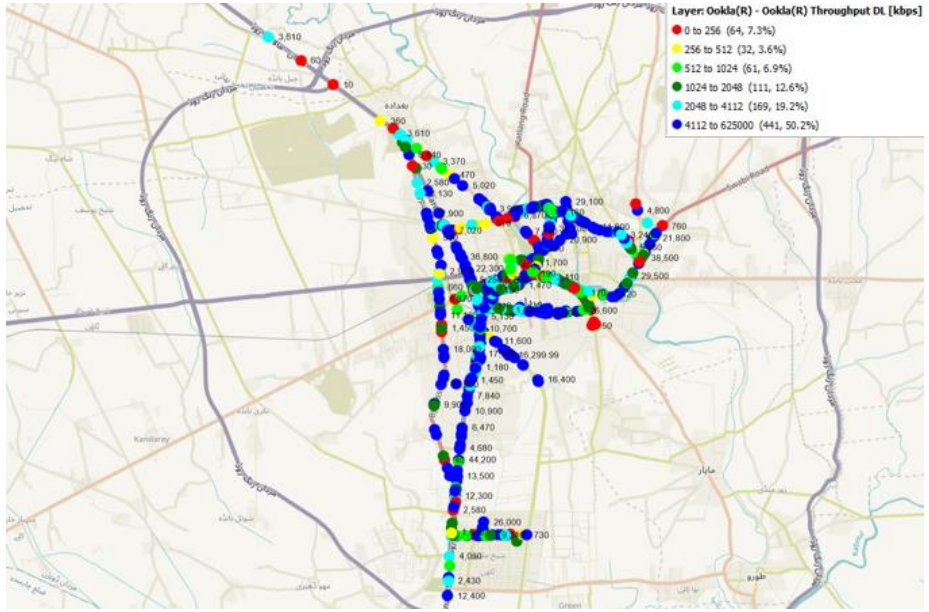
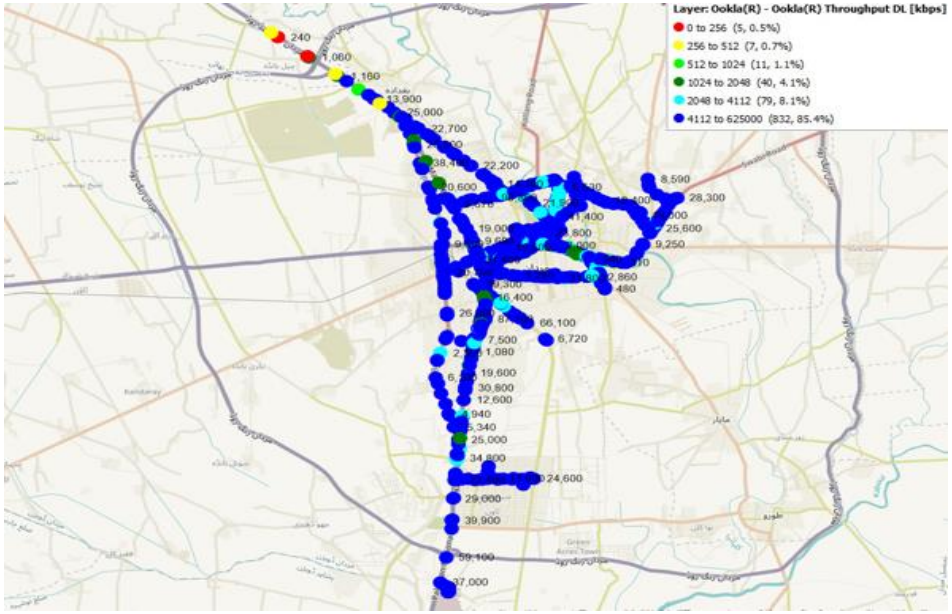
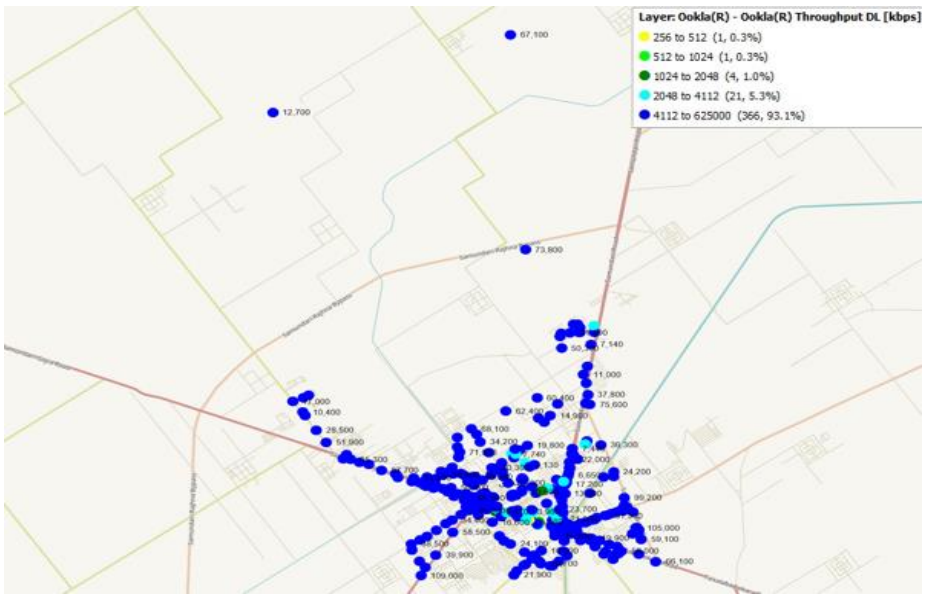


ZONG DOWNLOAD THROUGHPUT – MARDAN

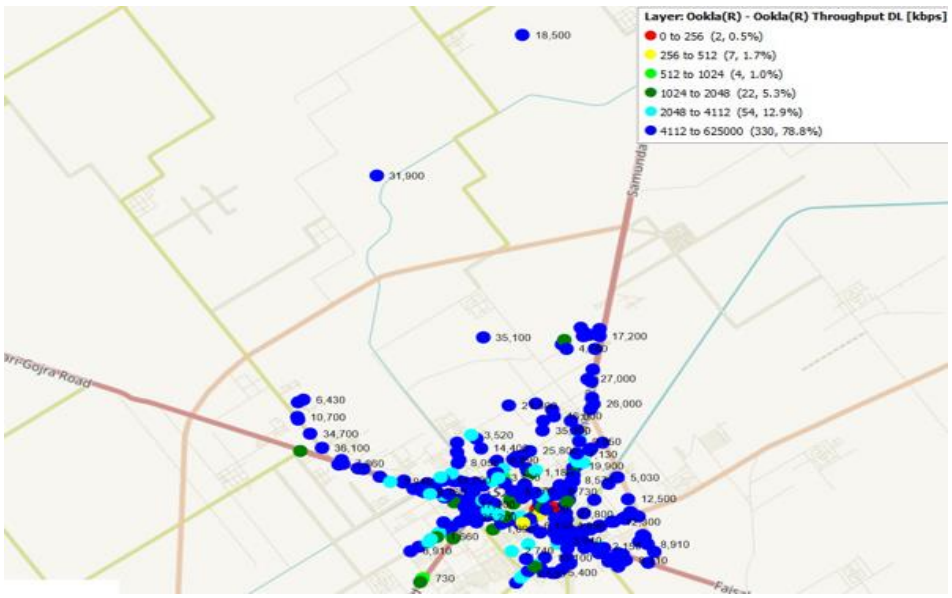


OOKLA SPEED TEST RESULTS

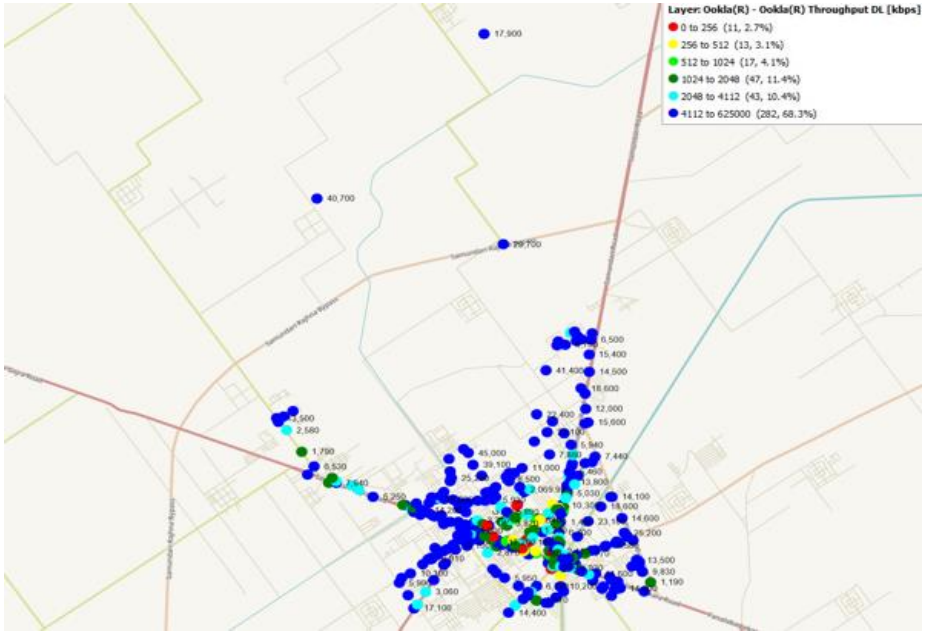
JAZZ DOWNLOAD THROUGHPUT – SAMUNDARI



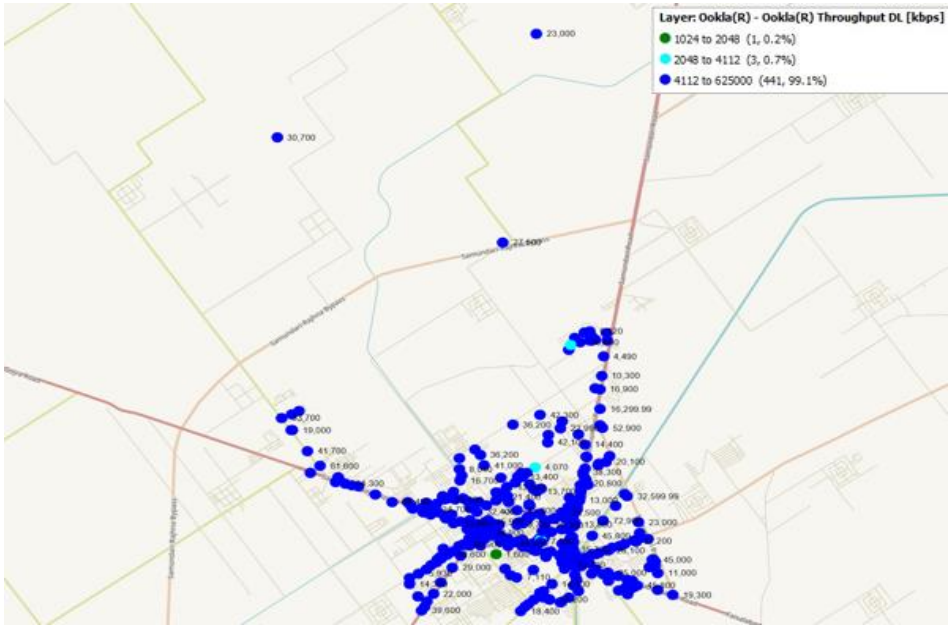
TELENOR DOWNLOAD THROUGHPUT – SAMUNDARI



UFONE DOWNLOAD THROUGHPUT – SAMUNDARI



ZONG DOWNLOAD THROUGHPUT – SAMUNDARI



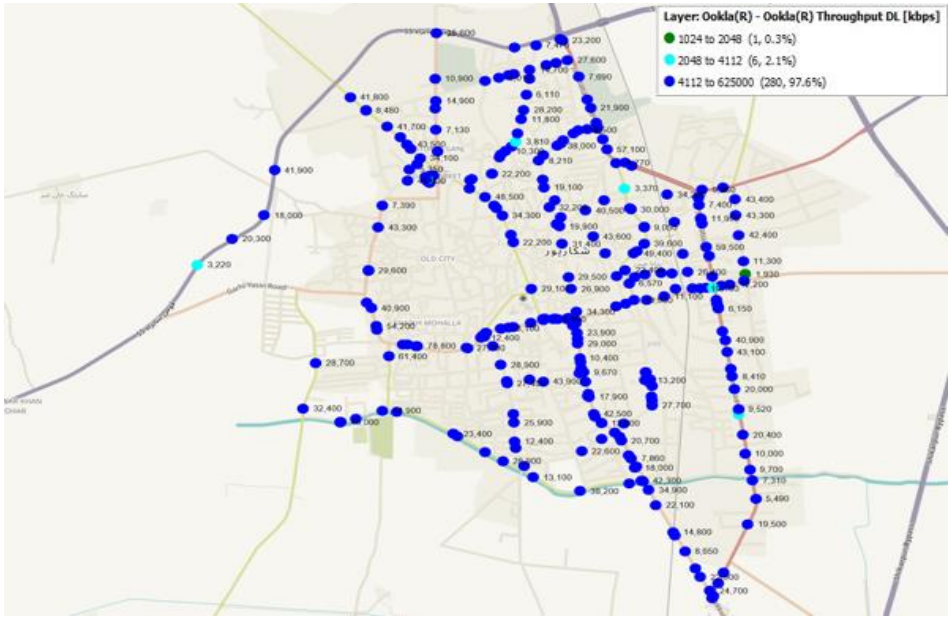
OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – SHIKARPUR

TELENOR DOWNLOAD THROUGHPUT– SHIKARPUR

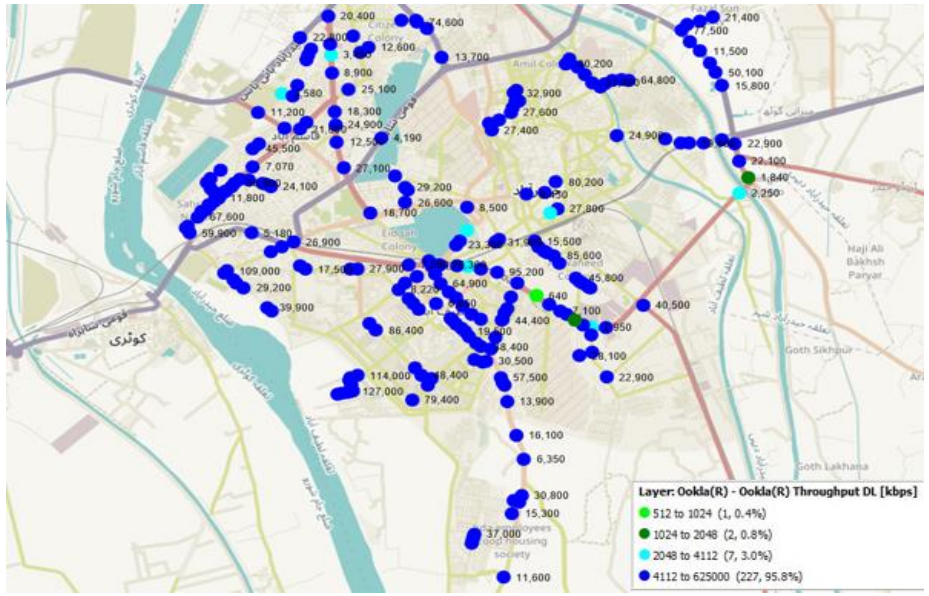
UFONE DOWNLOAD THROUGHPUT–SHIKARPUR

ZONG DOWNLOAD THROUGHPUT – SHIKARPUR

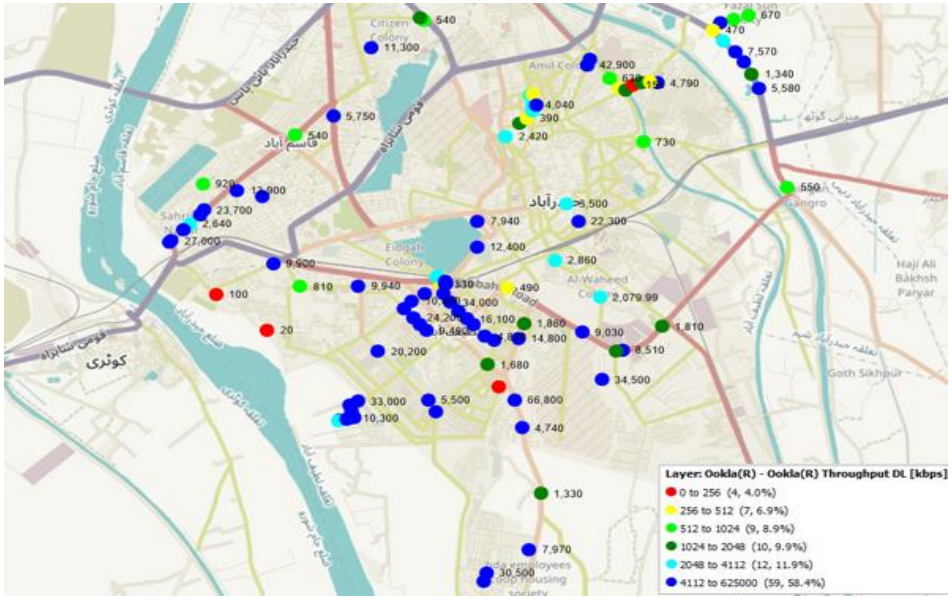


OOKLA SPEED TEST RESULTS

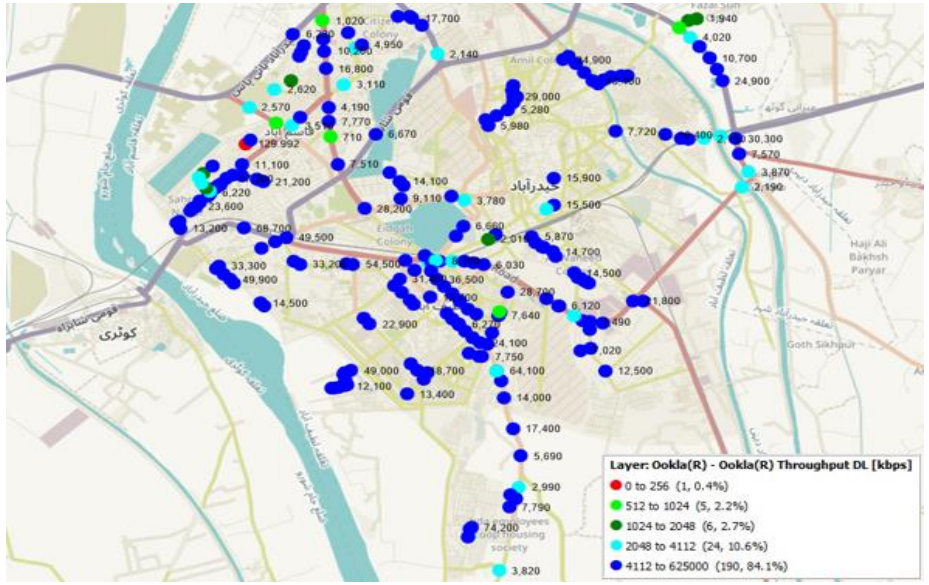
JAZZ DOWNLOAD THROUGHPUT – HYDERABAD



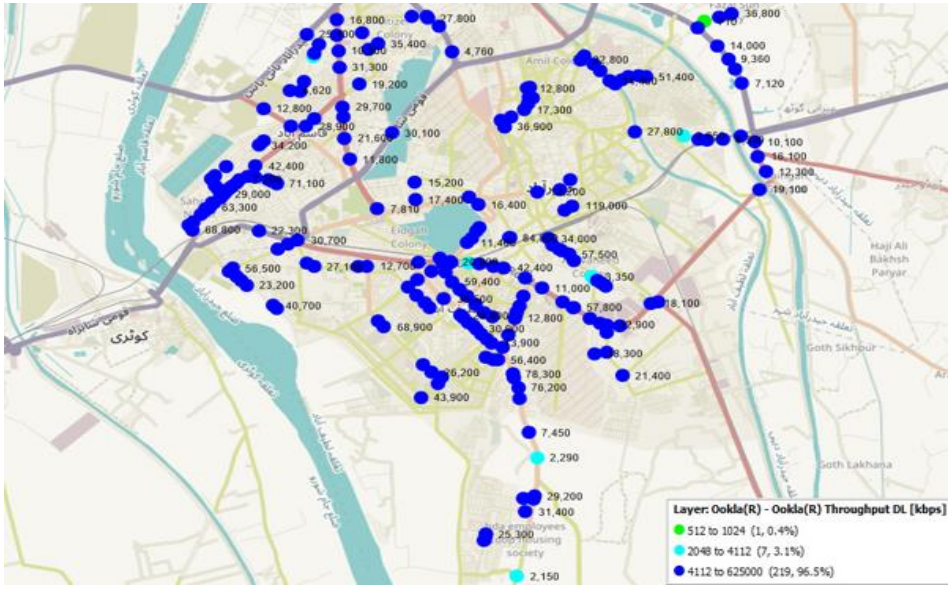
TELENOR DOWNLOAD THROUGHPUT – HYDERABAD



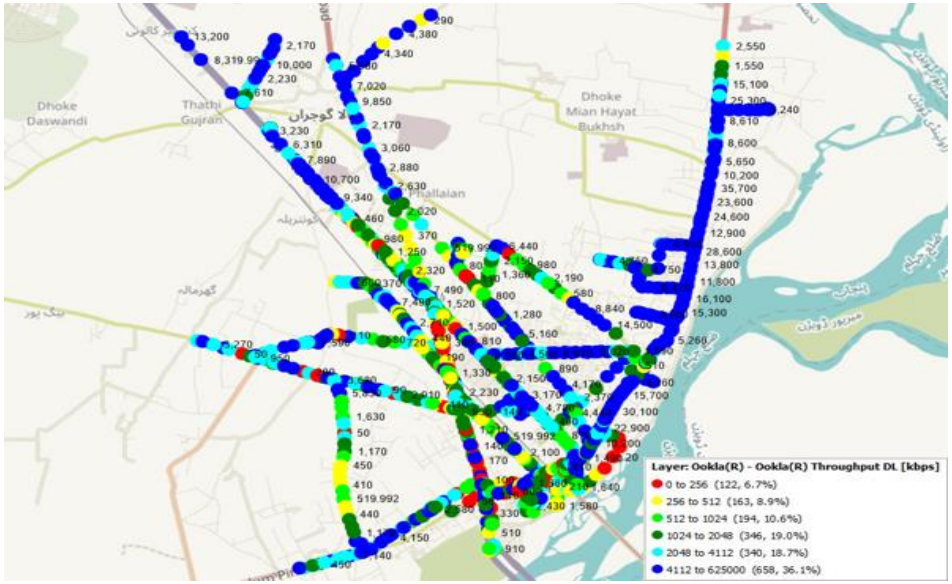
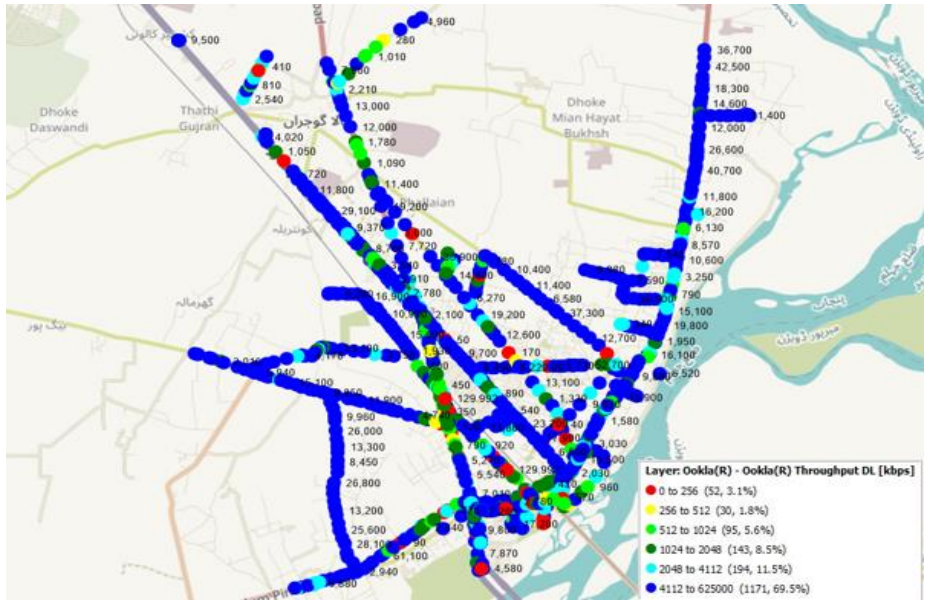
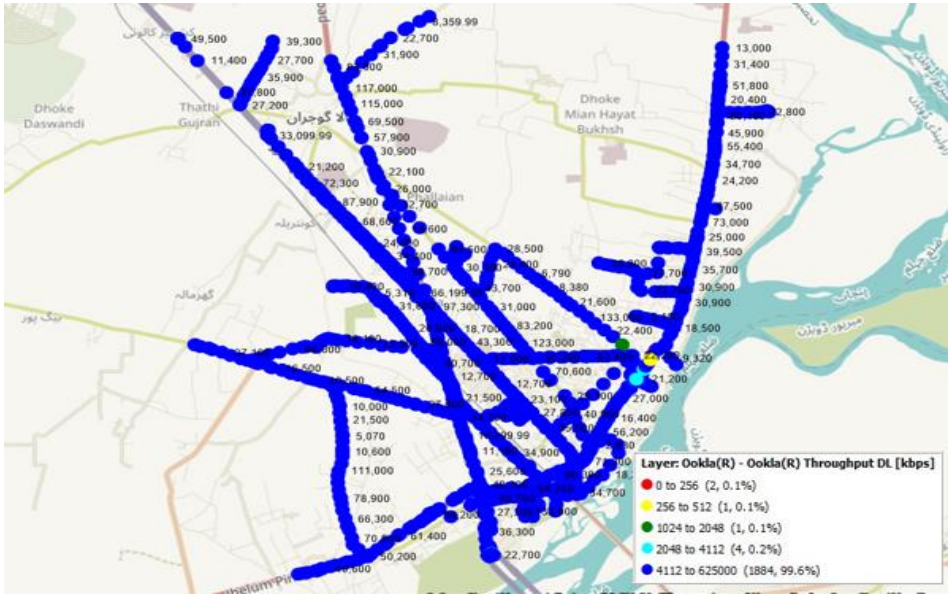
UFONE DOWNLOAD THROUGHPUT – HYDERABAD



ZONG DOWNLOAD THROUGHPUT – HYDERABAD

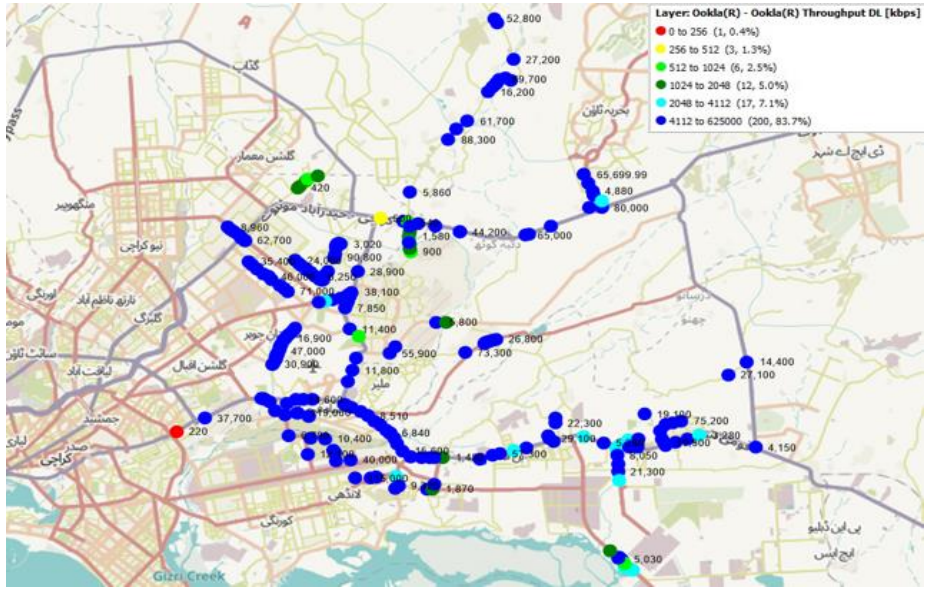


OOKLA SPEED TEST RESULTS

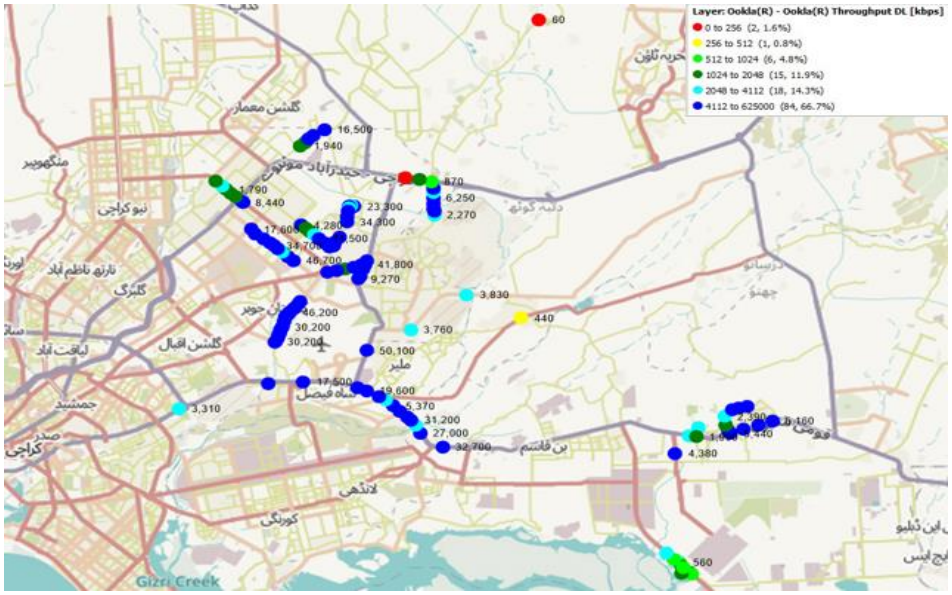
JAZZ DOWNLOAD THROUGHPUT – JHELUM	TELENOR DOWNLOAD THROUGHPUT – JHELUM
	
UFONE DOWNLOAD THROUGHPUT – JHELUM	**ZONG DOWNLOAD THROUGHPUT – JHELUM**
	

OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – KARACHI MALIR

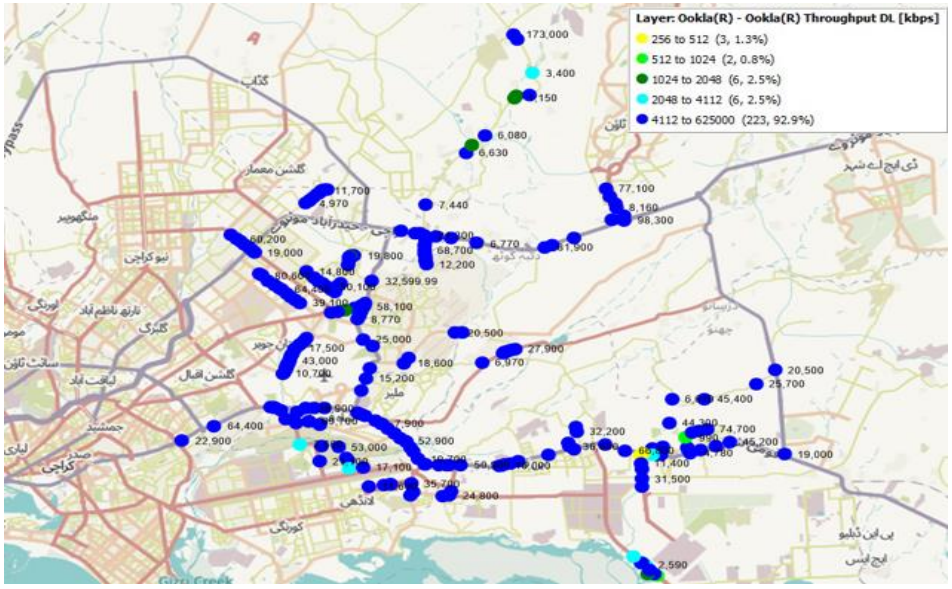


TELENOR DOWNLOAD THROUGHPUT – KARACHI MALIR



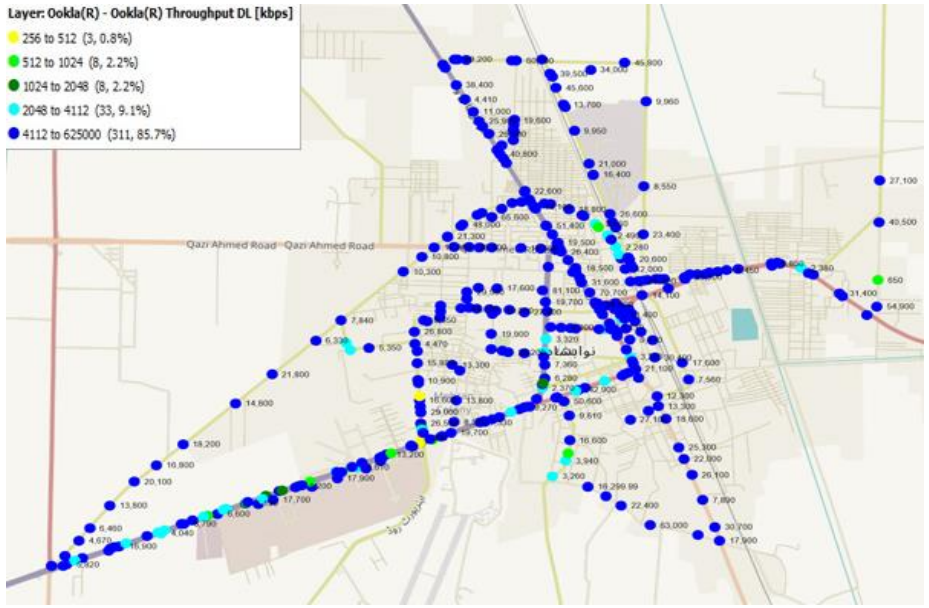
UFONE DOWNLOAD THROUGHPUT – KARACHI MALIR

ZONG DOWNLOAD THROUGHPUT – KARACHI MALIR

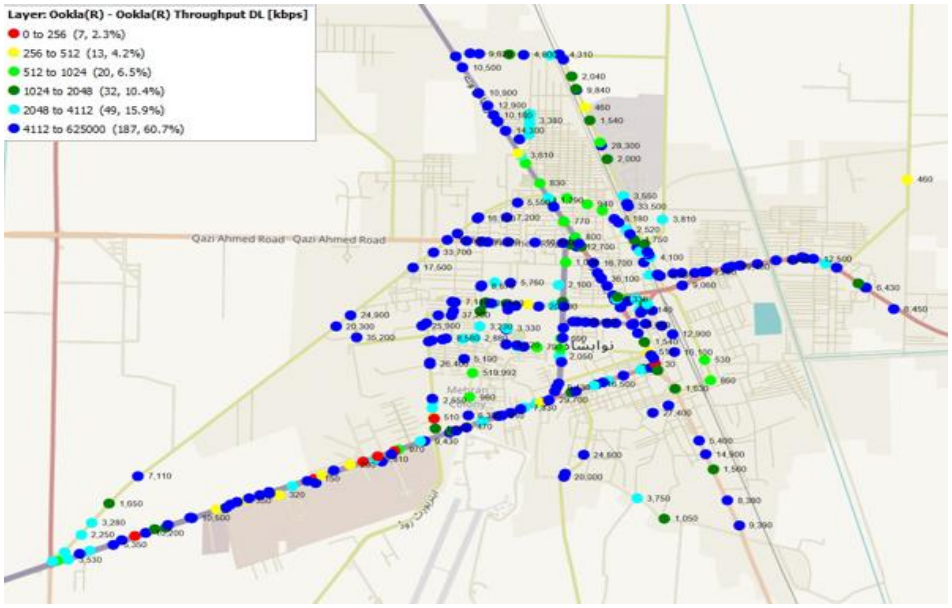


OOKLA SPEED TEST RESULTS

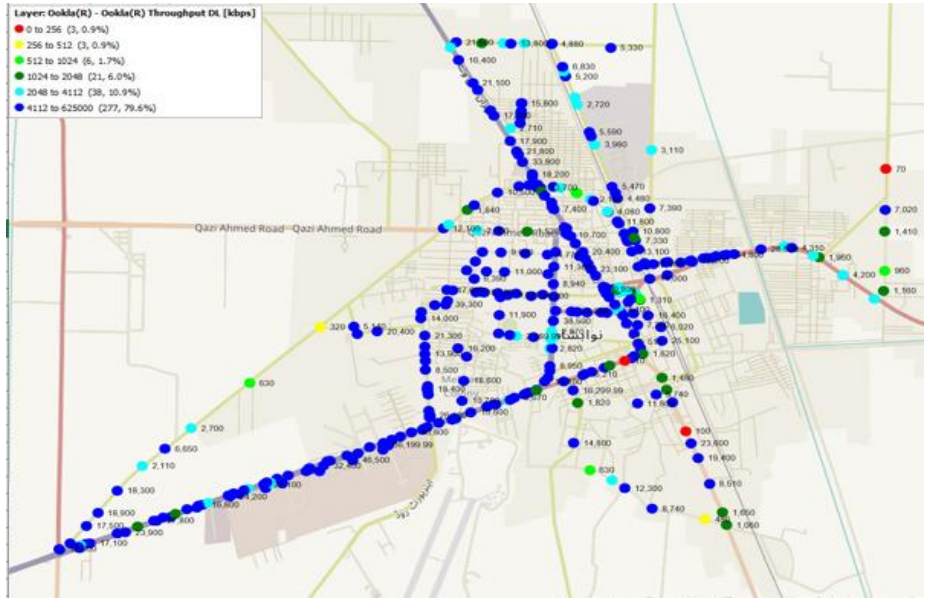
JAZZ DOWNLOAD THROUGHPUT – NAWABSHAH



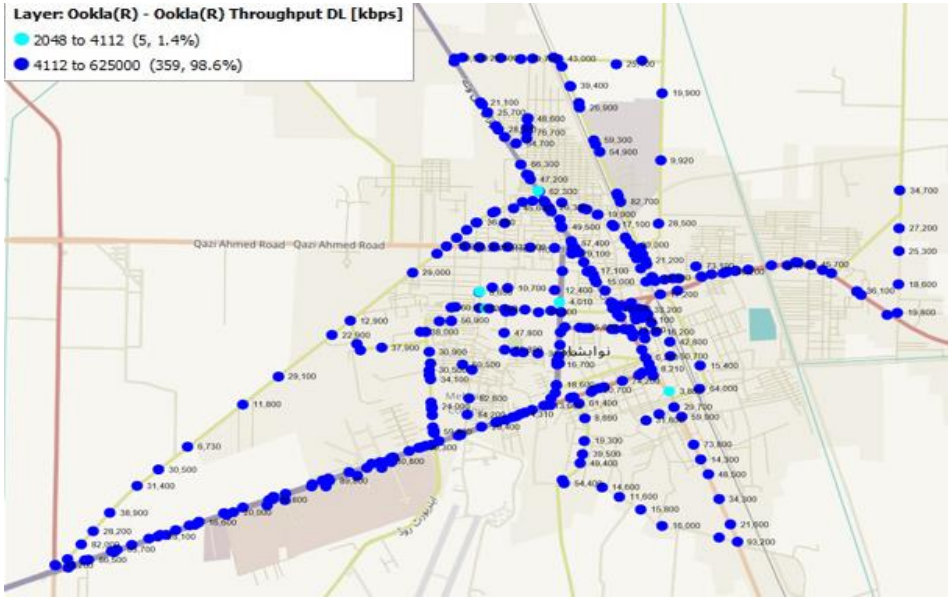
TELENOR DOWNLOAD THROUGHPUT – NAWABSHAH



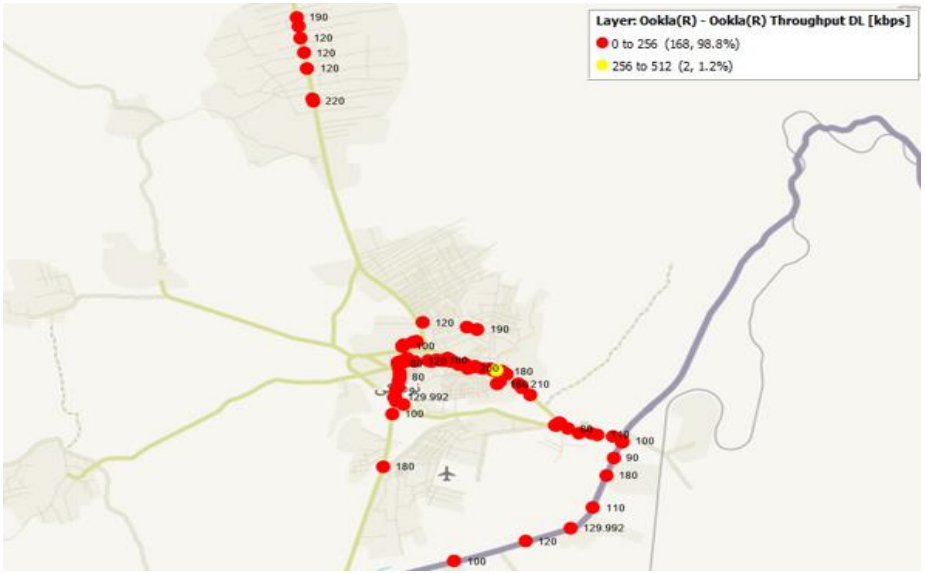
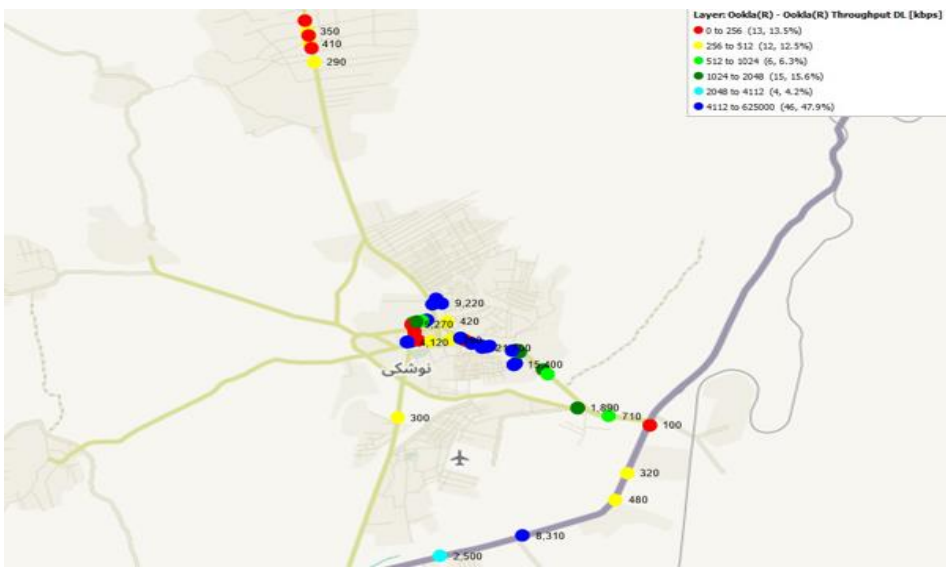
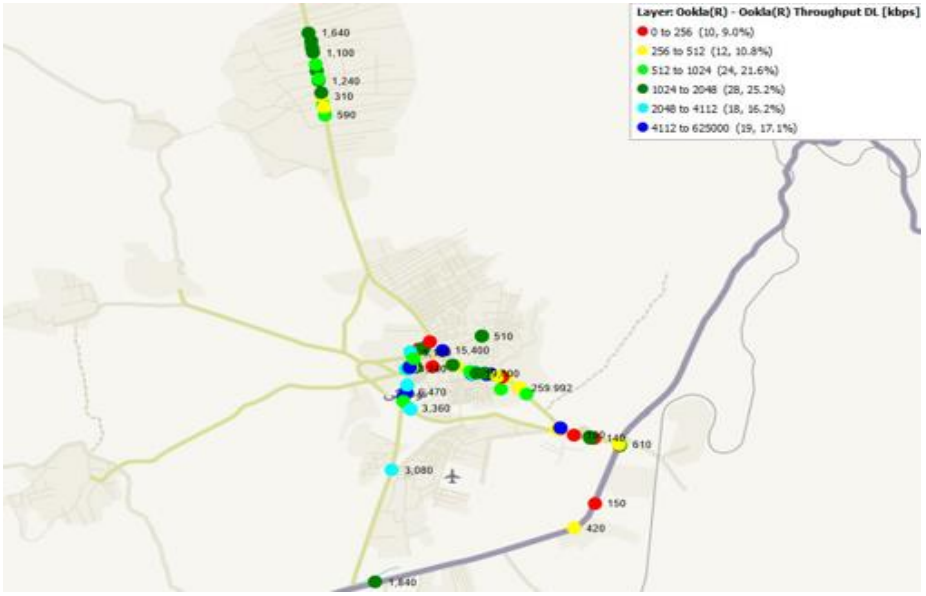
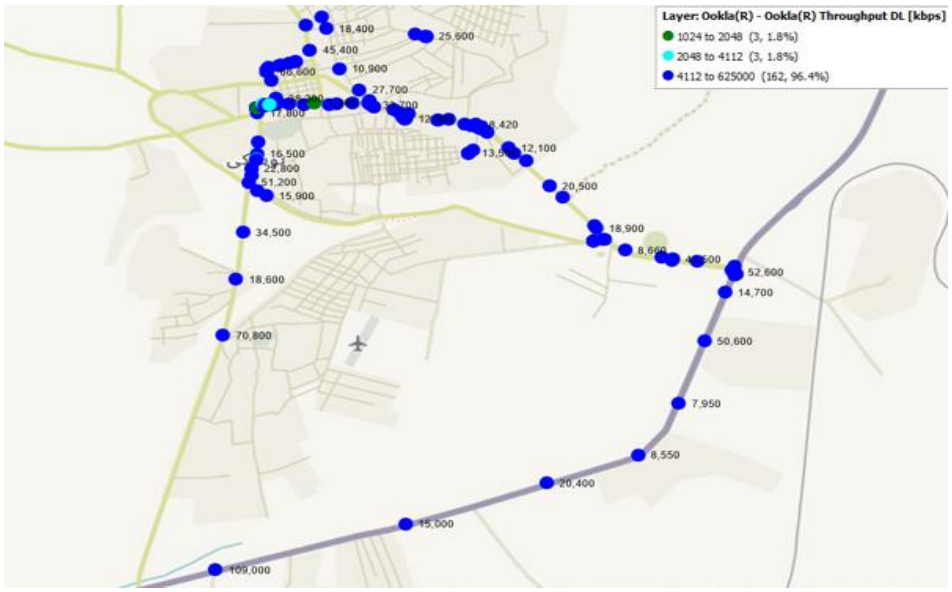
UFONE DOWNLOAD THROUGHPUT – NAWABSHAH



ZONG DOWNLOAD THROUGHPUT – NAWABSHAH

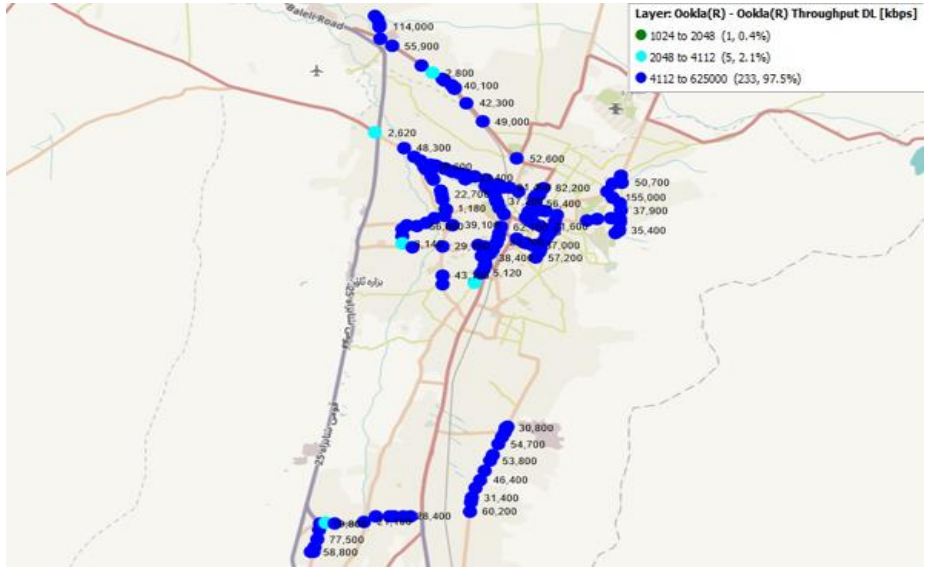


OOKLA SPEED TEST RESULTS

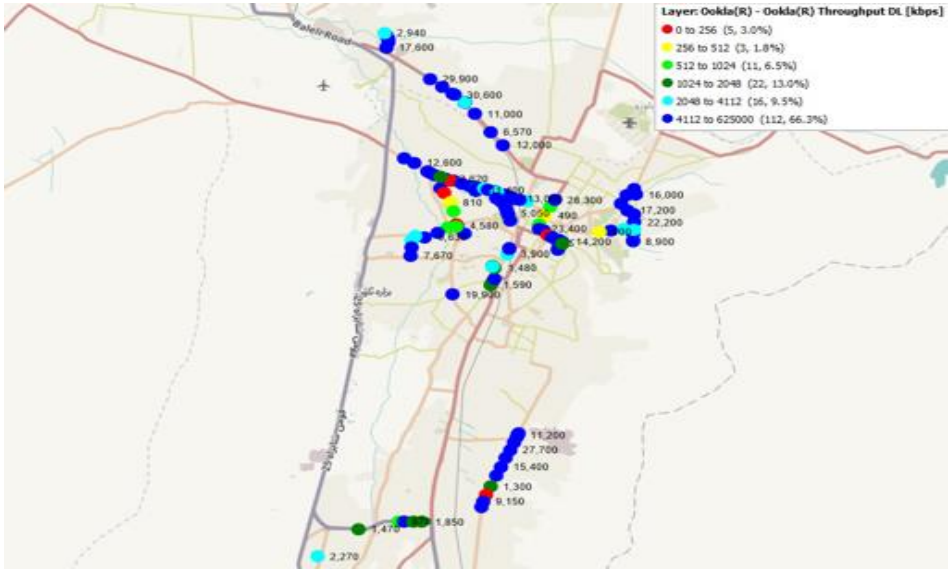
JAZZ DOWNLOAD THROUGHPUT – NUSHKI	TELENOR DOWNLOAD THROUGHPUT – NUSHKI
	
UFONE DOWNLOAD THROUGHPUT – NUSHKI	**ZONG DOWNLOAD THROUGHPUT – NUSHKI**
	

OOKLA SPEED TEST RESULTS

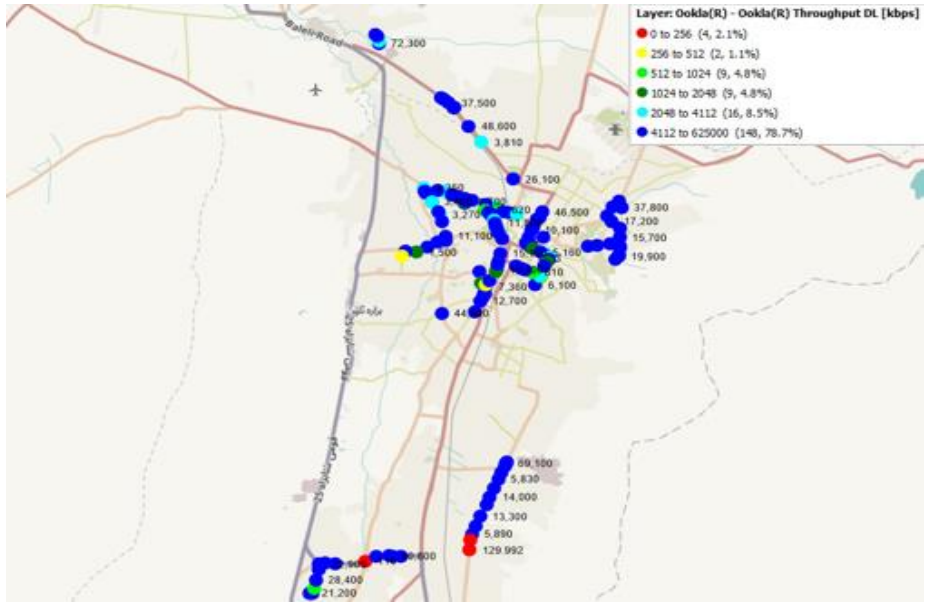
JAZZ DOWNLOAD THROUGHPUT – QUETTA



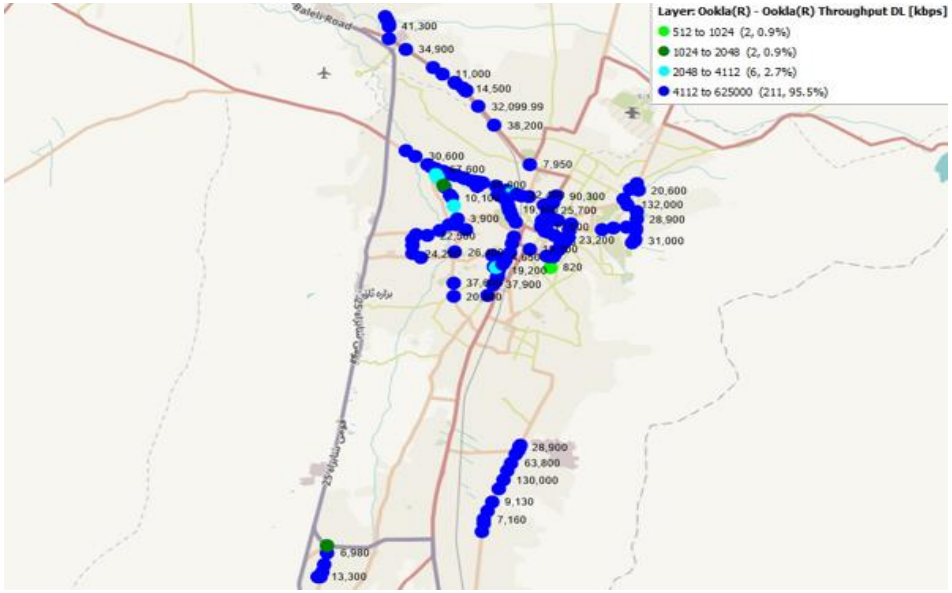
TELENOR DOWNLOAD THROUGHPUT – QUETTA



UFONE DOWNLOAD THROUGHPUT – QUETTA

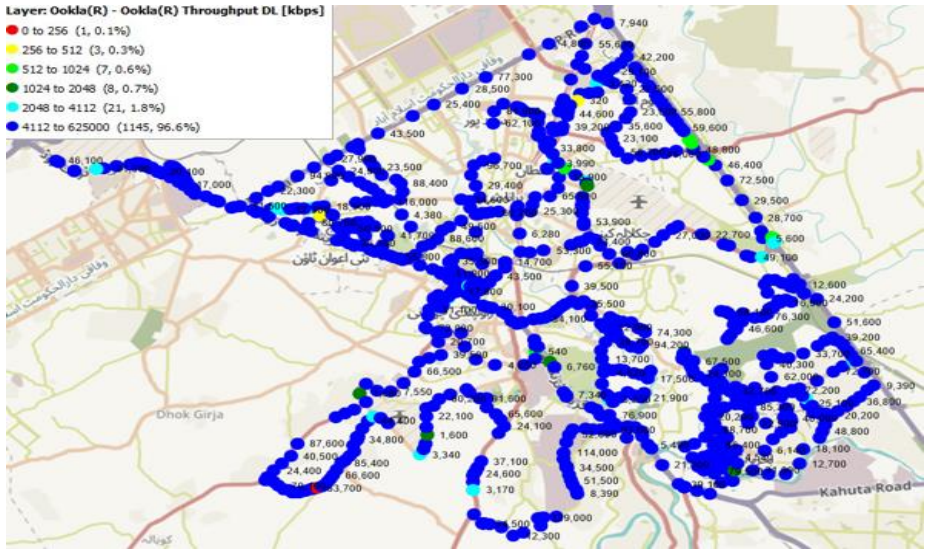


ZONG DOWNLOAD THROUGHPUT – QUETTA

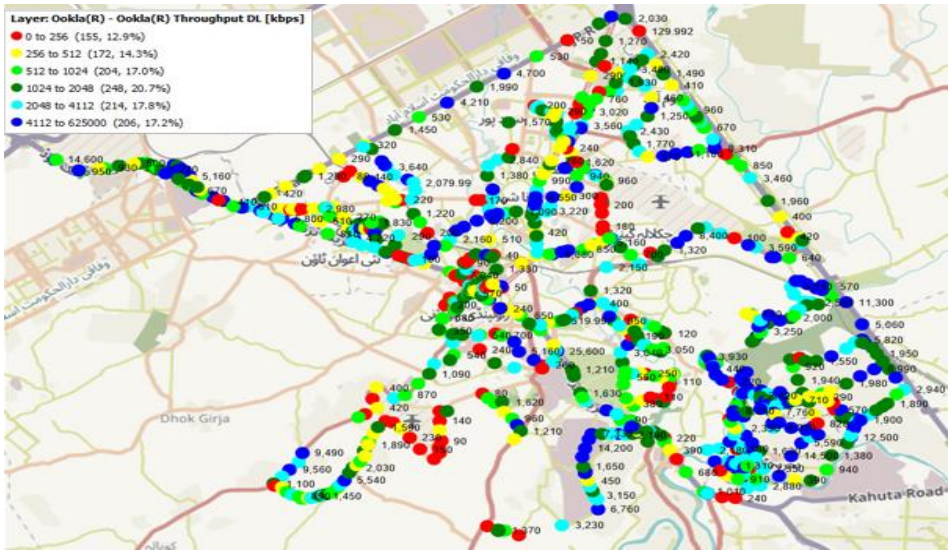


OOKLA SPEED TEST RESULTS

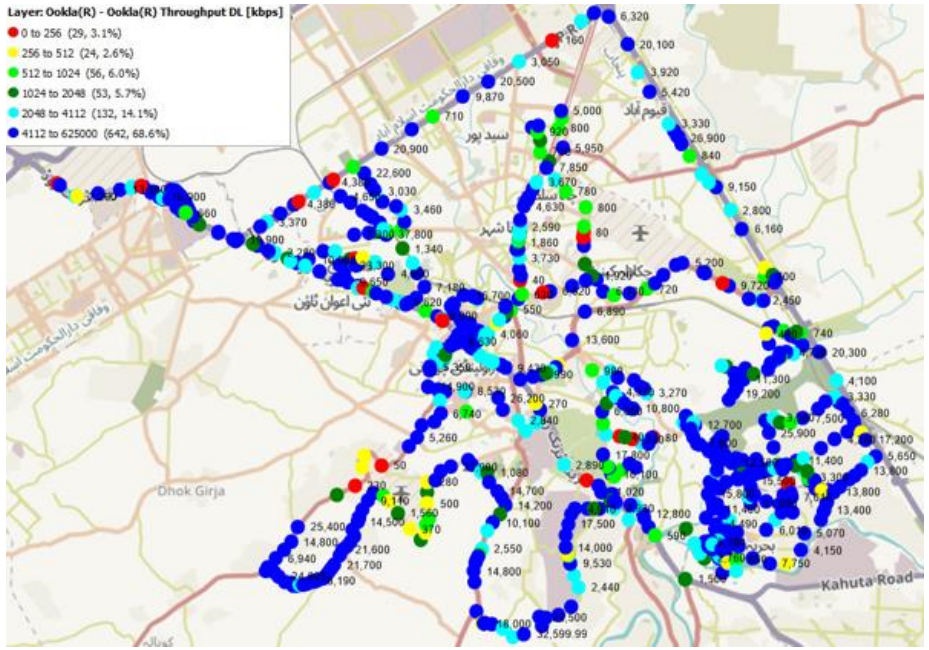
JAZZ DOWNLOAD THROUGHPUT – RAWALPINDI



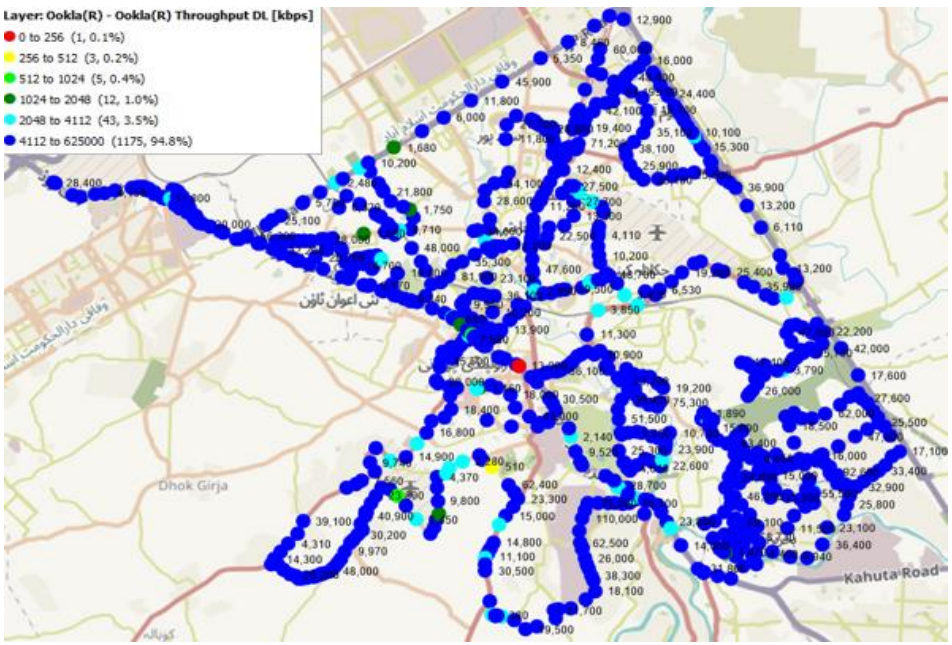
TELENOR DOWNLOAD THROUGHPUT – RAWALPINDI



UFONE DOWNLOAD THROUGHPUT – RAWALPINDI

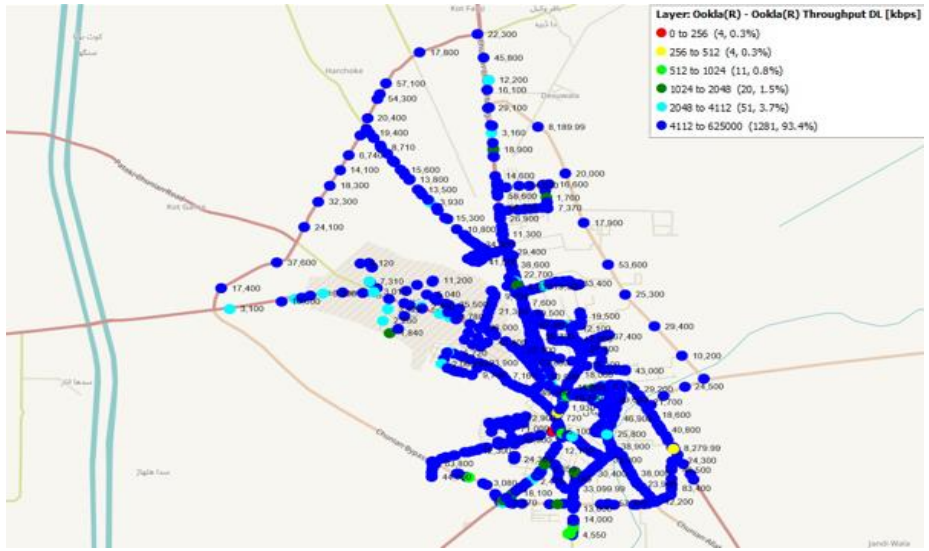


ZONG DOWNLOAD THROUGHPUT – RAWALPINDI

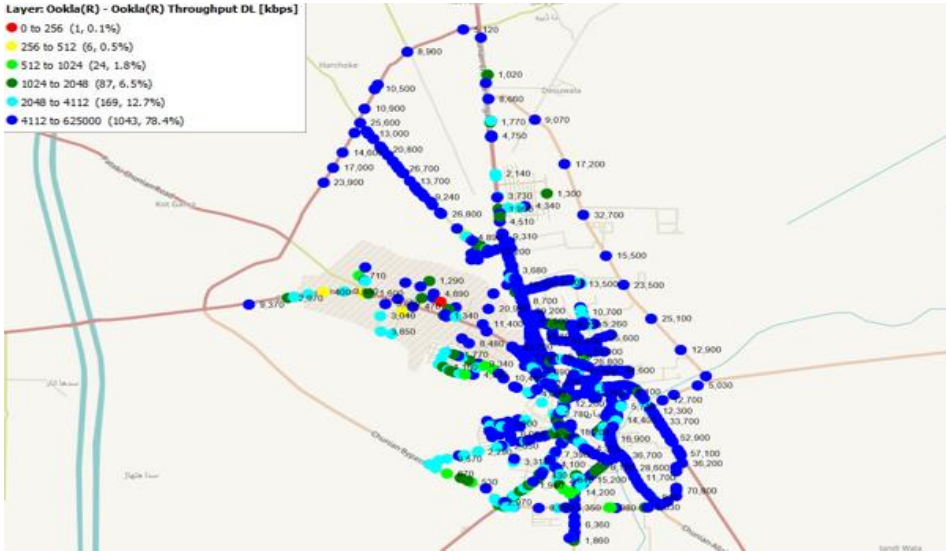


OOKLA SPEED TEST RESULTS

JAZZ DOWNLOAD THROUGHPUT – CHUNIAN



TELENOR DOWNLOAD THROUGHPUT – CHUNIAN



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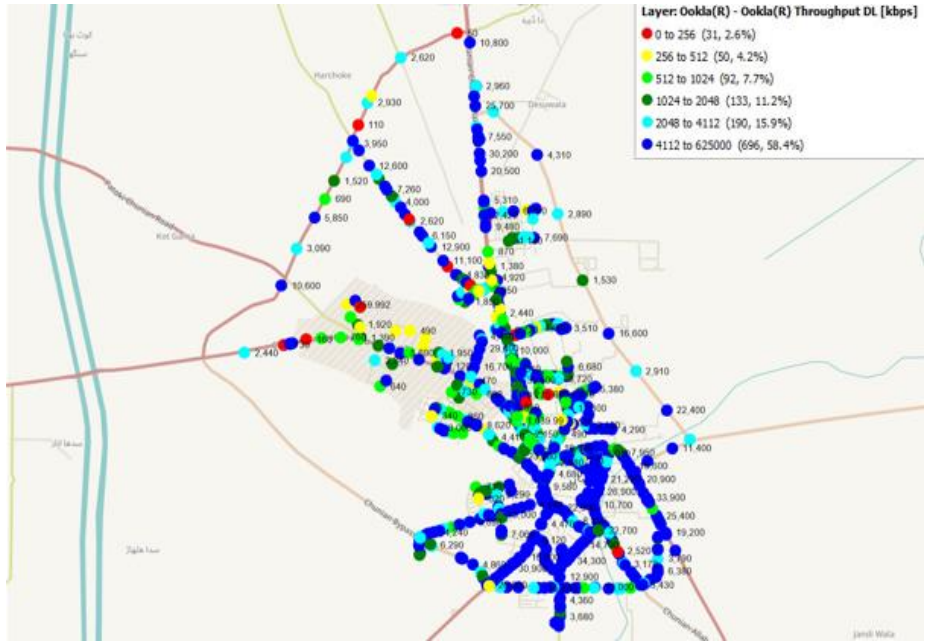
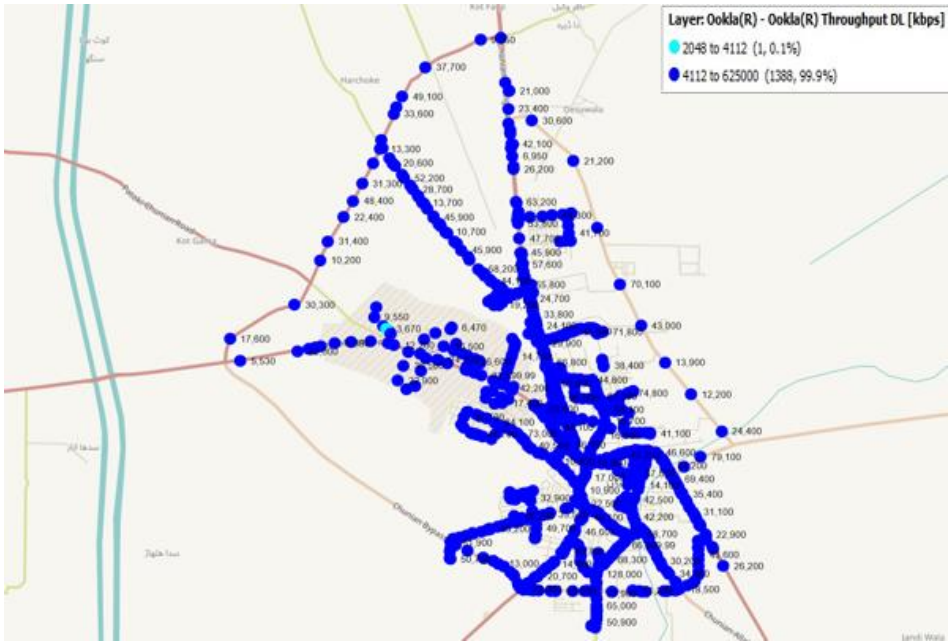
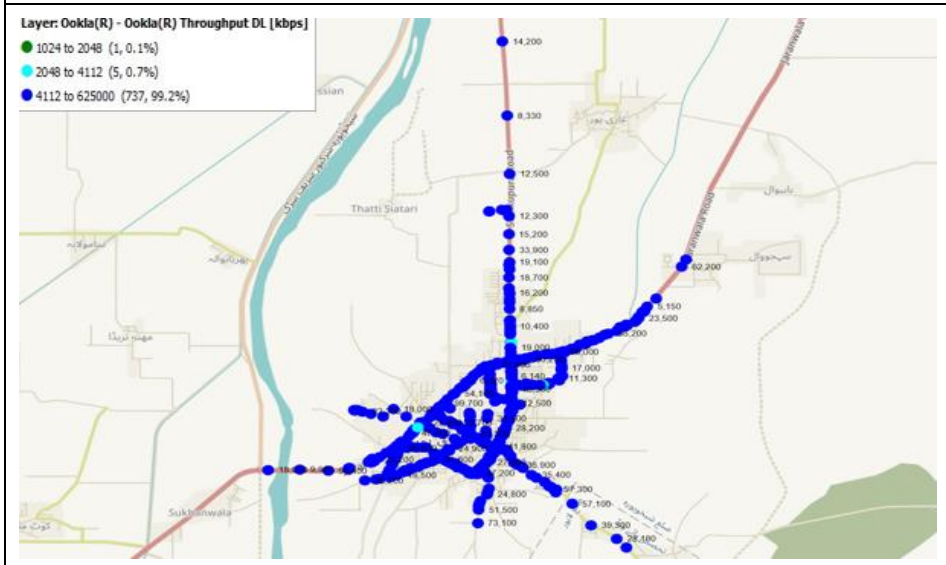


ZONG DOWNLOAD THROUGHPUT – CHUNIAN

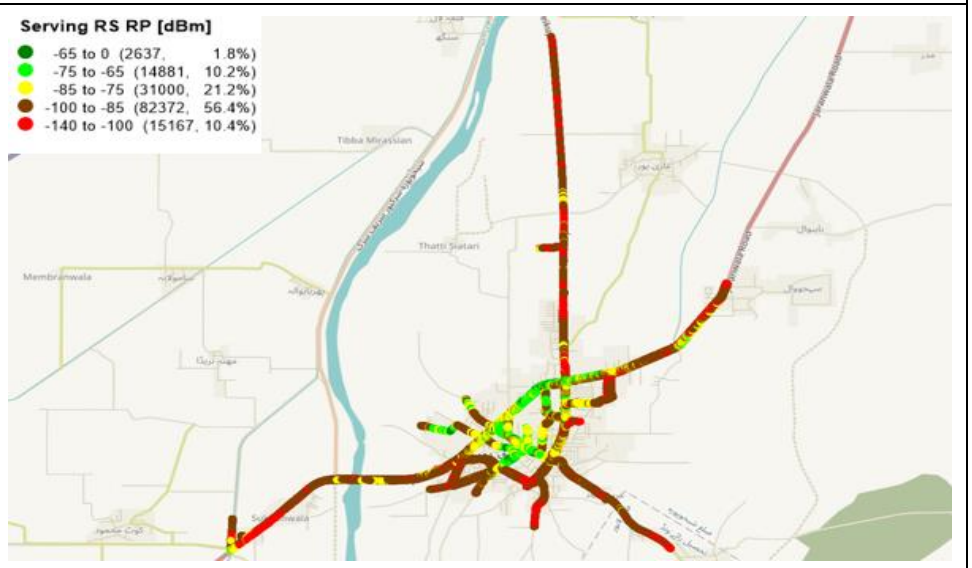


OOKLA SPEED TEST RESULTS

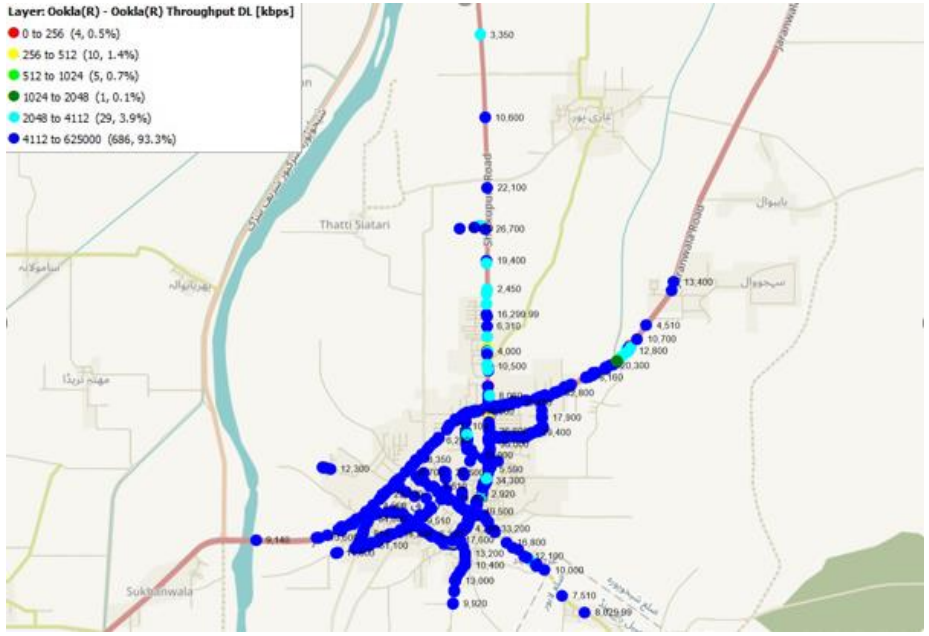
JAZZ DOWNLOAD THROUGHPUT – SHARAQPUR



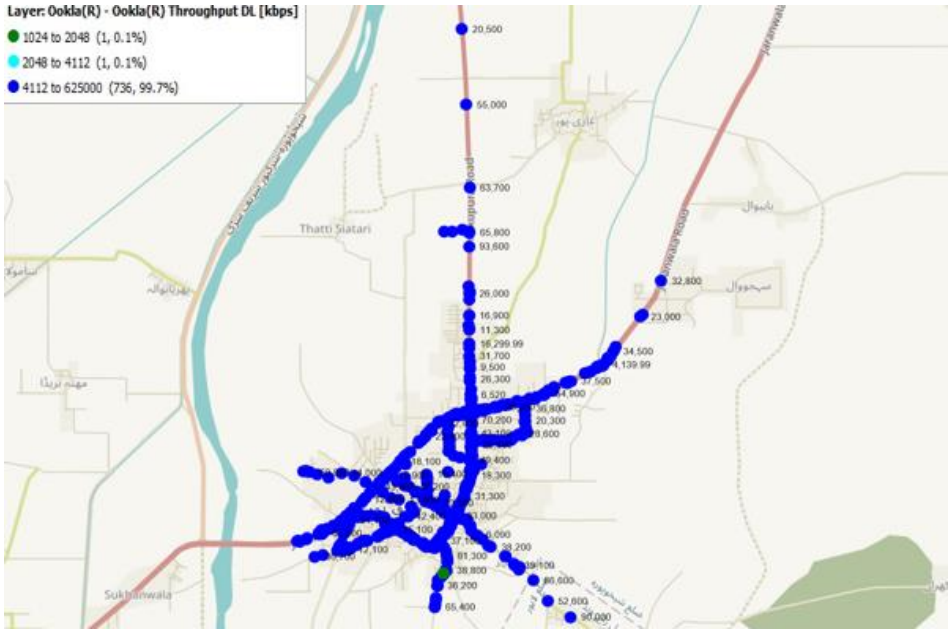
TELENOR DOWNLOAD THROUGHPUT – SHARAQPUR



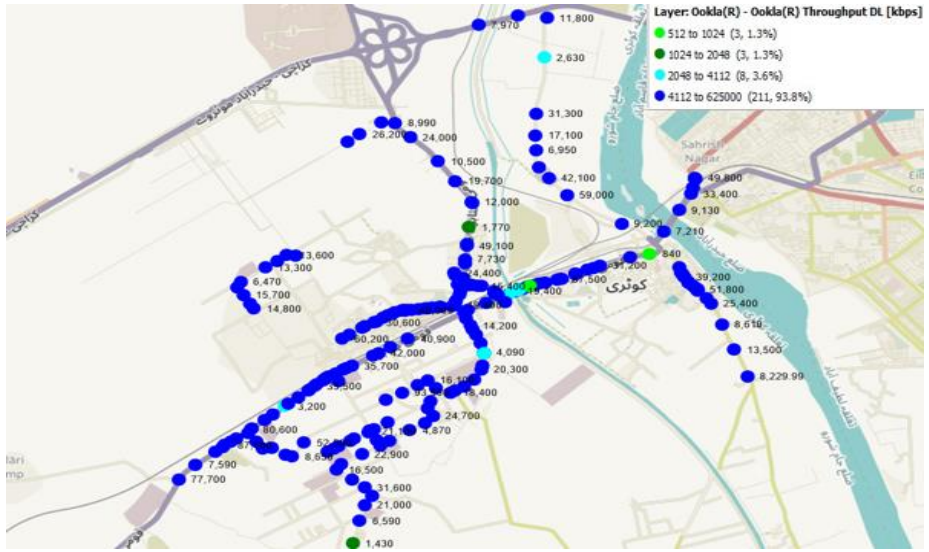
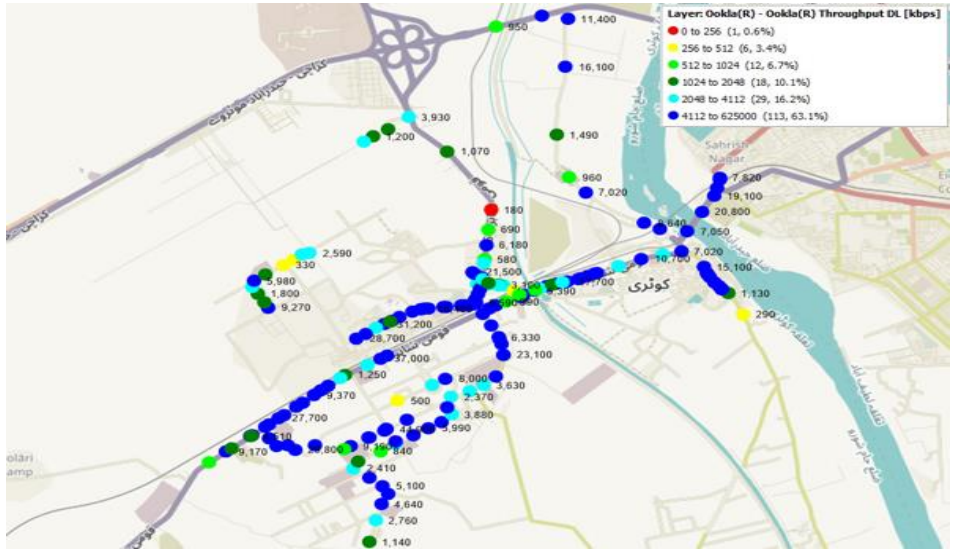
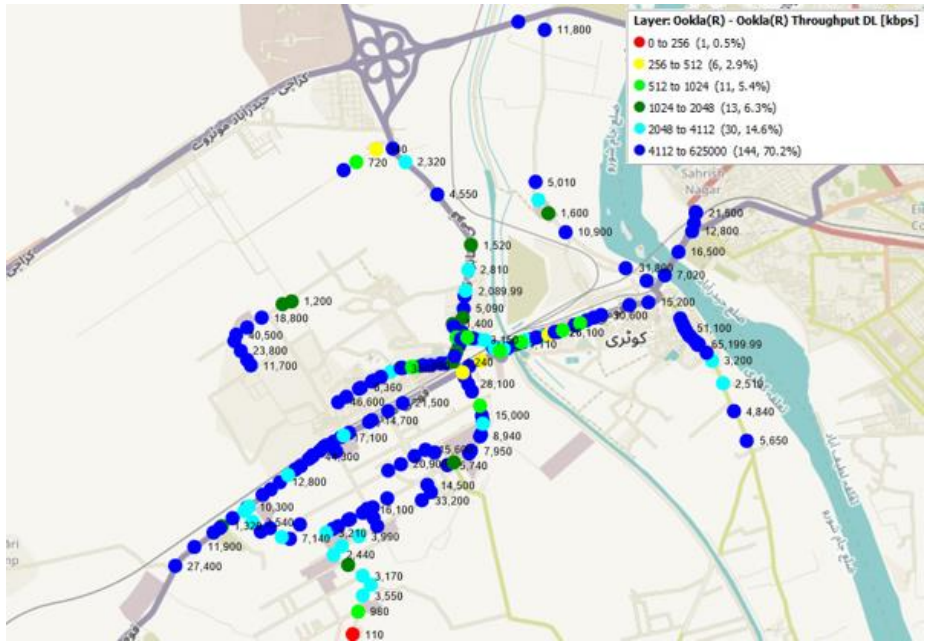
UFONE DOWNLOAD THROUGHPUT – SHARAQPUR



ZONG DOWNLOAD THROUGHPUT – SHARAQPUR



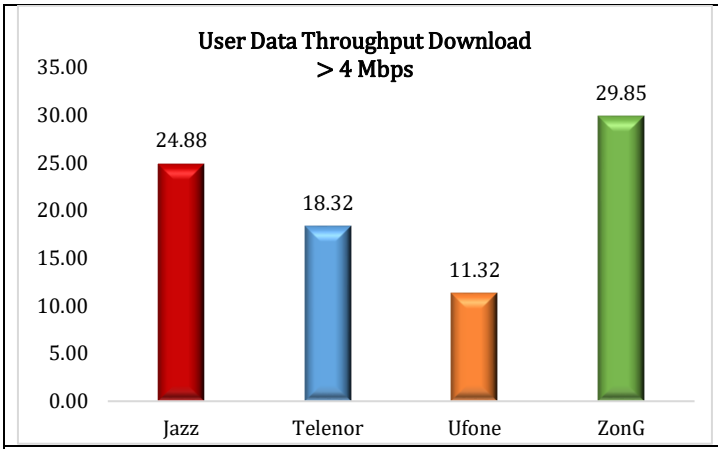
OOKLA SPEED TEST RESULTS

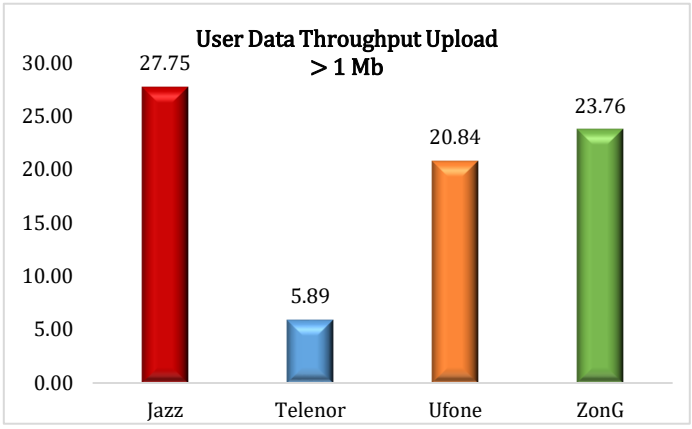
JAZZ NETWORK COVERAGE –KOTRI	TELENOR 3G NETWORK COVERAGE – KOTRI
	
UFONE NETWORK COVERAGE – KOTRI	**ZONG NETWORK COVERAGE – KOTRI**
	

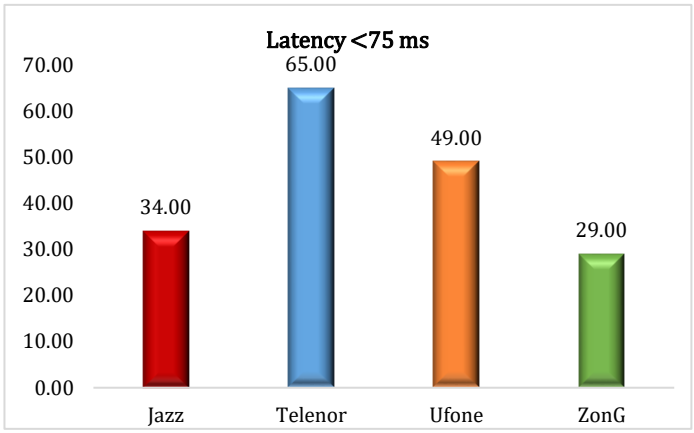
Annex -B1(Data QoS Results)

OOKLA

QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –BAHAWALNAGAR







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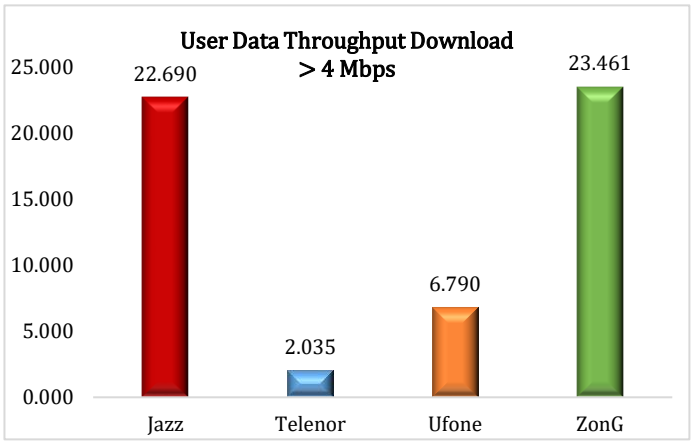
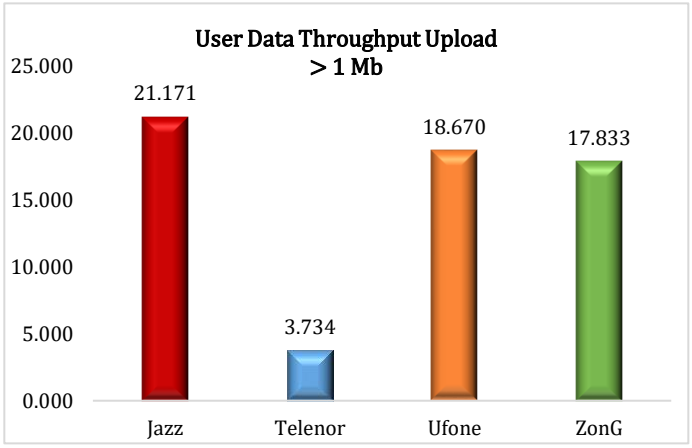
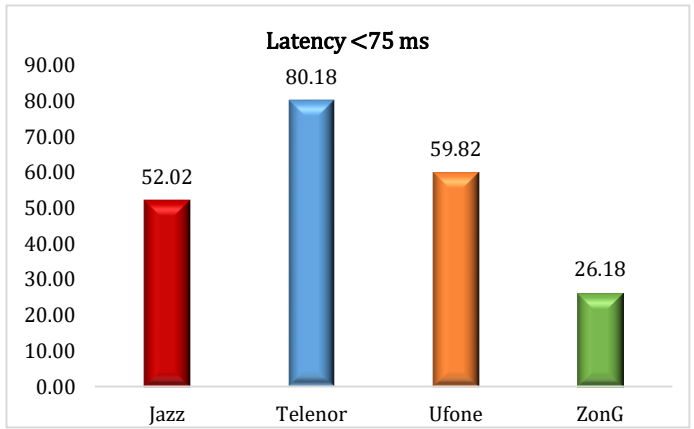
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –D.I KHAN







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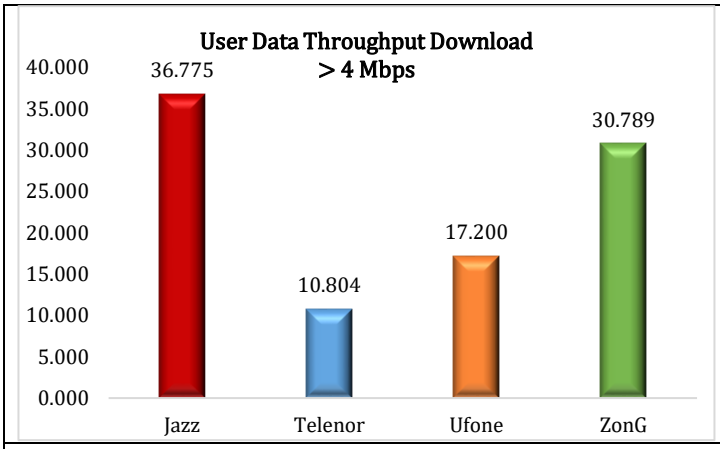
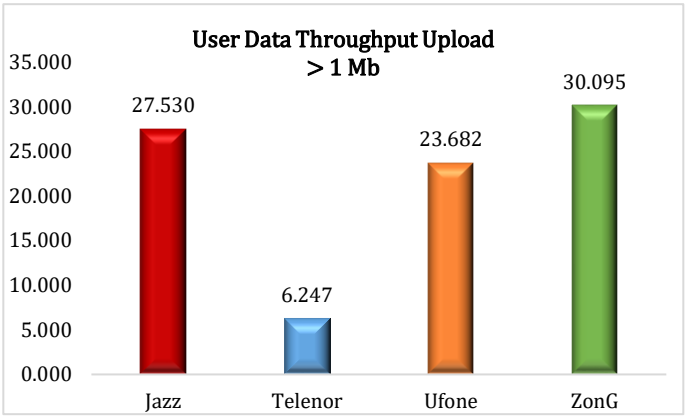
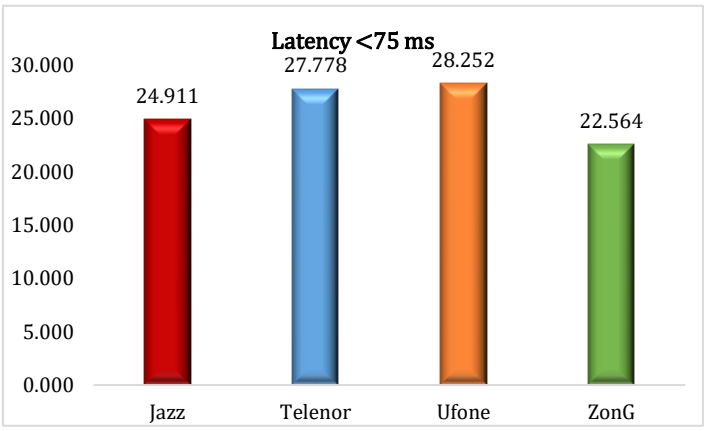
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –HYDERABAD







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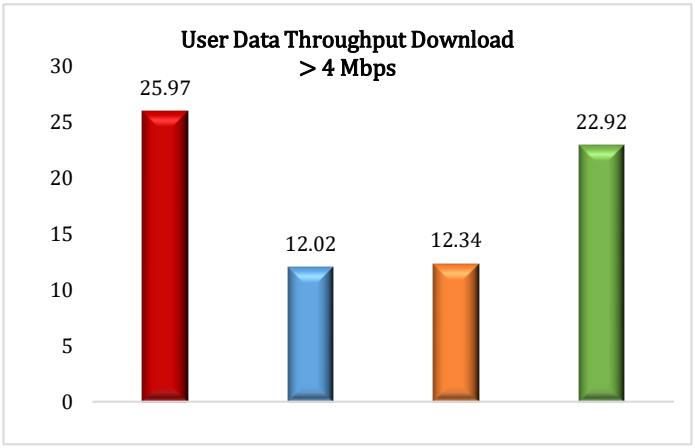
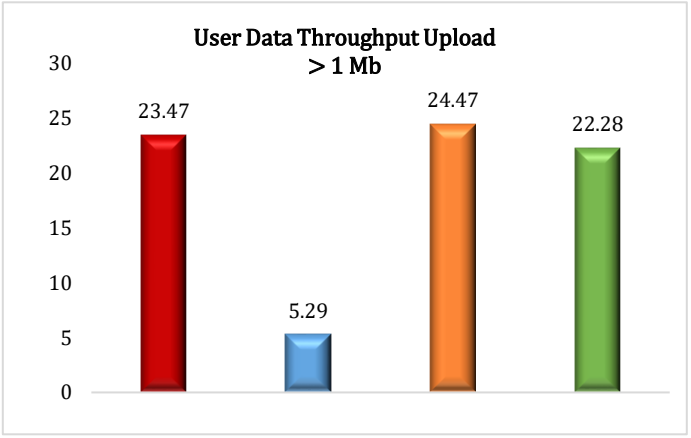
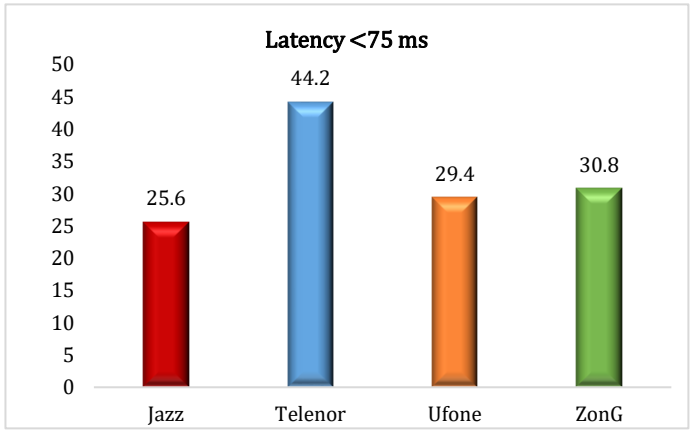
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) – SHIKARPUR







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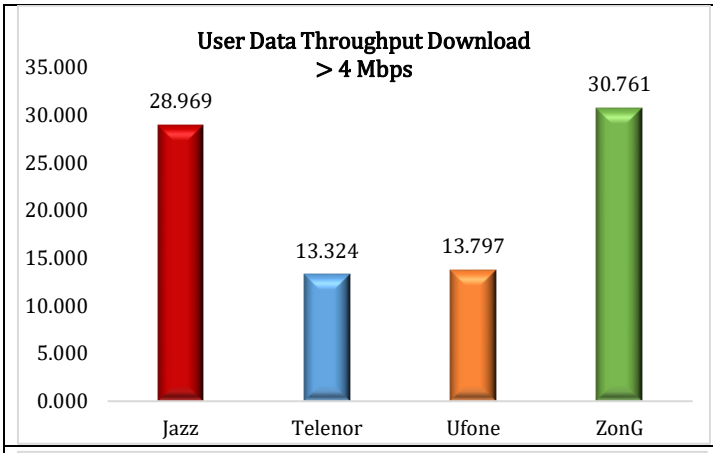
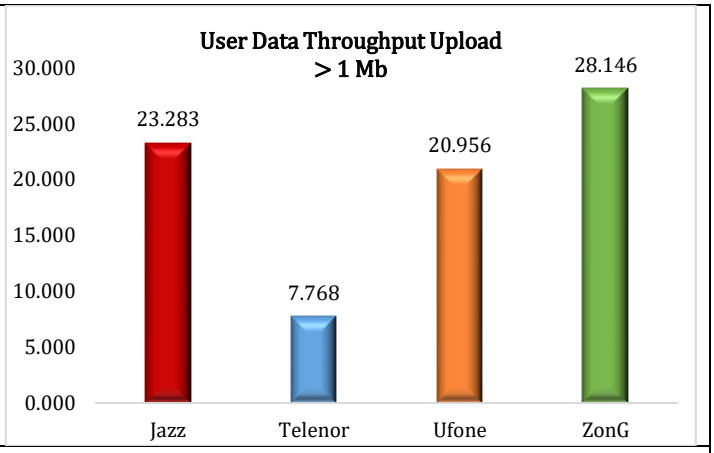
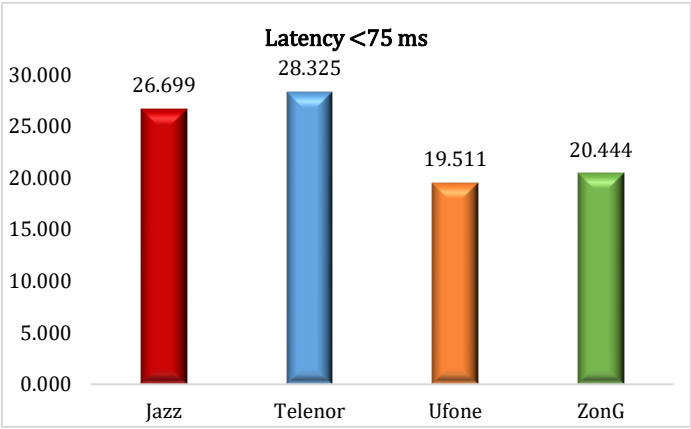
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –KARACHI MALIR







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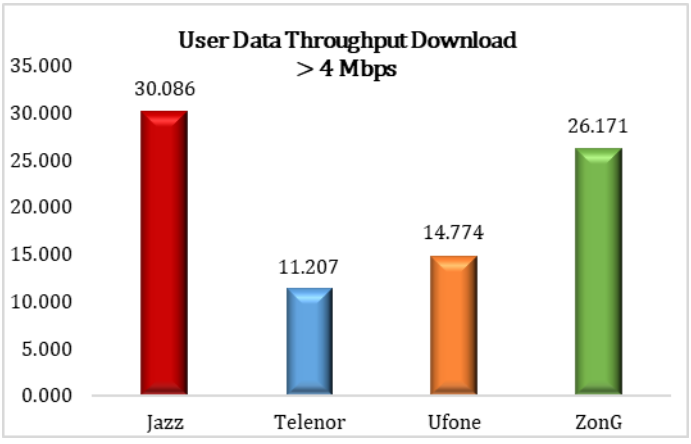
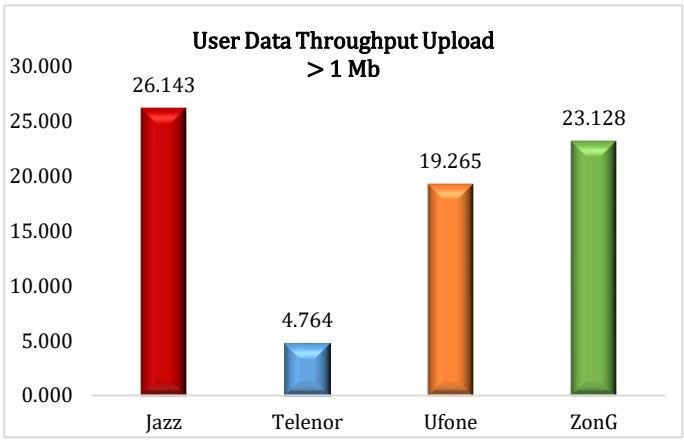
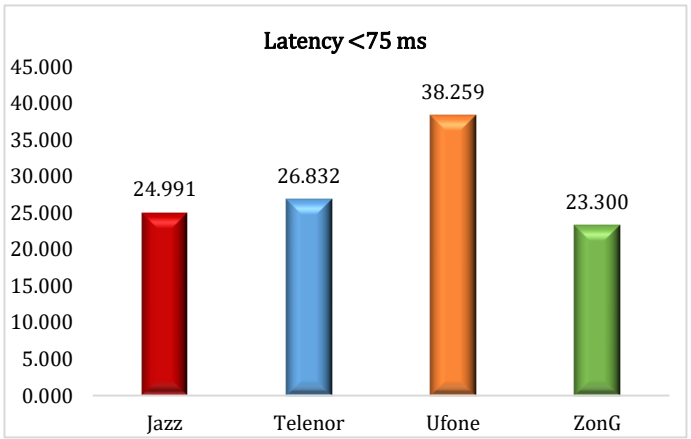
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –KOTRI







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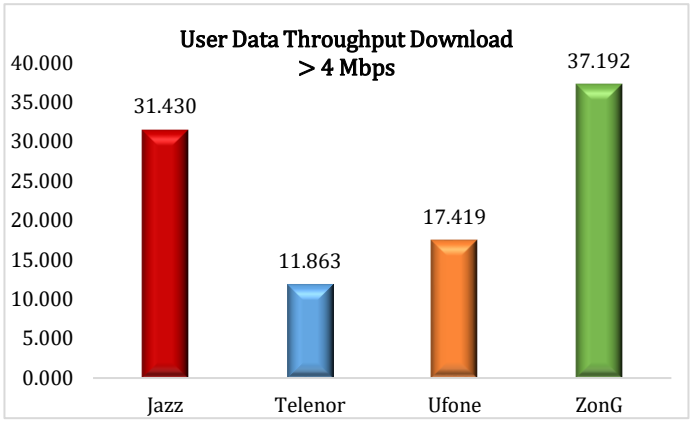
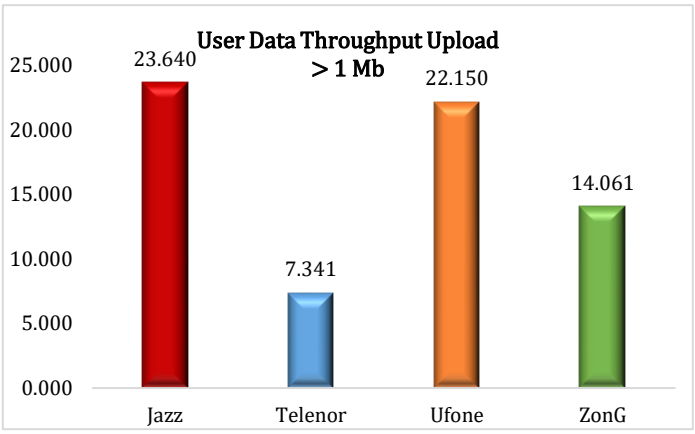
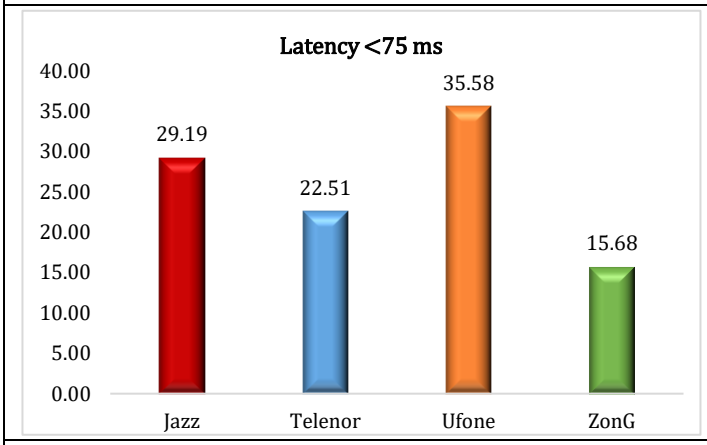
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –LAHORE







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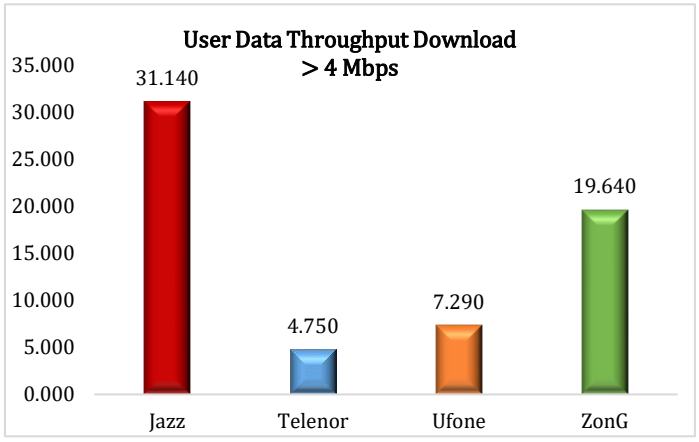
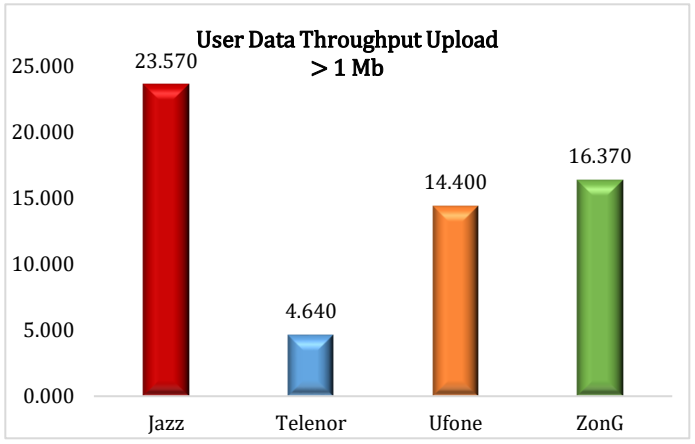
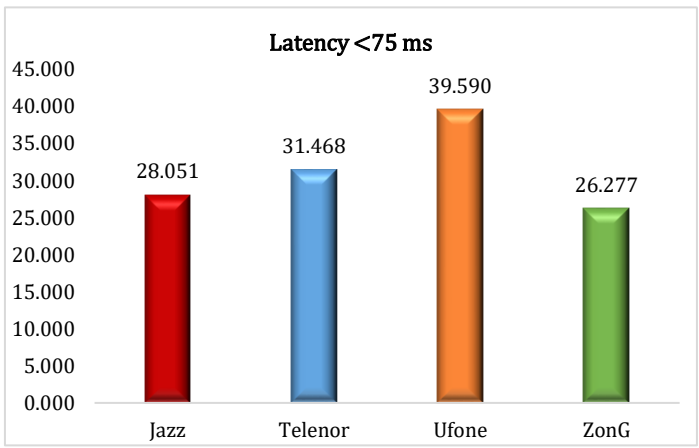
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –MARDAN







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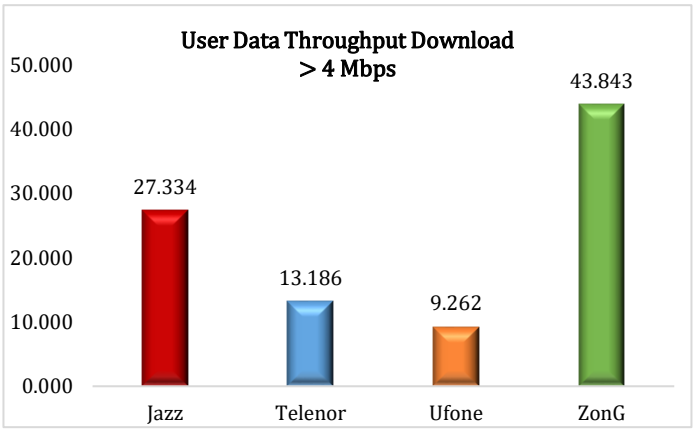
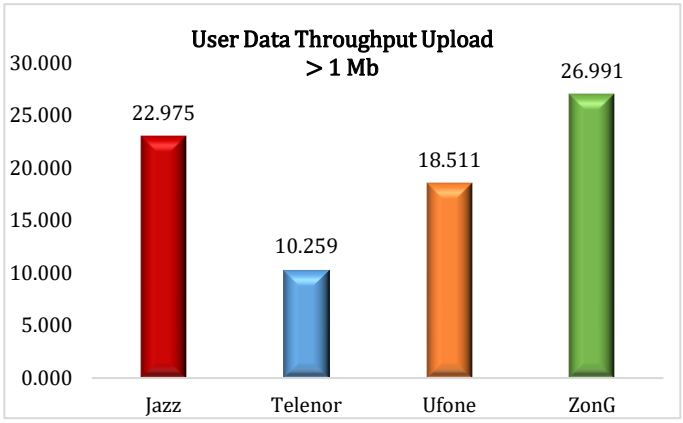
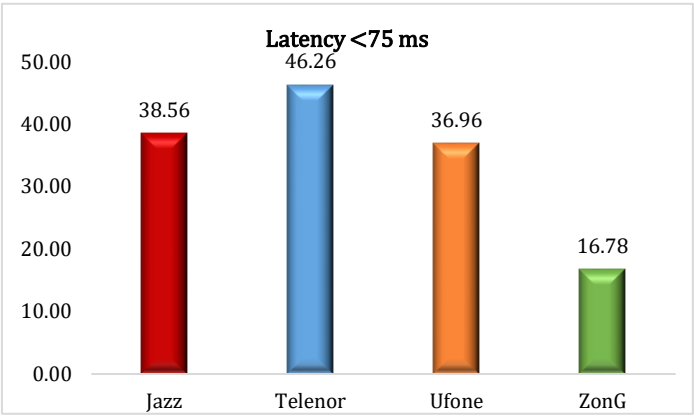
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –CHUNIAN







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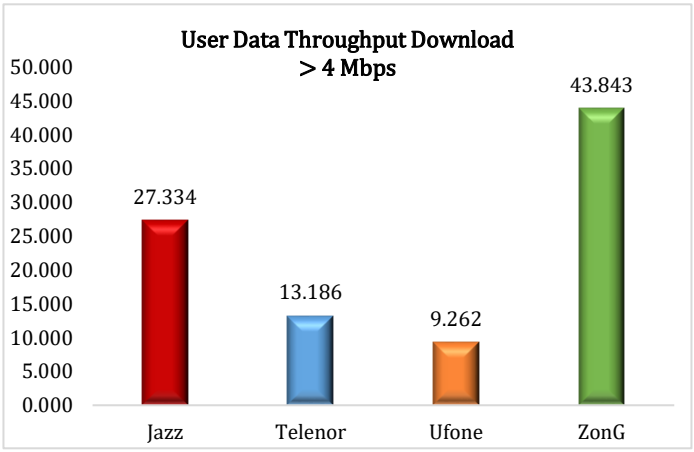
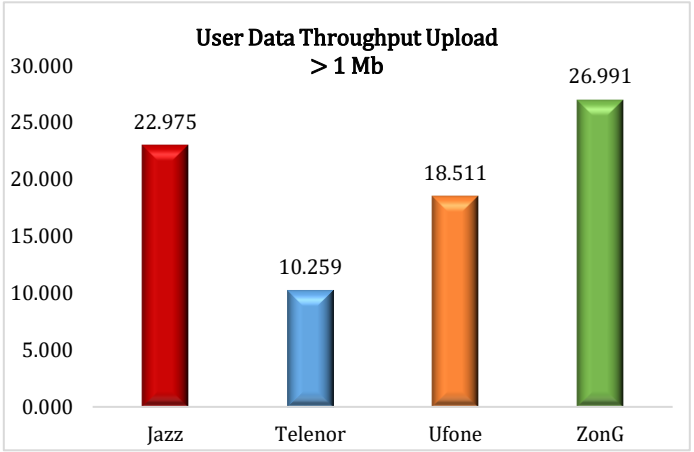
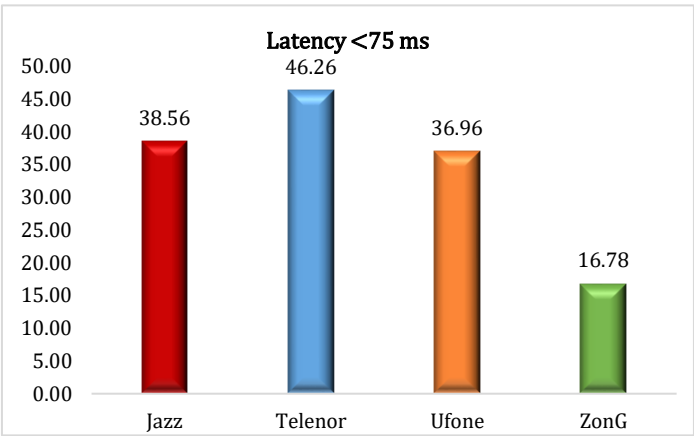
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –SHARAQPUR







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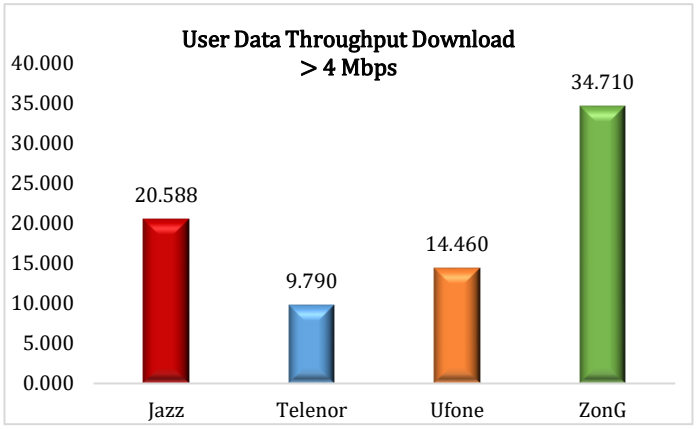
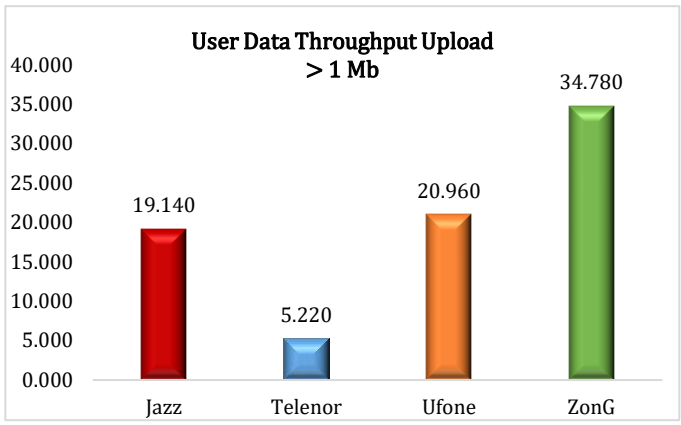
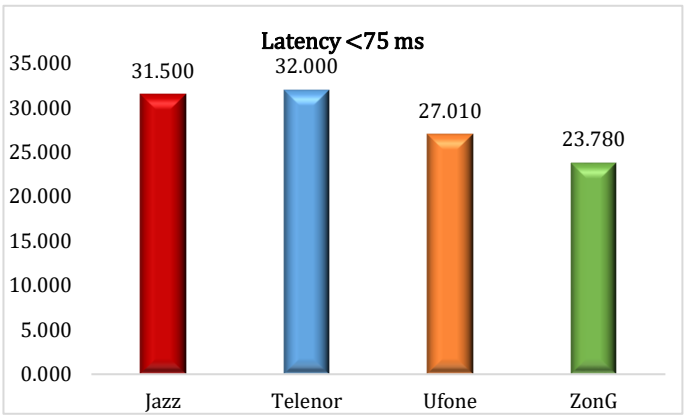
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –NAWABSHAH







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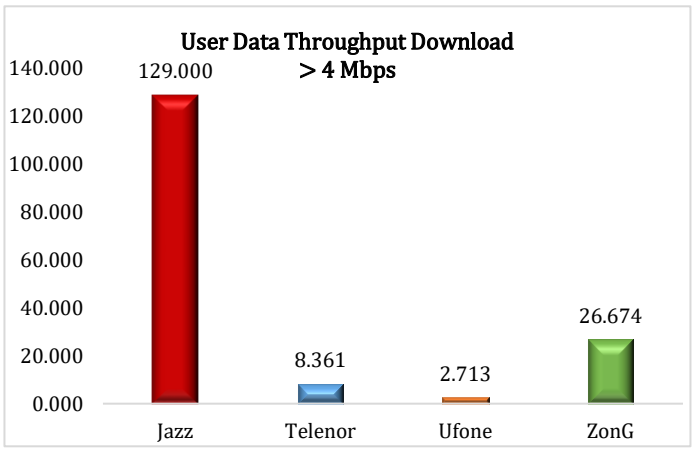
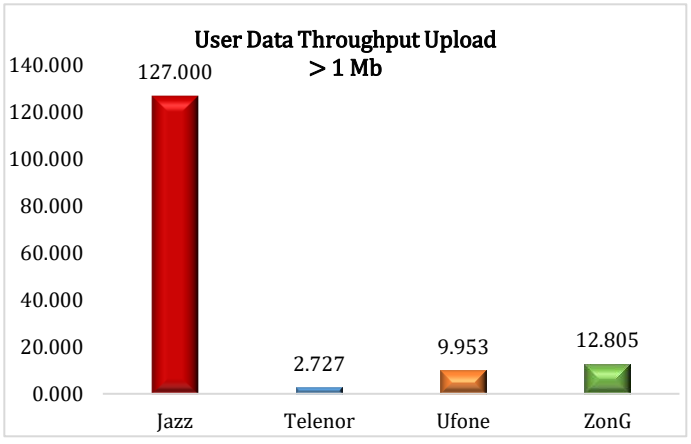
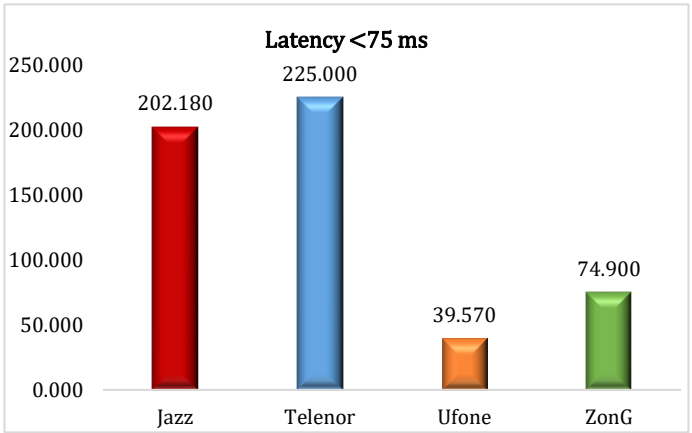
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –NUSHKI







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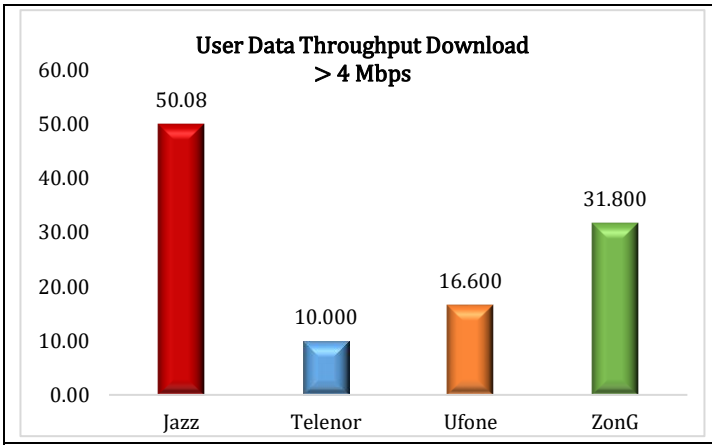
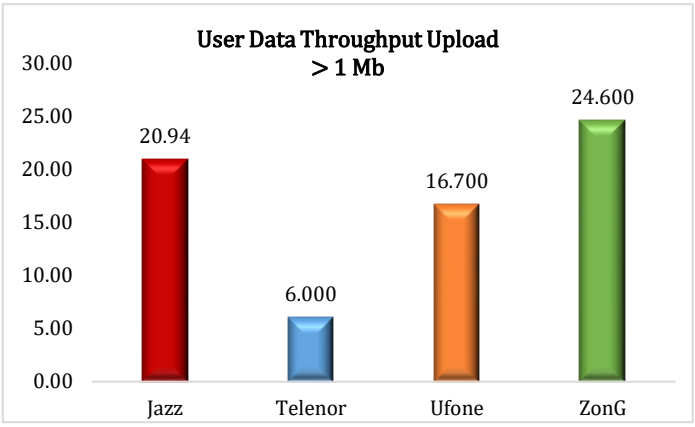
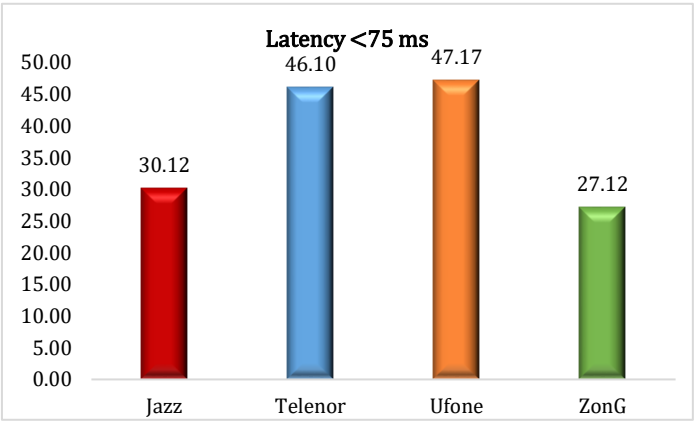
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –QUETTA







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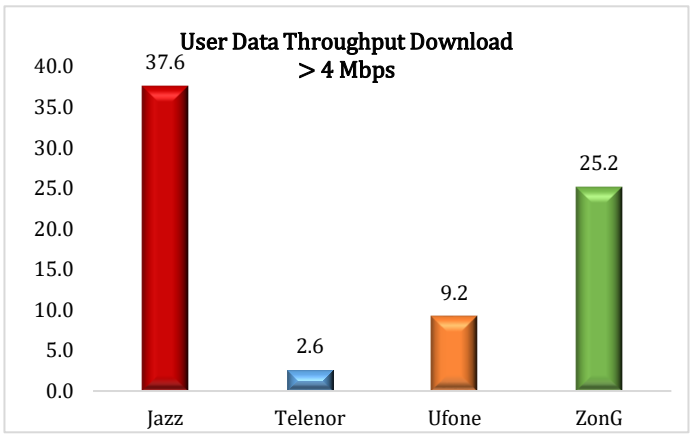
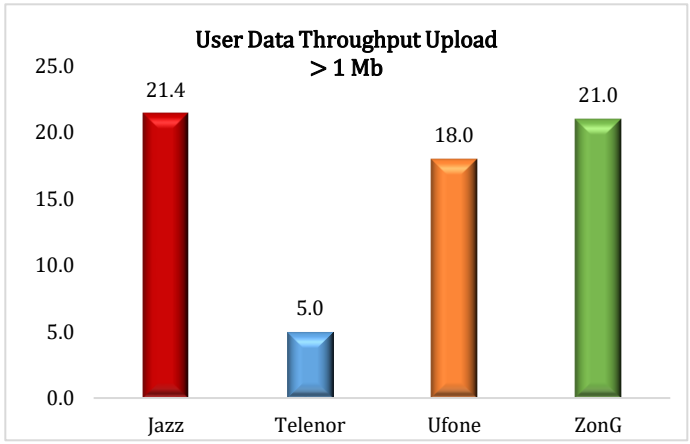
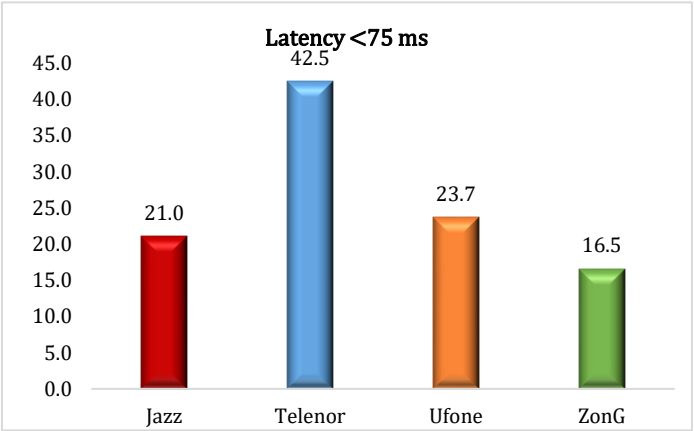
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –RAWALPINDI







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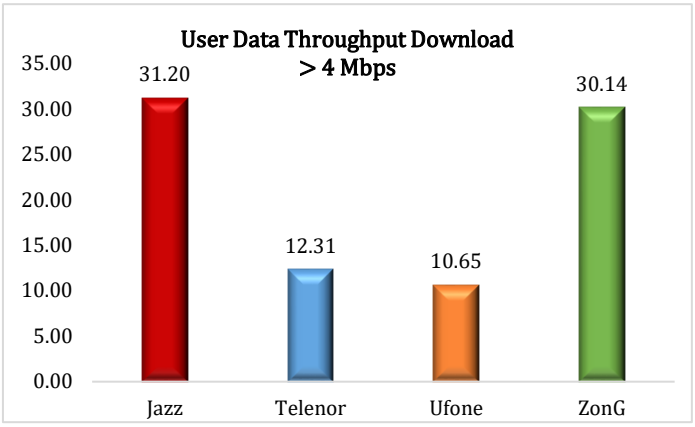
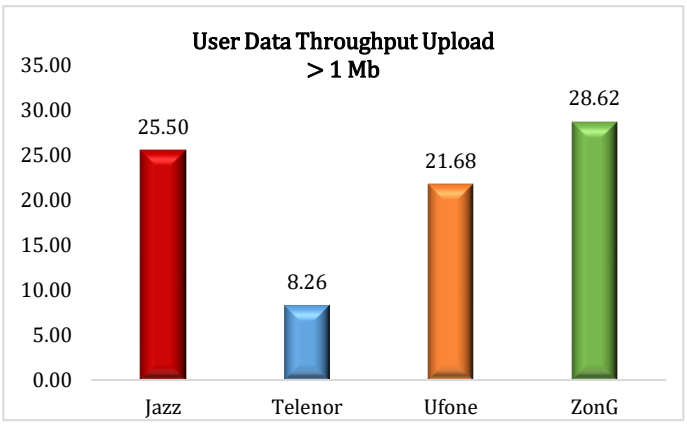
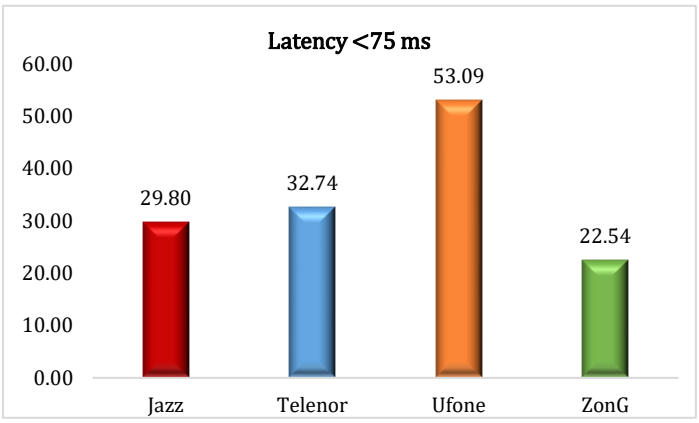
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –SAMUNDARI







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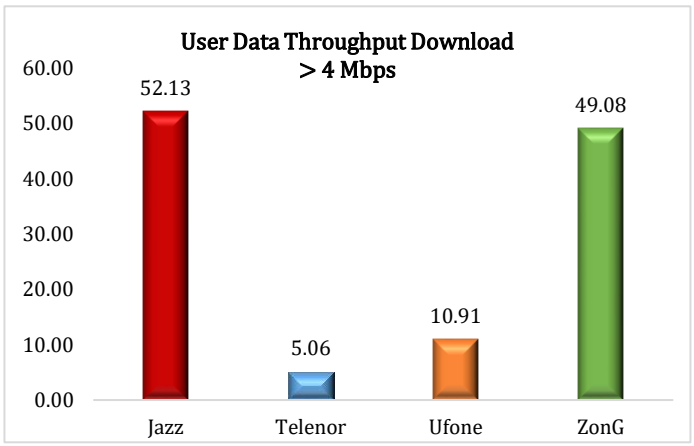
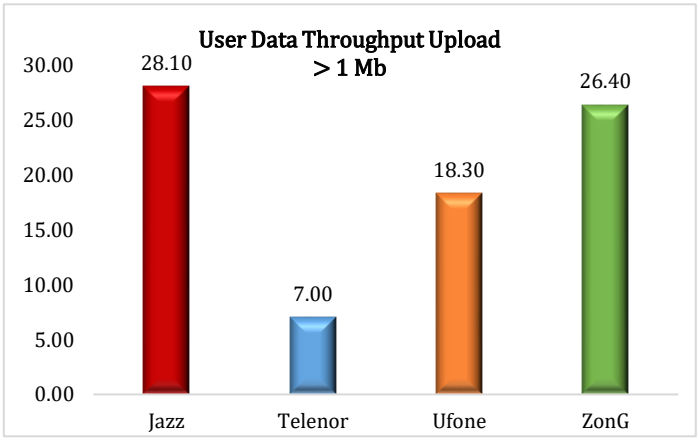
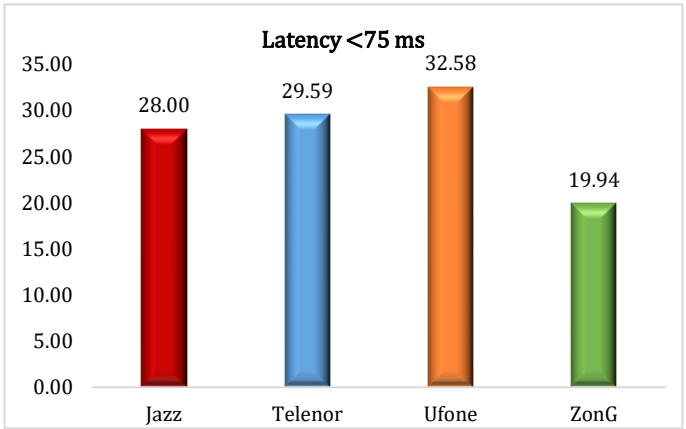
QUALITY OF SERVICE SURVEY RESULTS (OOKLA) –JHELUM







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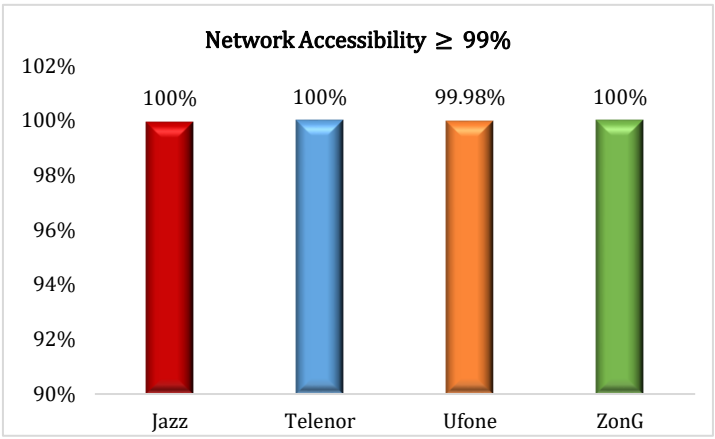
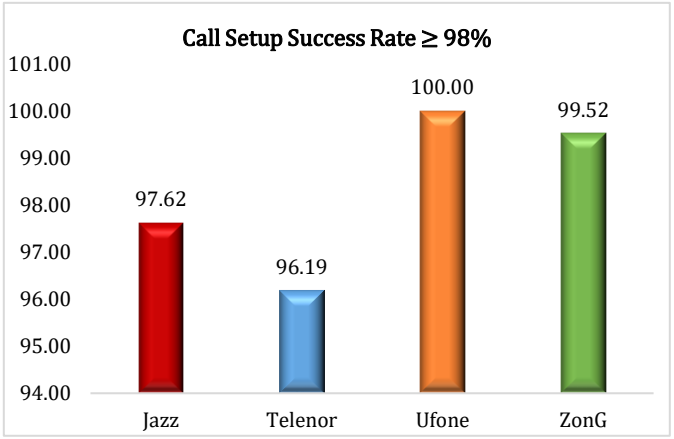
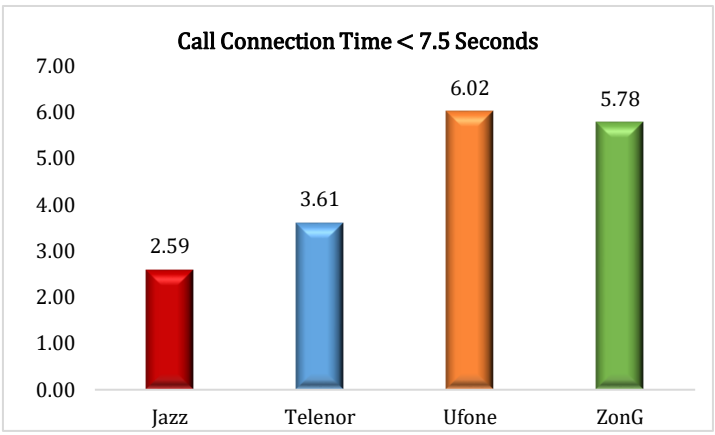
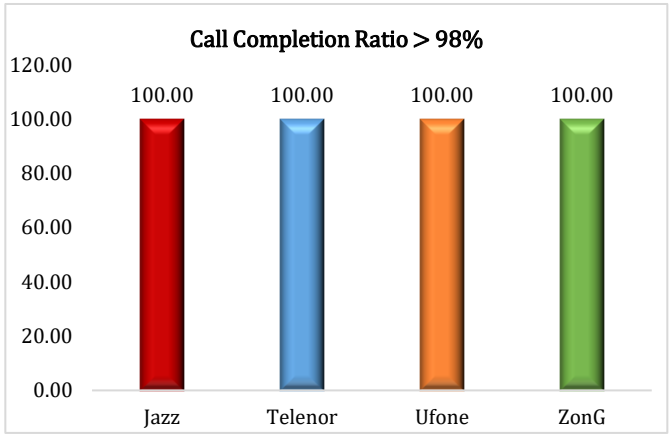
VOICE & SMS AUTOMODE

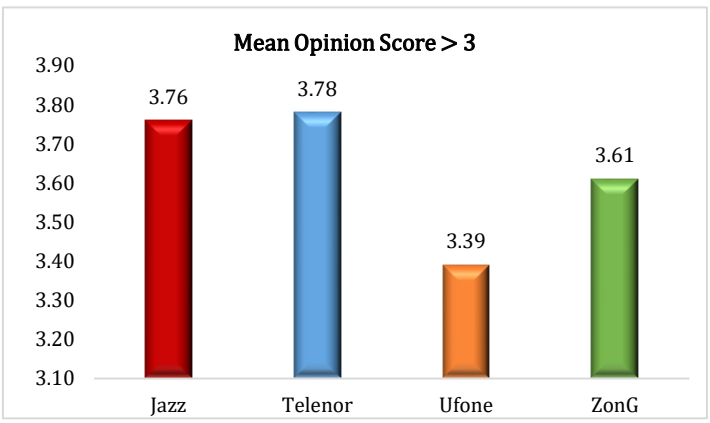
QUALITY OF SERVICE SURVEY RESULTS – BAHAWALNAGAR











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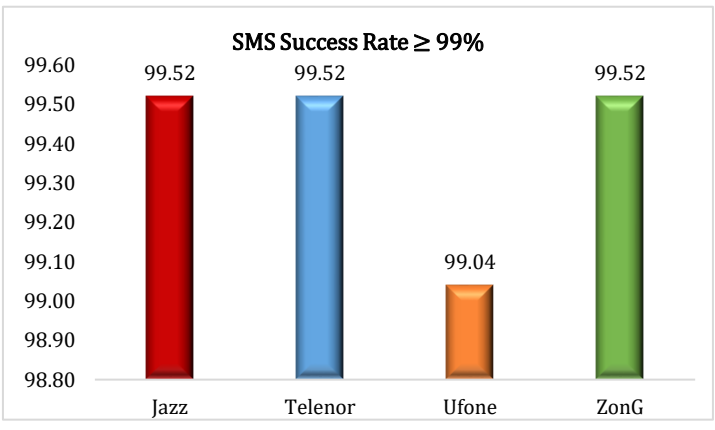
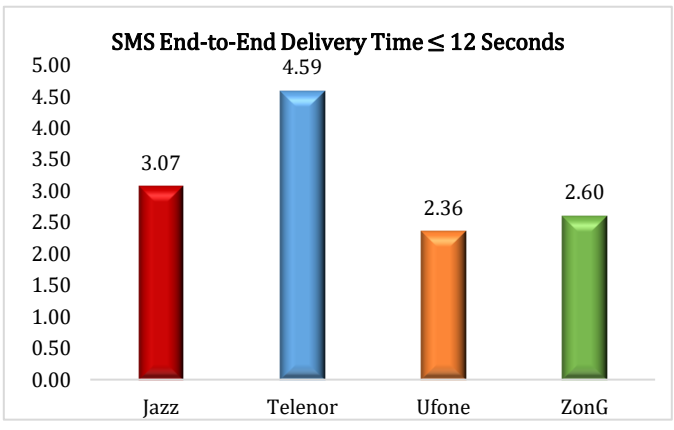
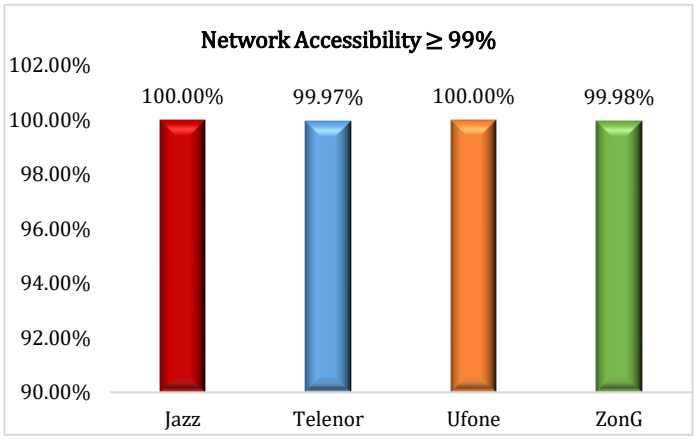
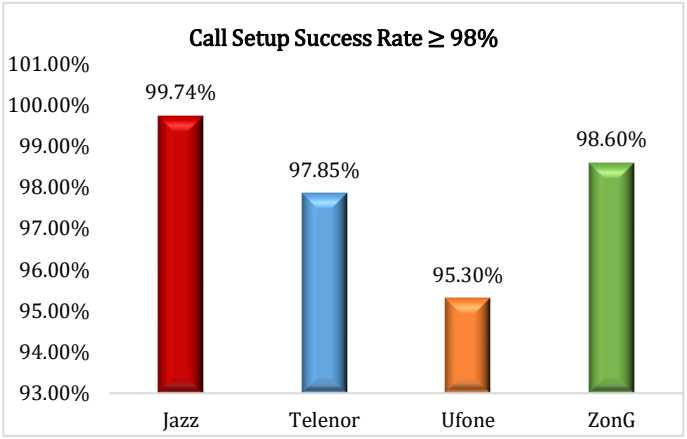
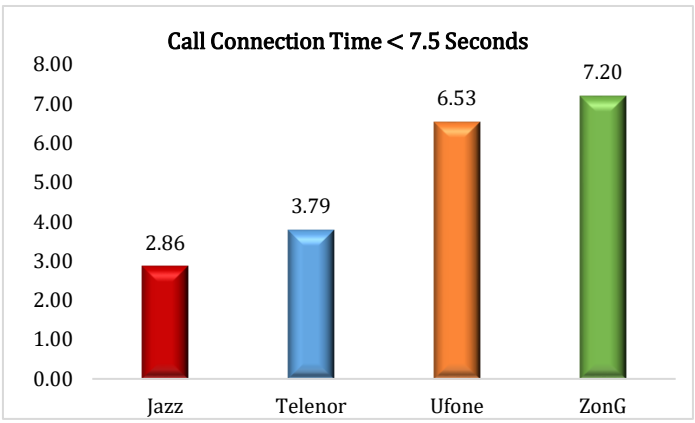


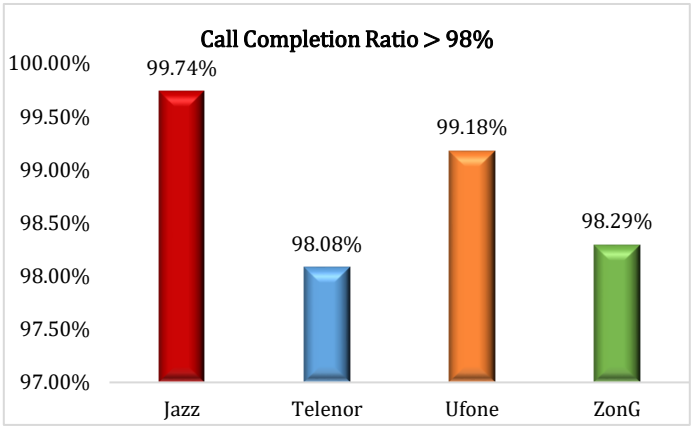


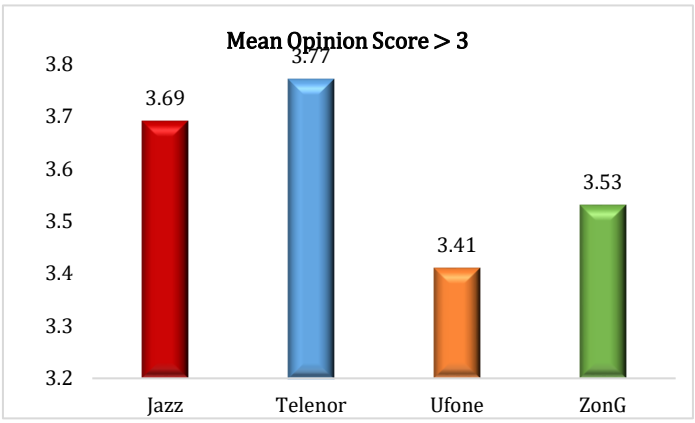
QUALITY OF SERVICE SURVEY RESULTS – D.I KHAN











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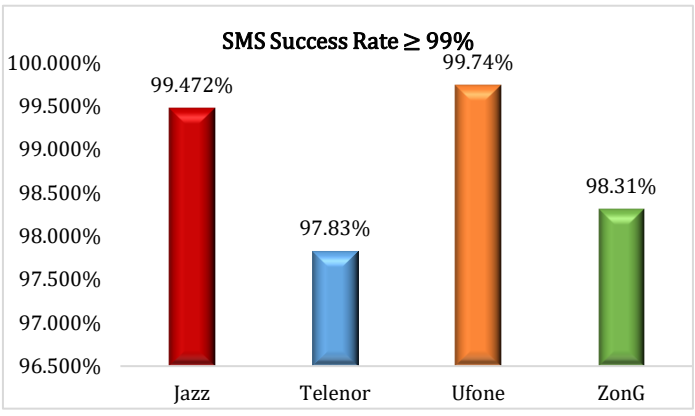
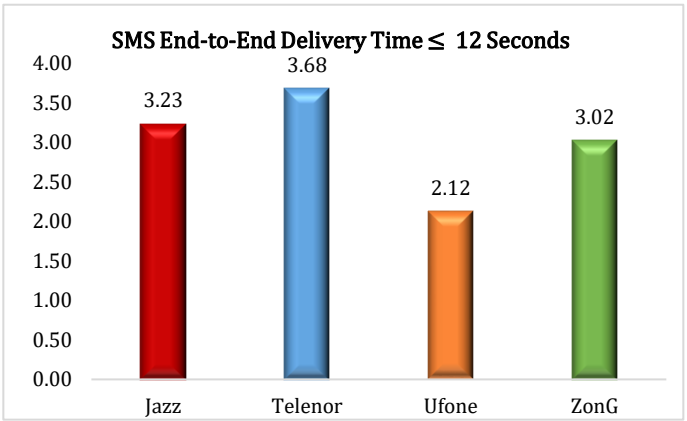
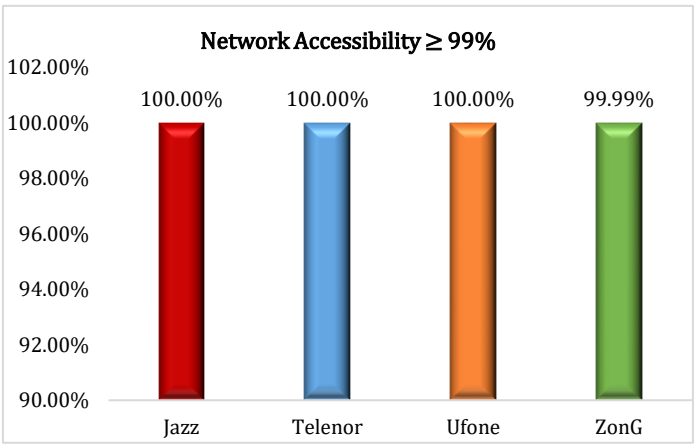
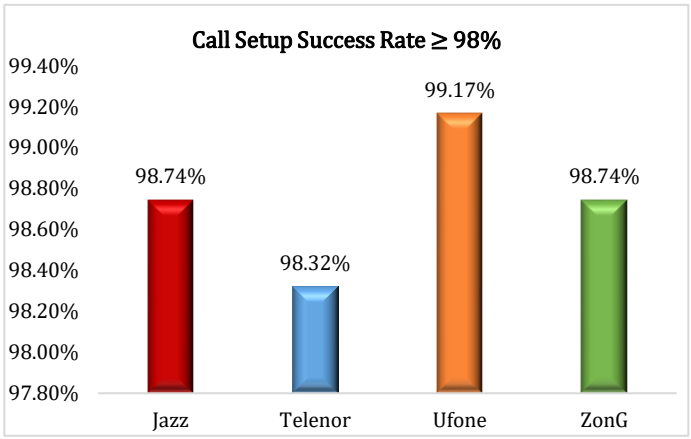
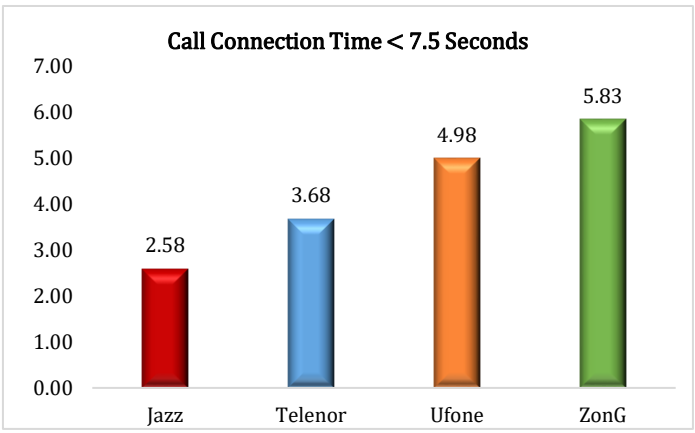


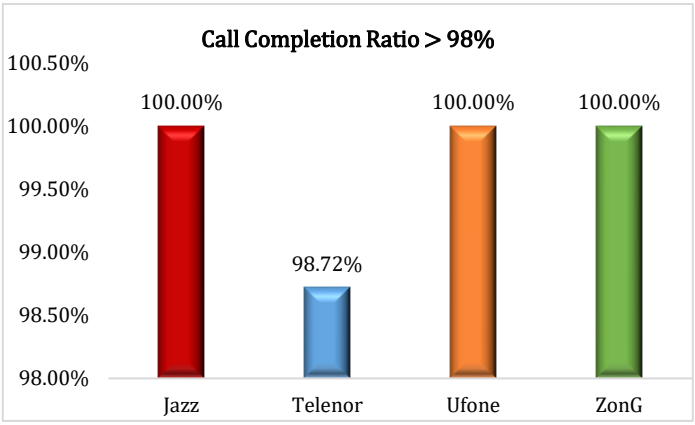


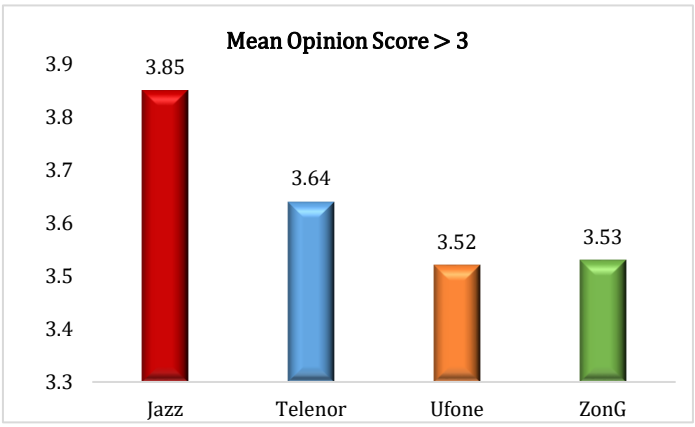
QUALITY OF SERVICE SURVEY RESULTS – HYDERABAD











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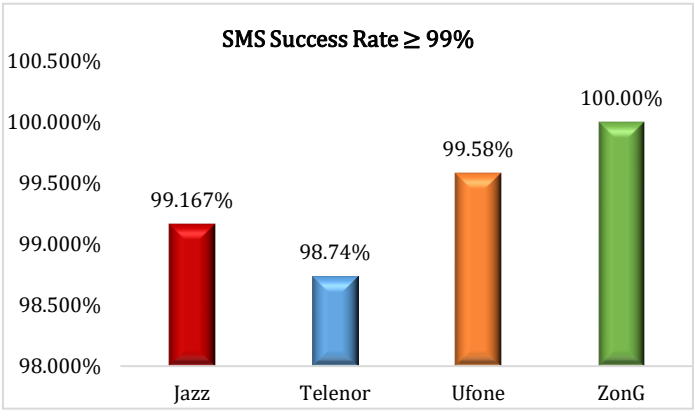
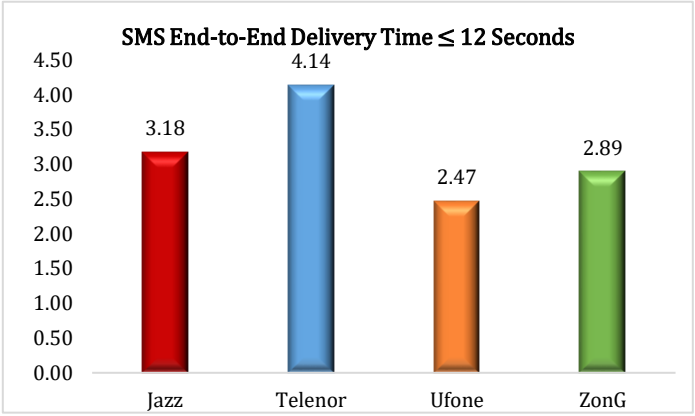
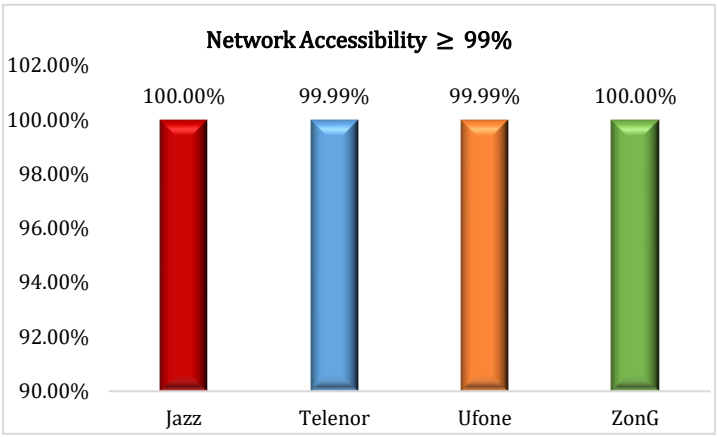
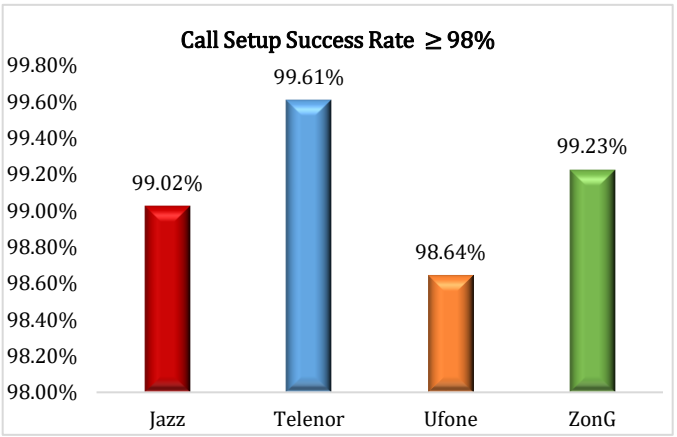
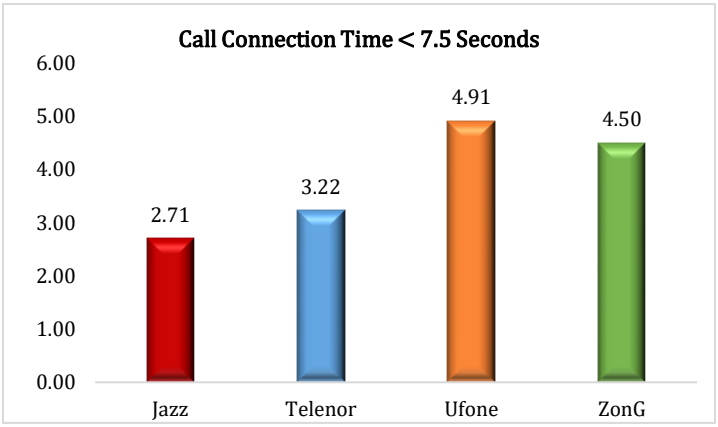


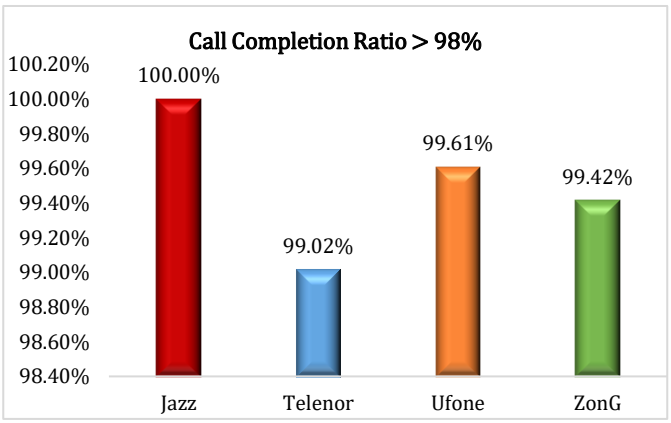


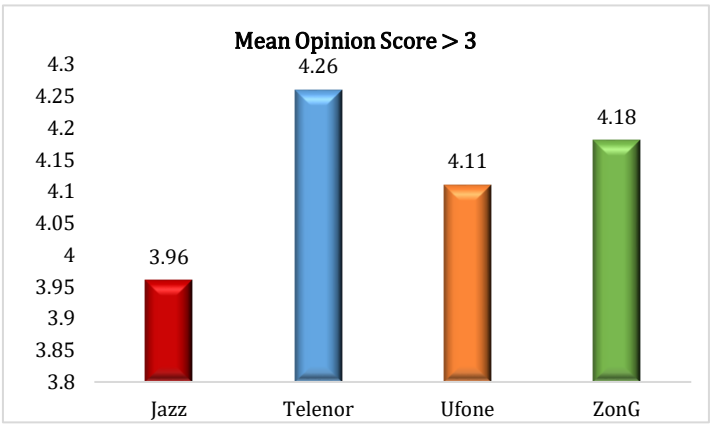
QUALITY OF SERVICE SURVEY RESULTS – JHELUM











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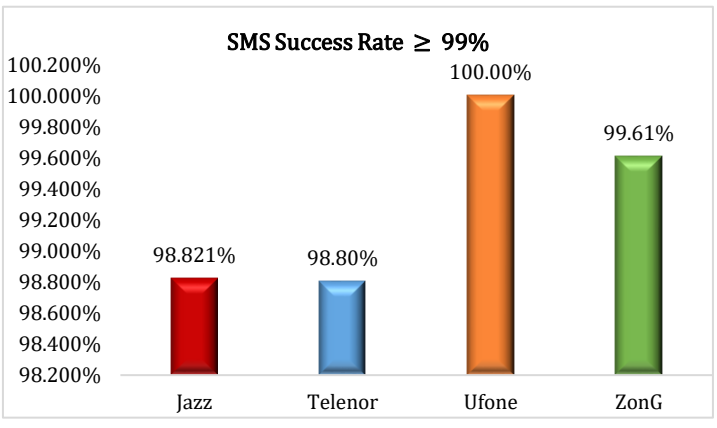
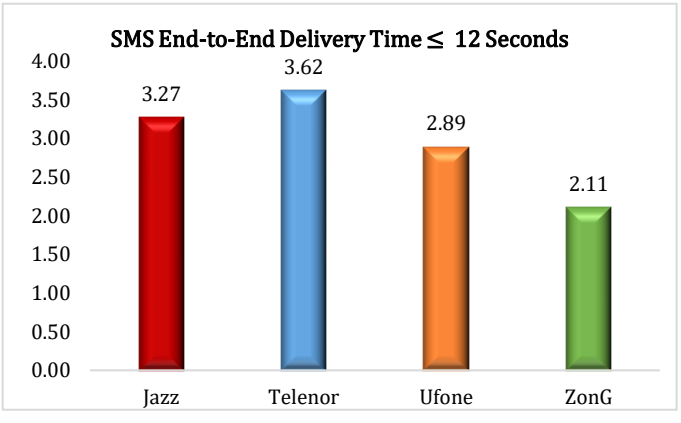
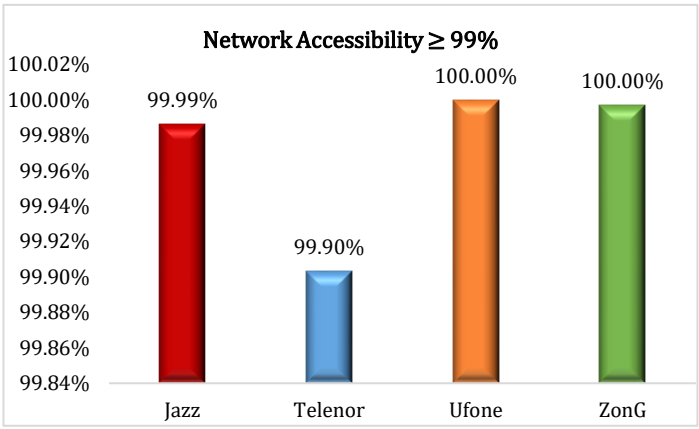
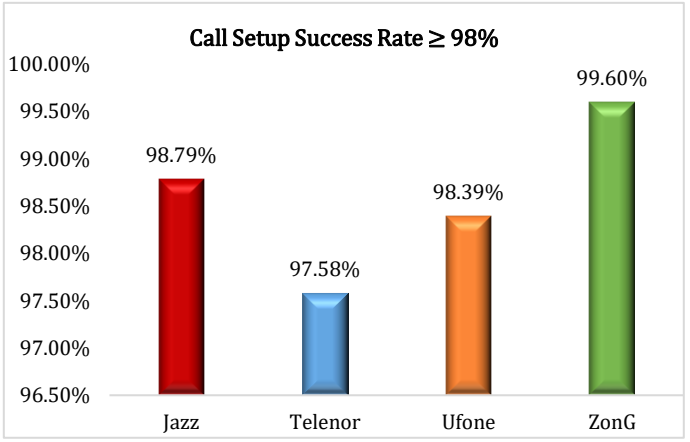
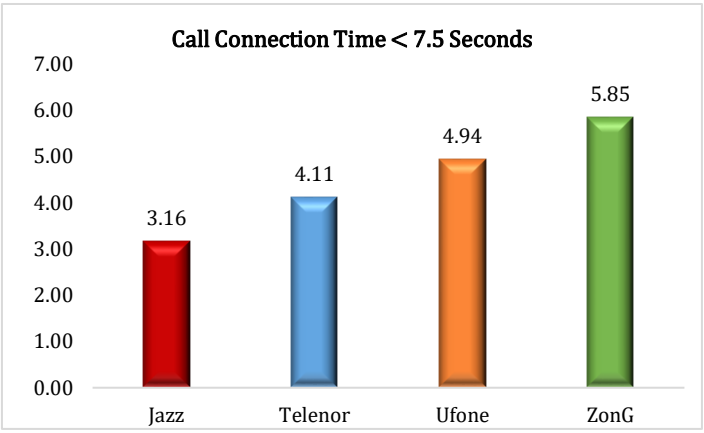


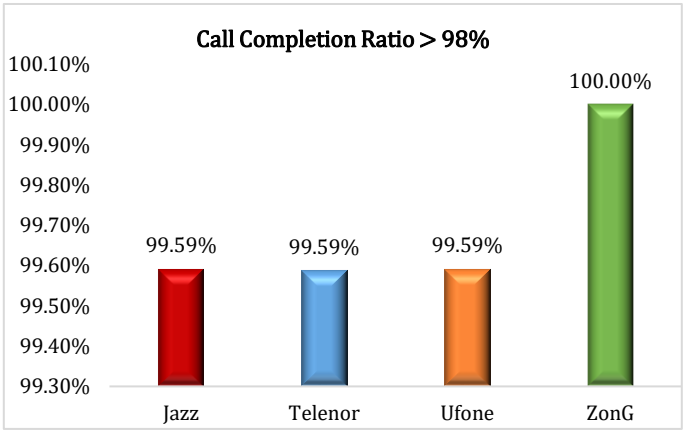


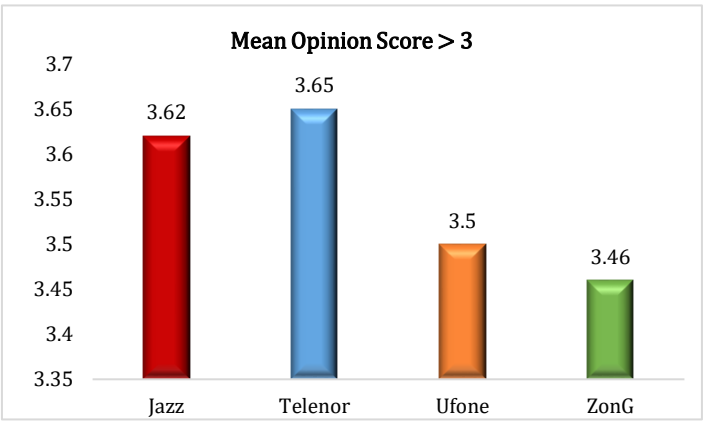
QUALITY OF SERVICE SURVEY RESULTS – KARACHI MALIR











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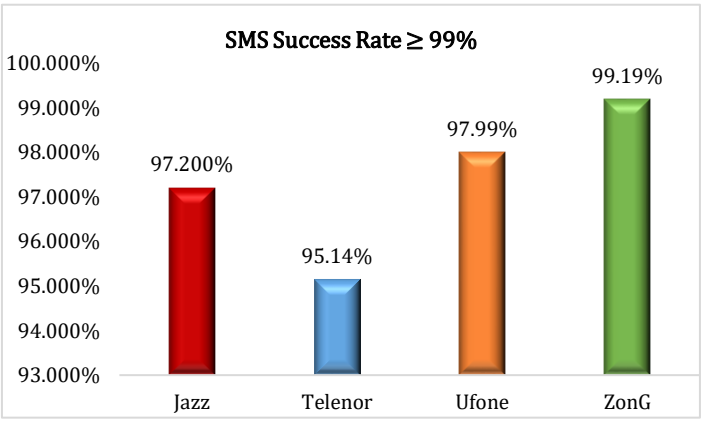
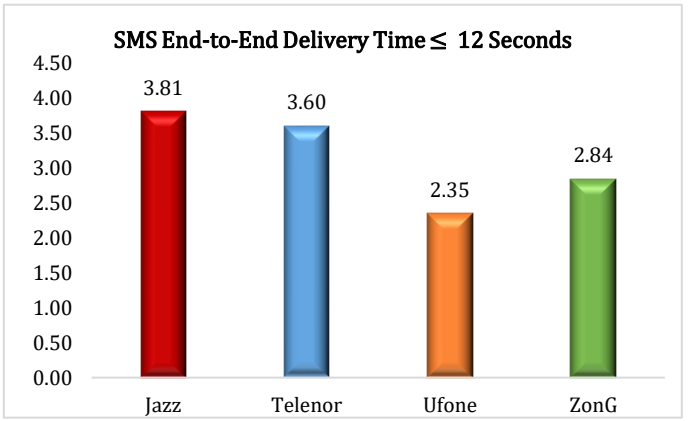
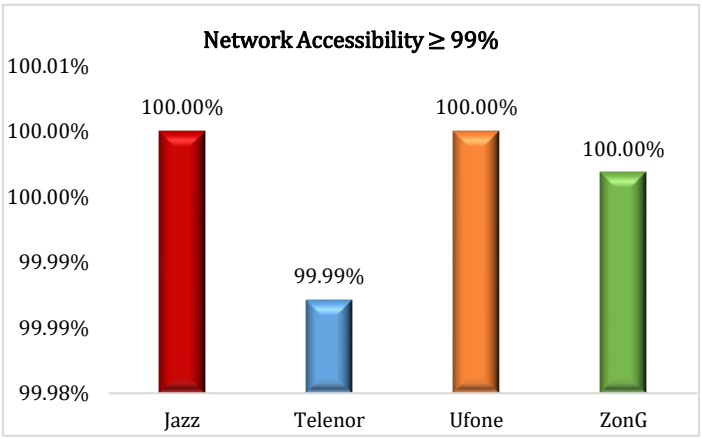
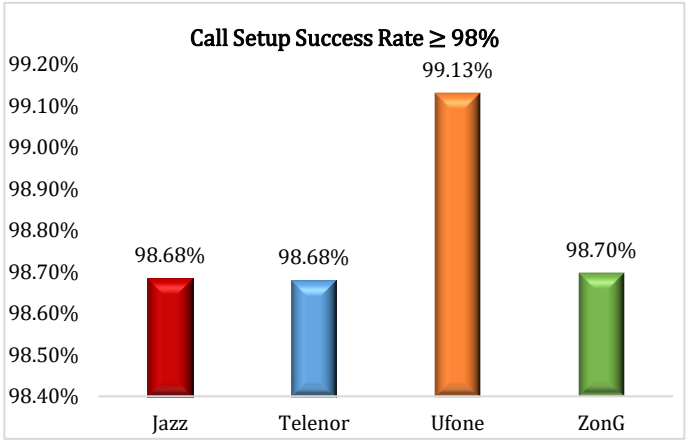
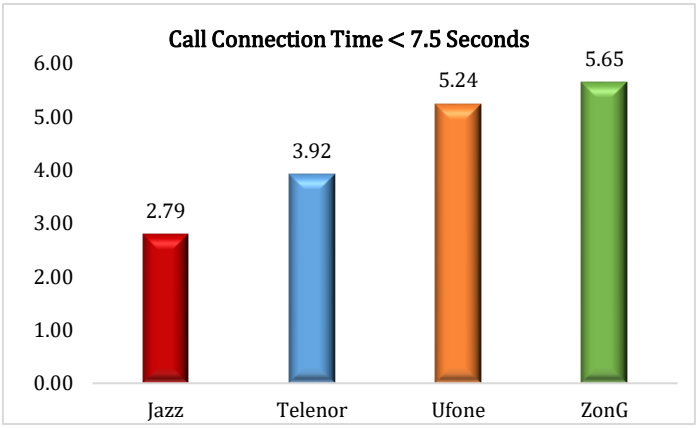


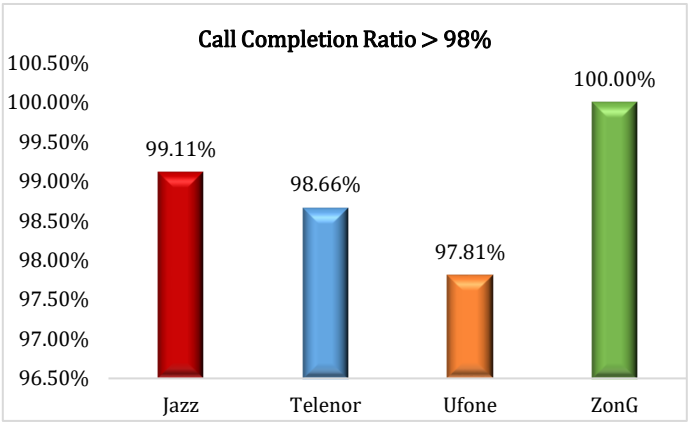


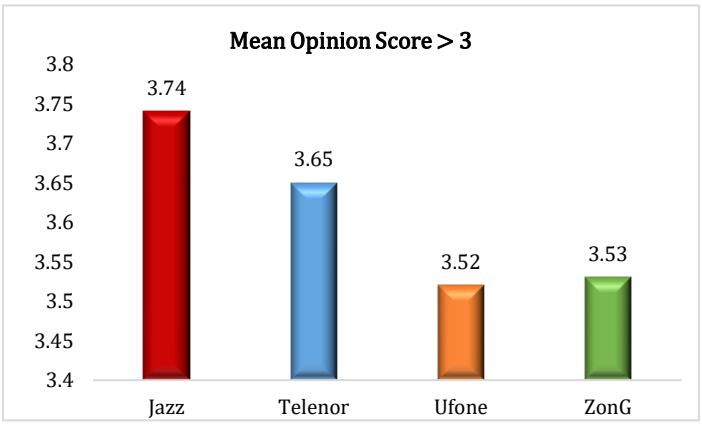
QUALITY OF SERVICE SURVEY RESULTS – KOTRI











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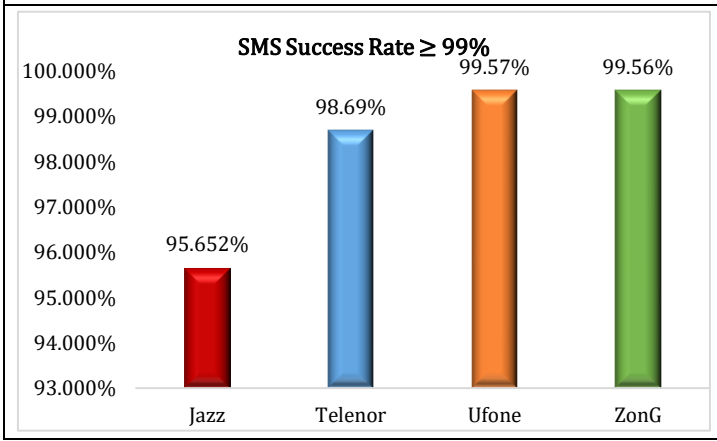
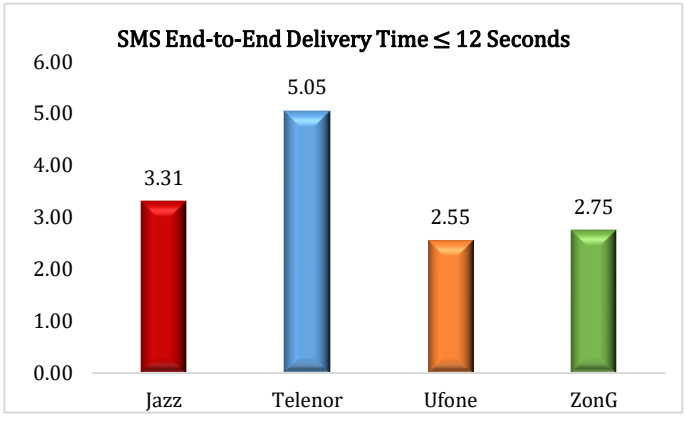
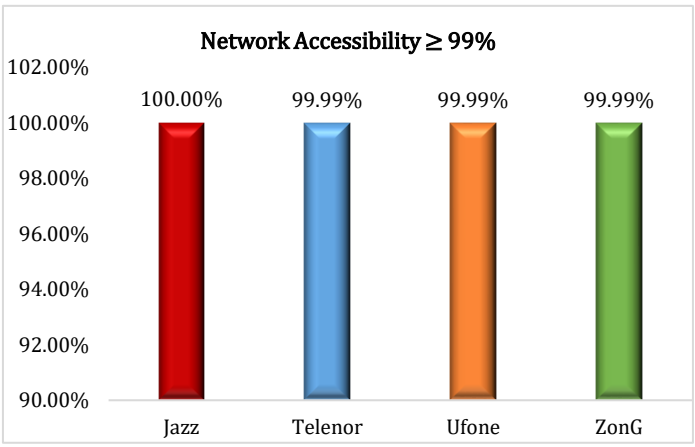
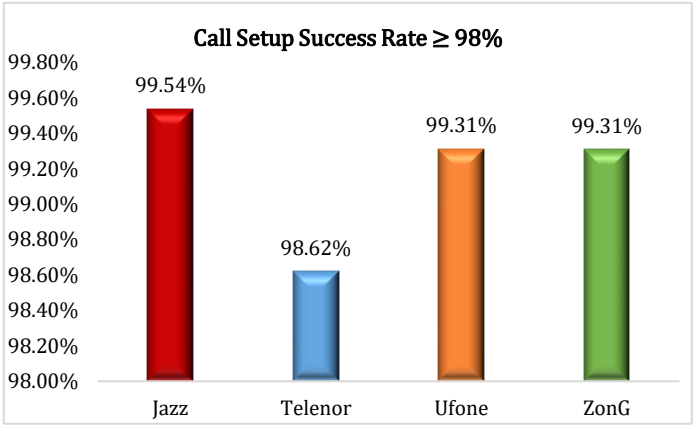
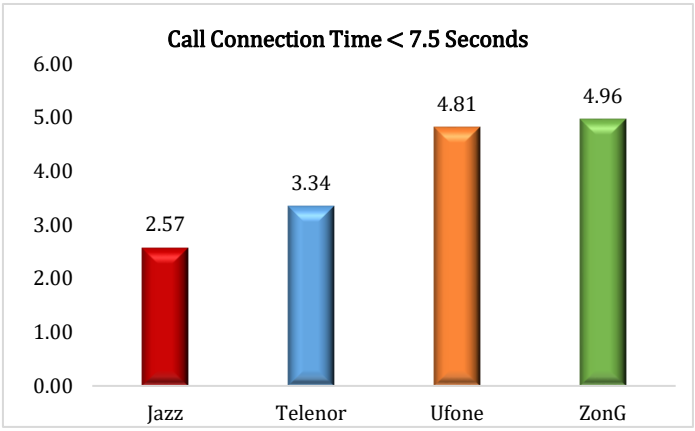


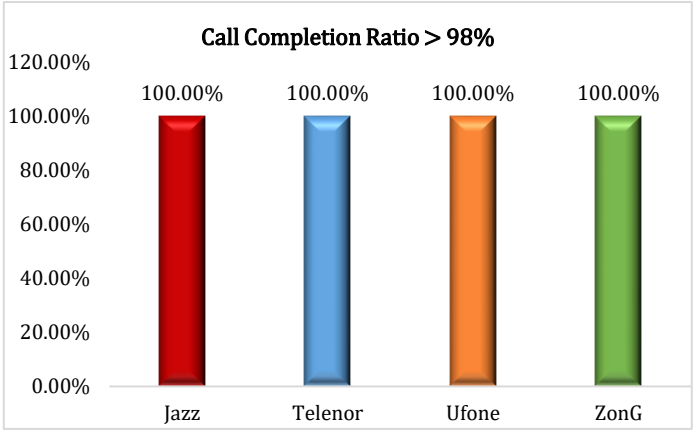


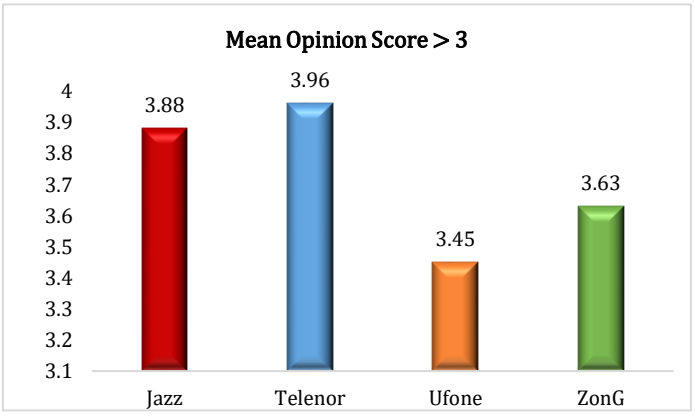
QUALITY OF SERVICE SURVEY RESULTS –CHUNIAN











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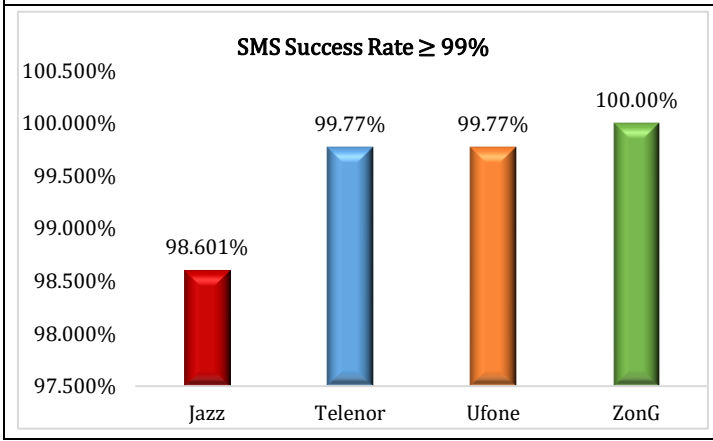
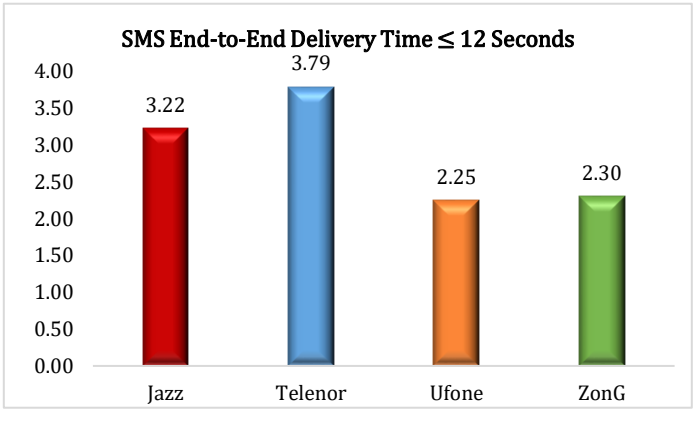
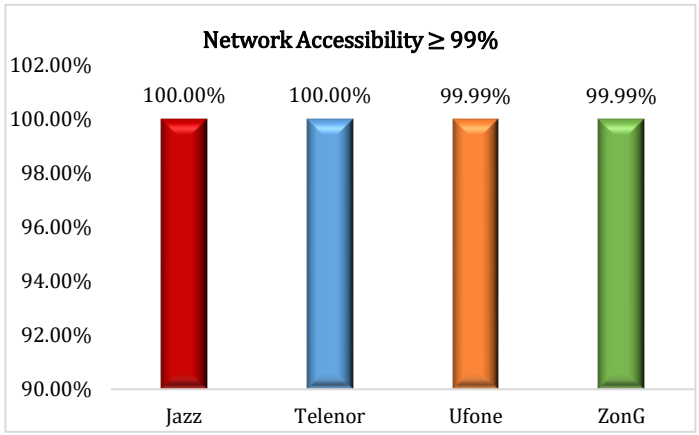
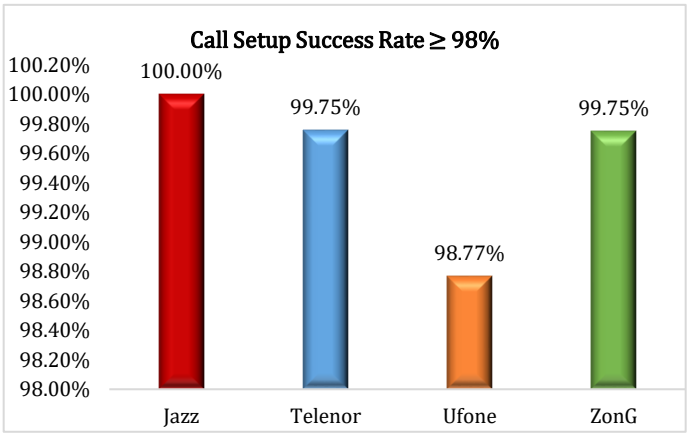
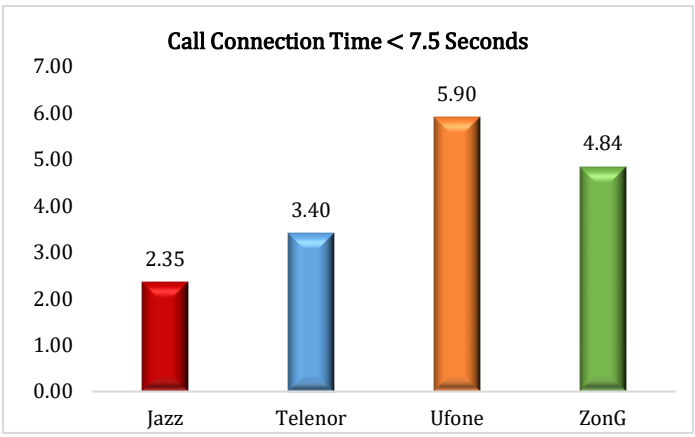


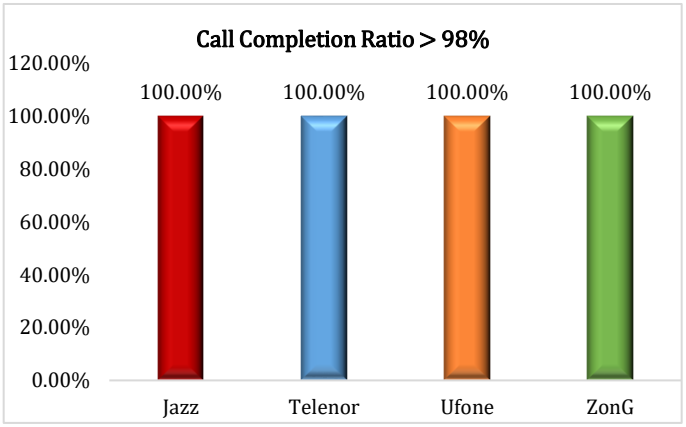


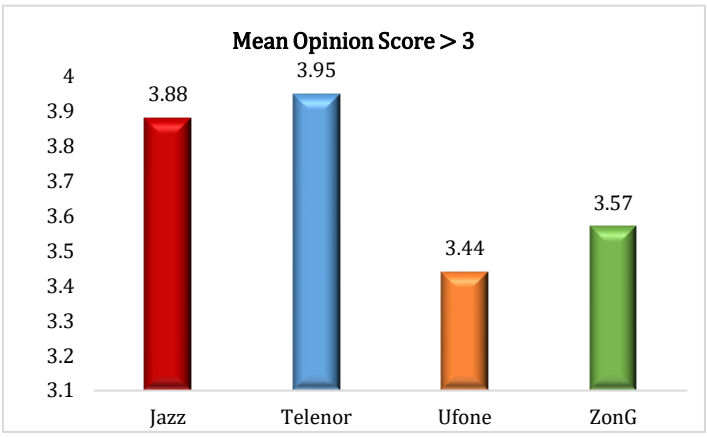
QUALITY OF SERVICE SURVEY RESULTS –SHARAQPUR











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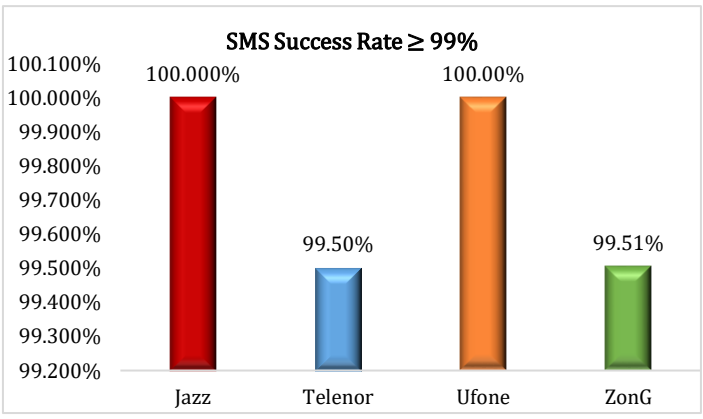
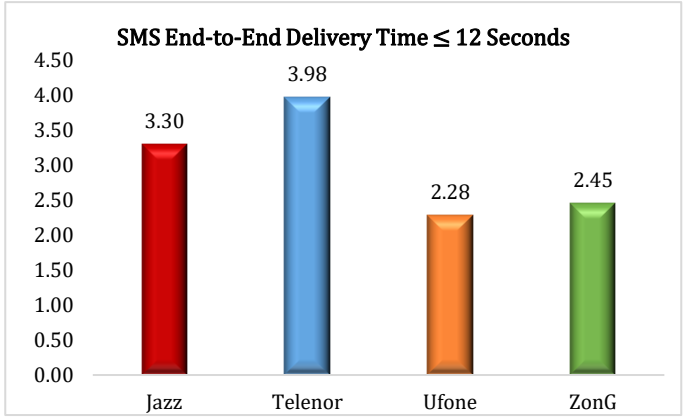
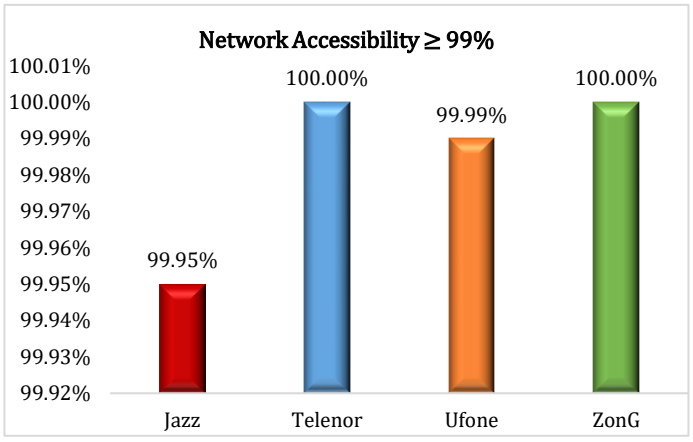
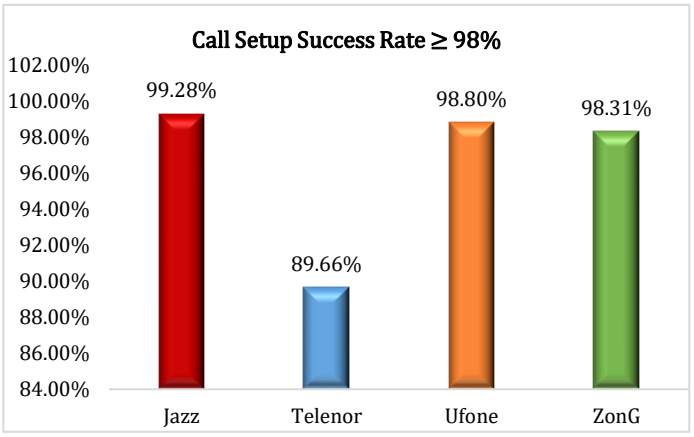
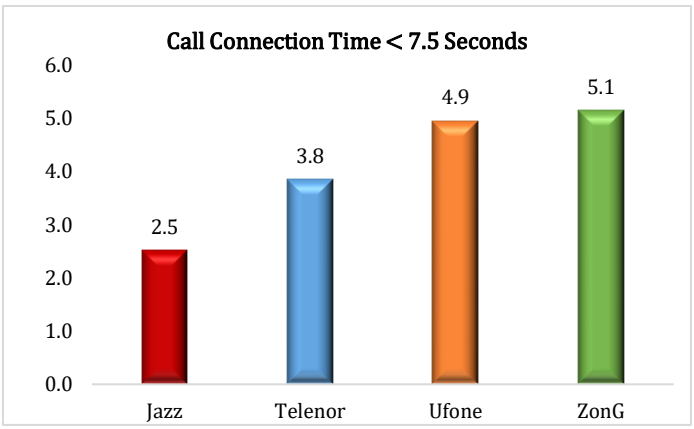


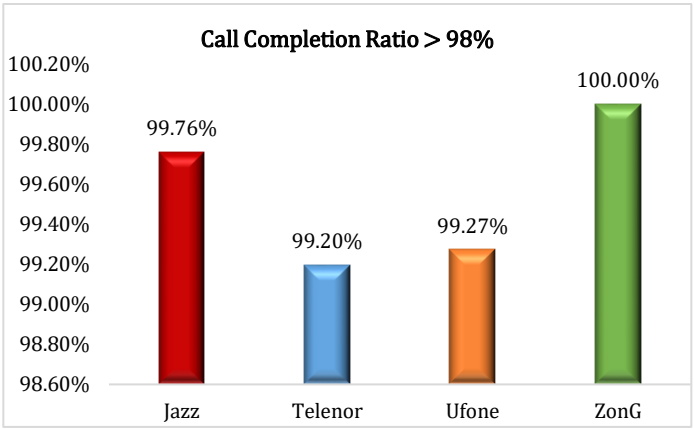


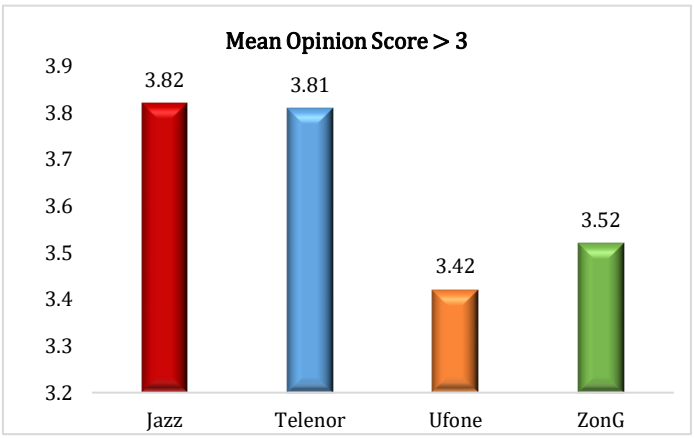
QUALITY OF SERVICE SURVEY RESULTS – LAHORE











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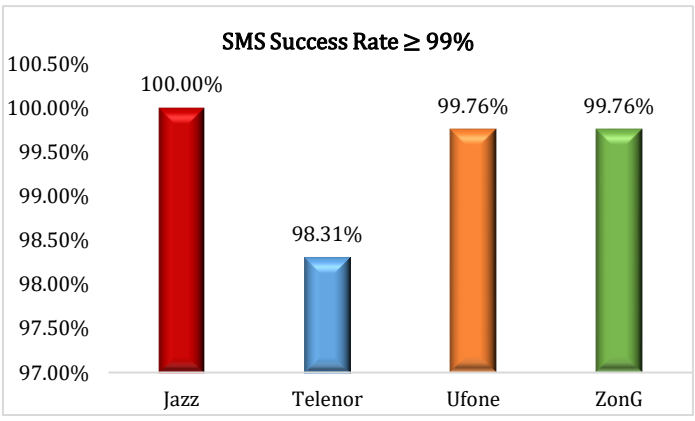
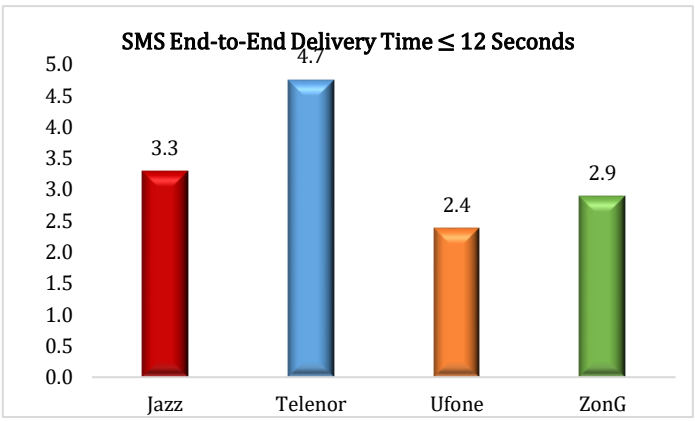
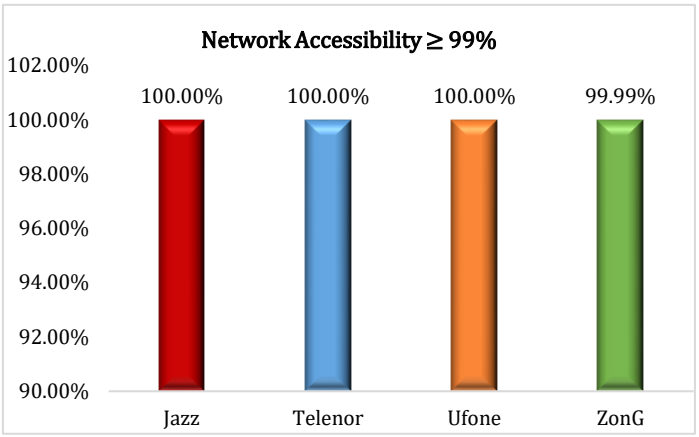
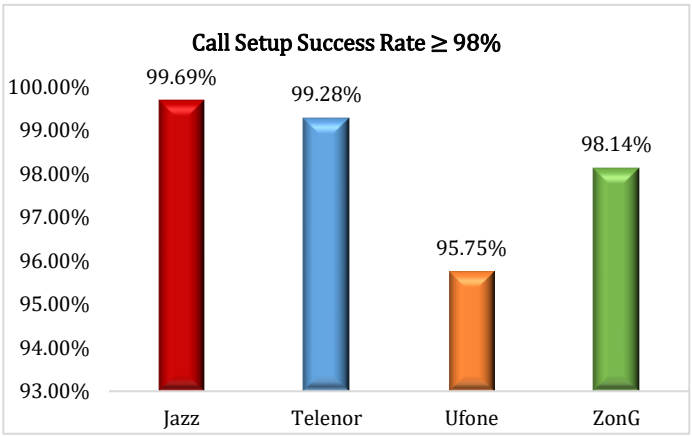
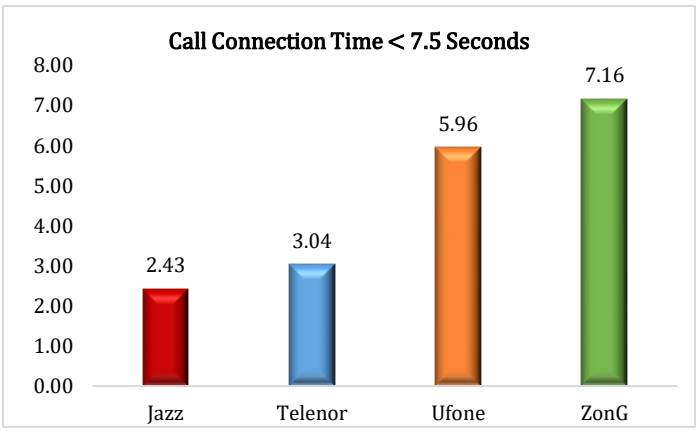


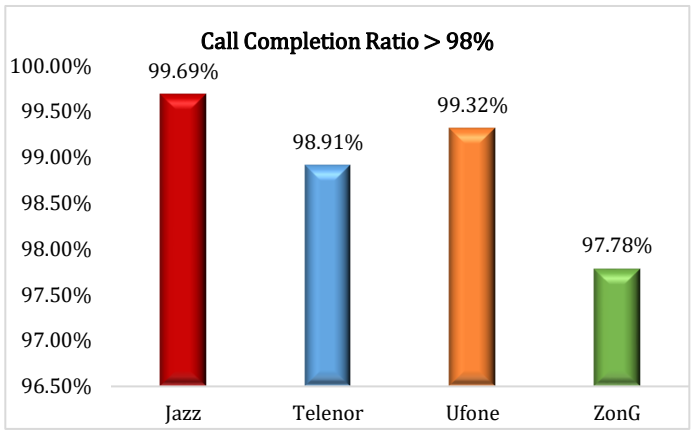


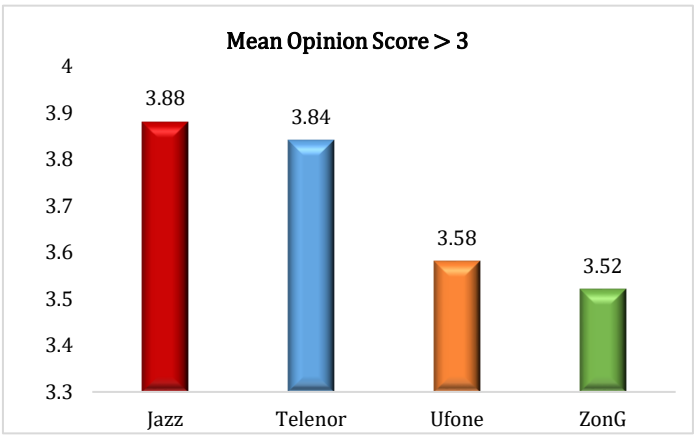
QUALITY OF SERVICE SURVEY RESULTS – MARDAN











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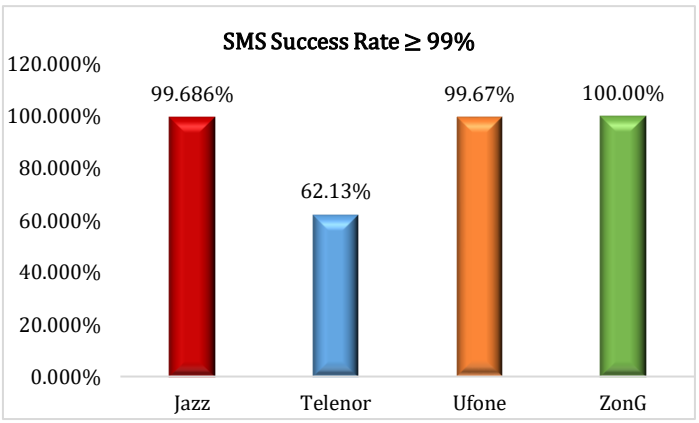
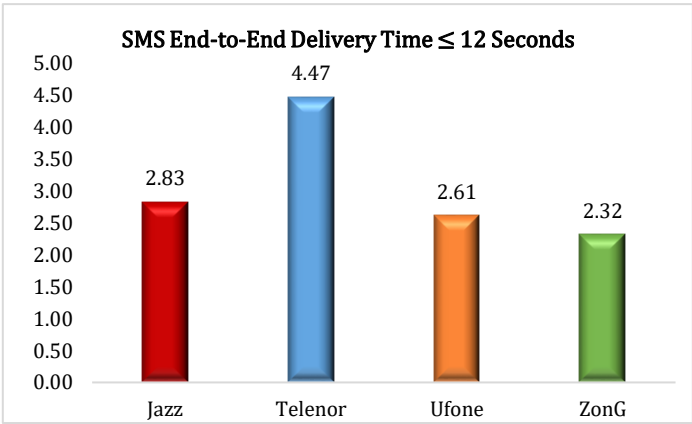
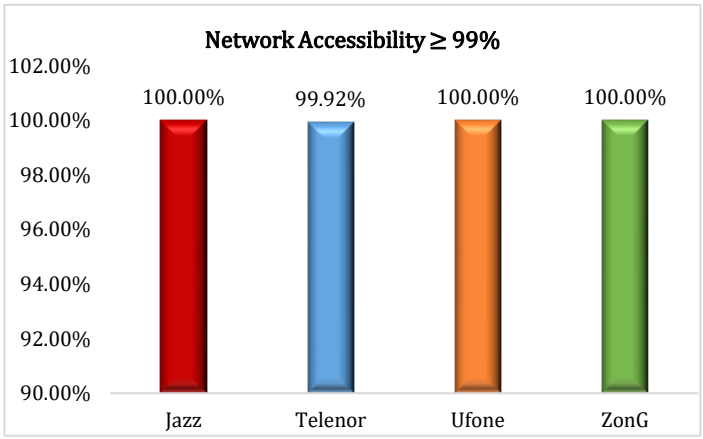
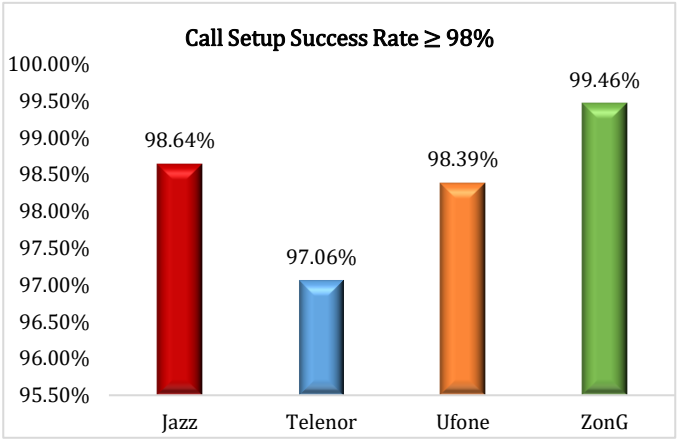
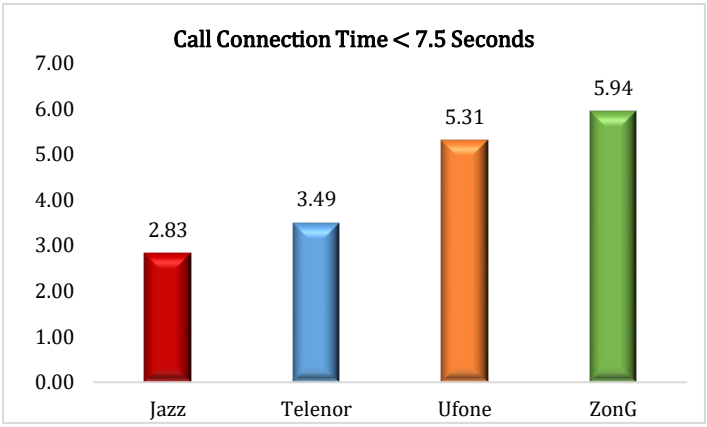


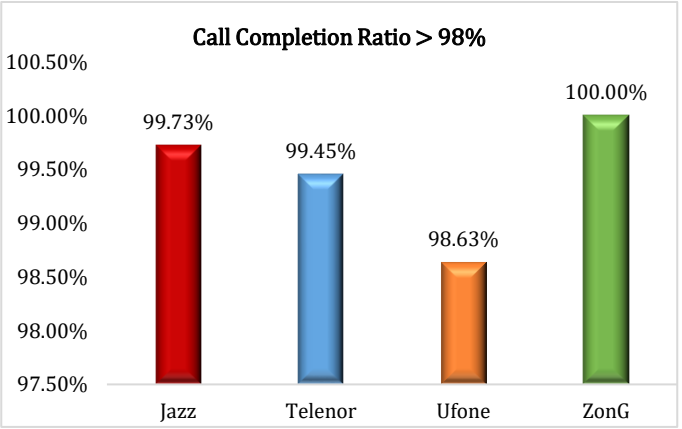


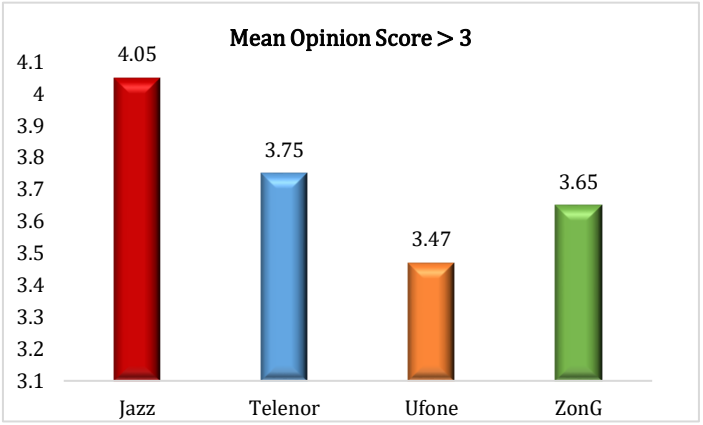
QUALITY OF SERVICE SURVEY RESULTS – NAWABSHAH











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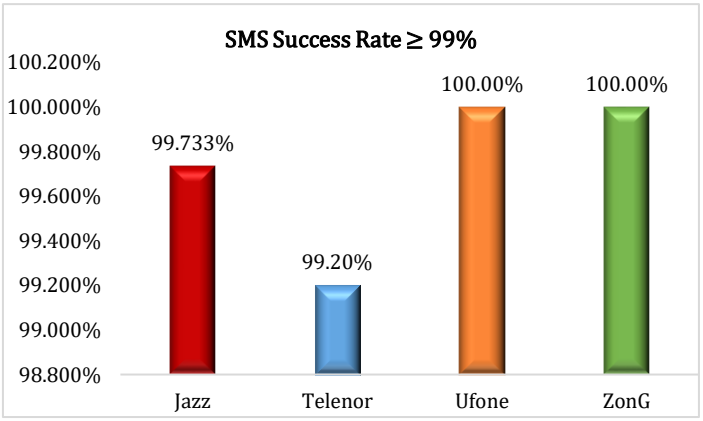
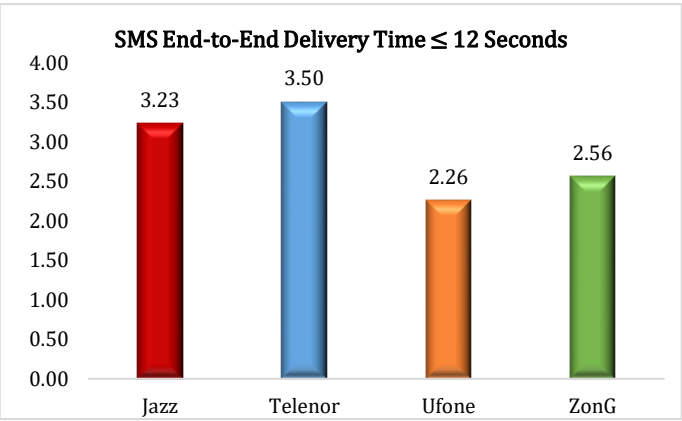
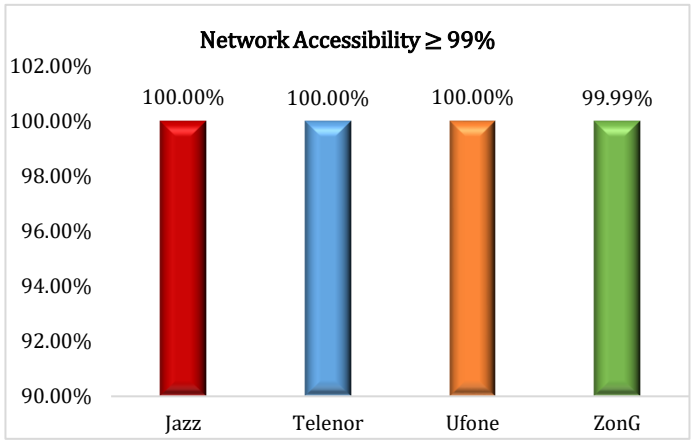
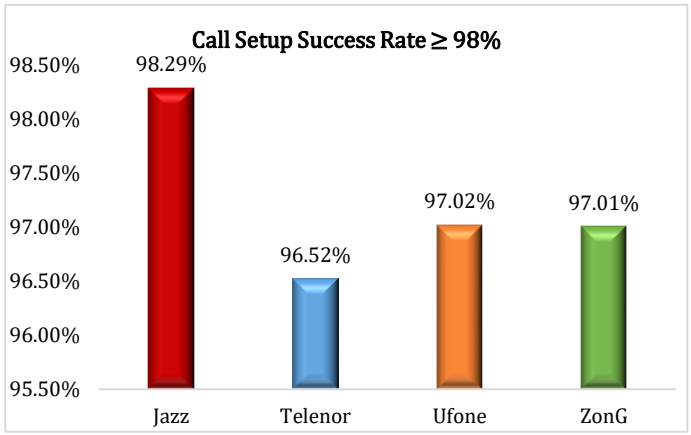
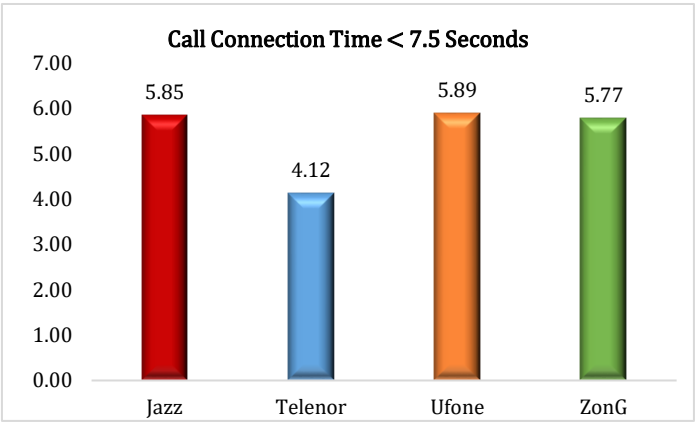


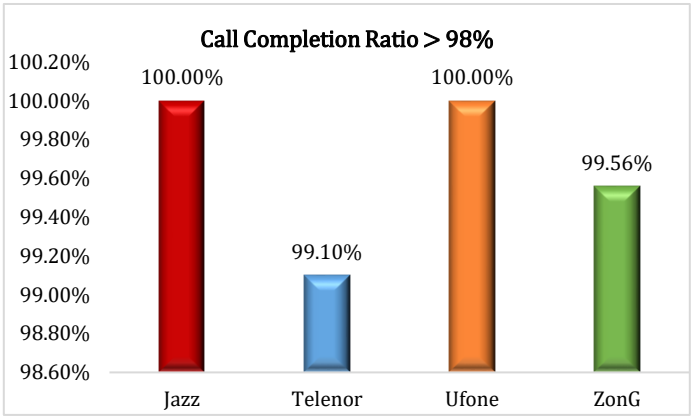


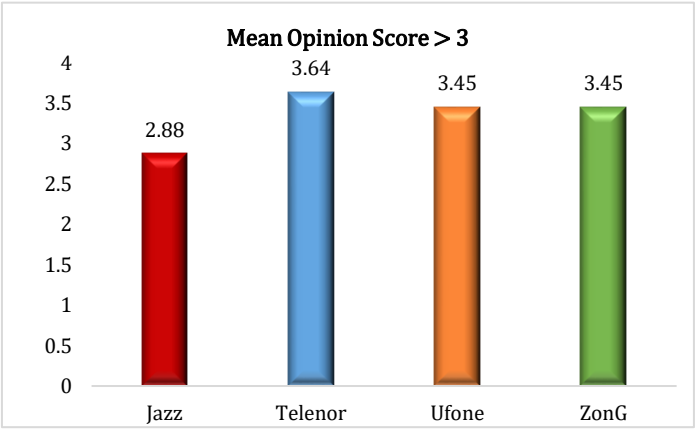
QUALITY OF SERVICE SURVEY RESULTS – NUSHKI











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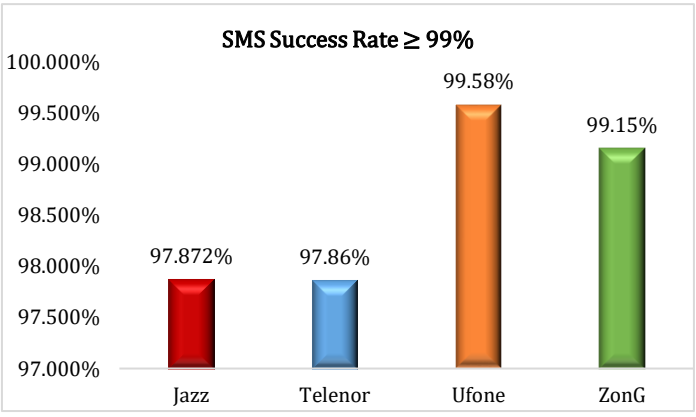
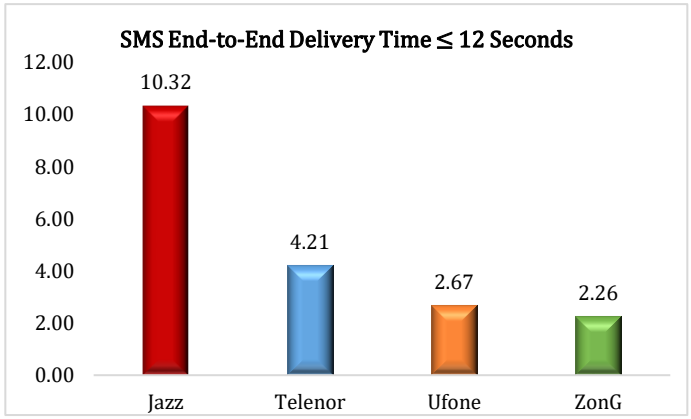
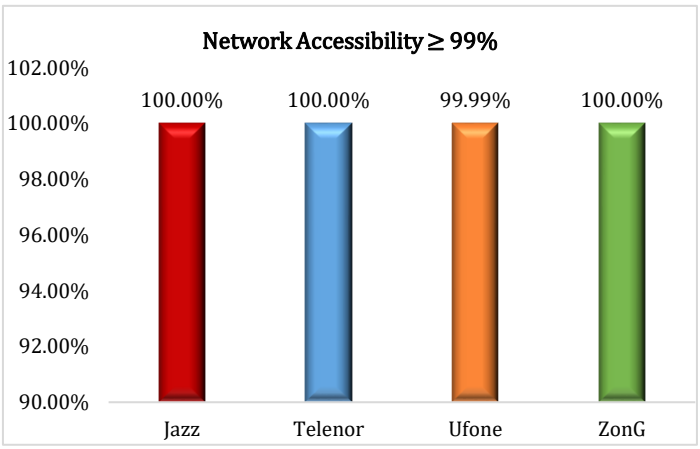
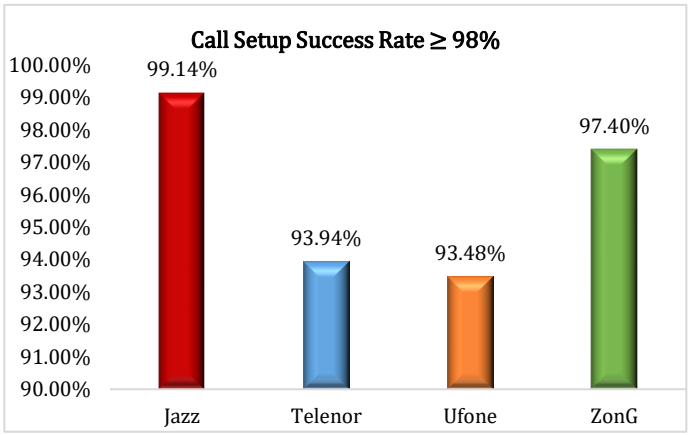
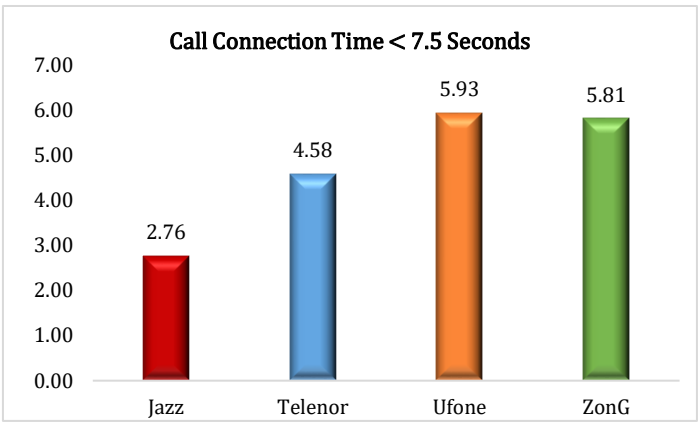


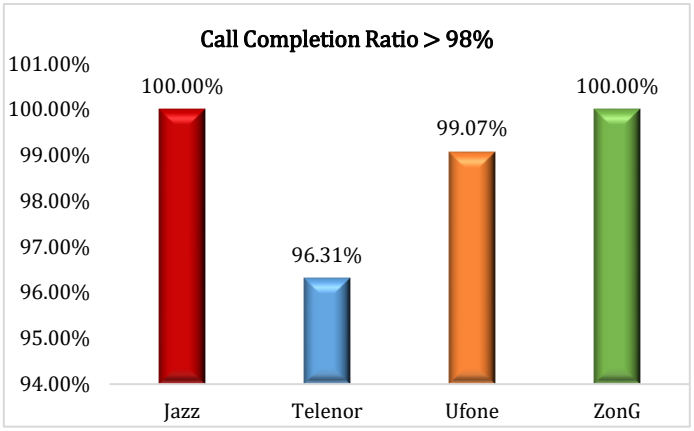


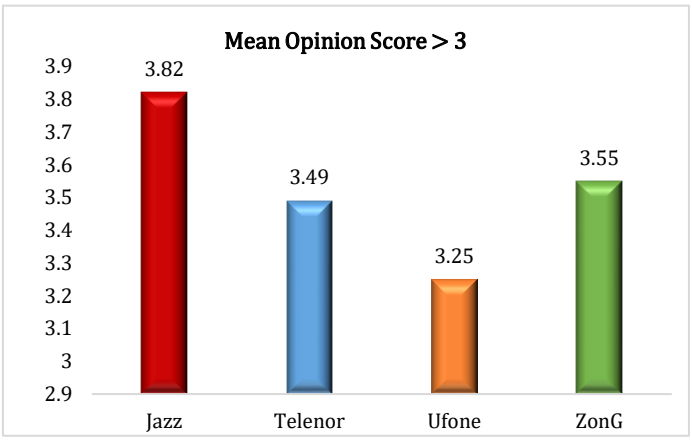
QUALITY OF SERVICE SURVEY RESULTS – QUETTA











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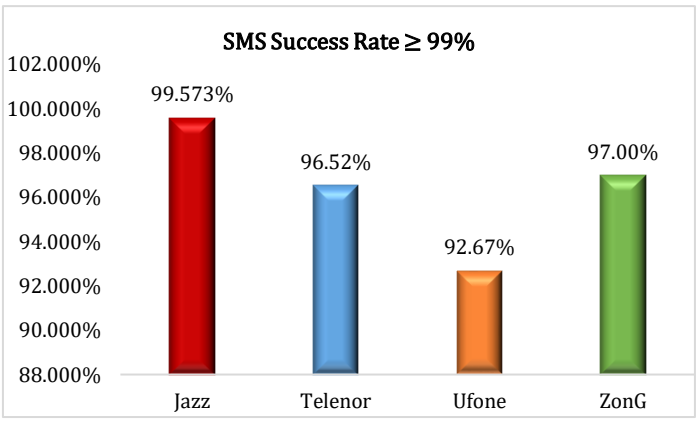
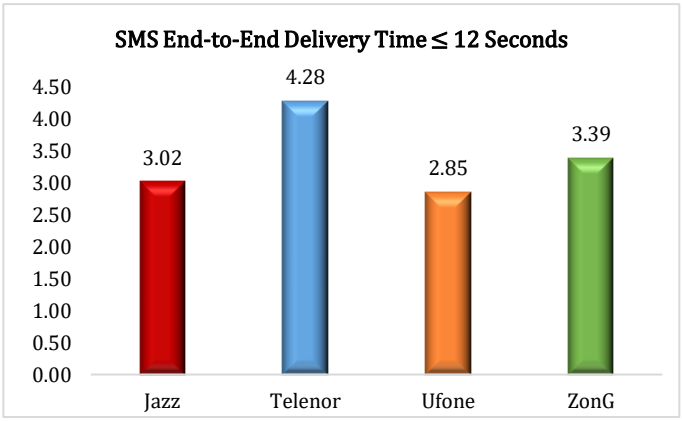
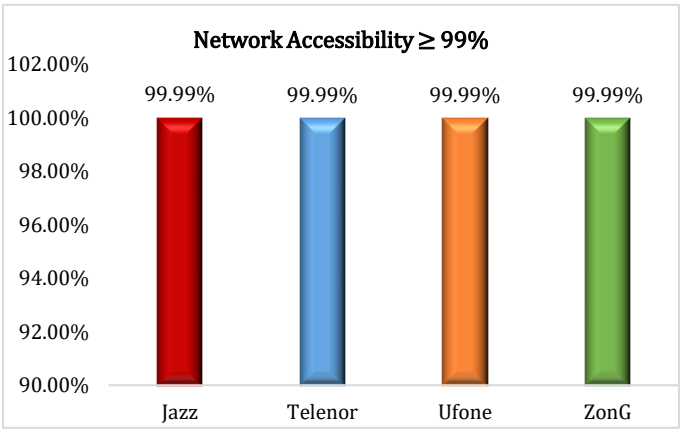
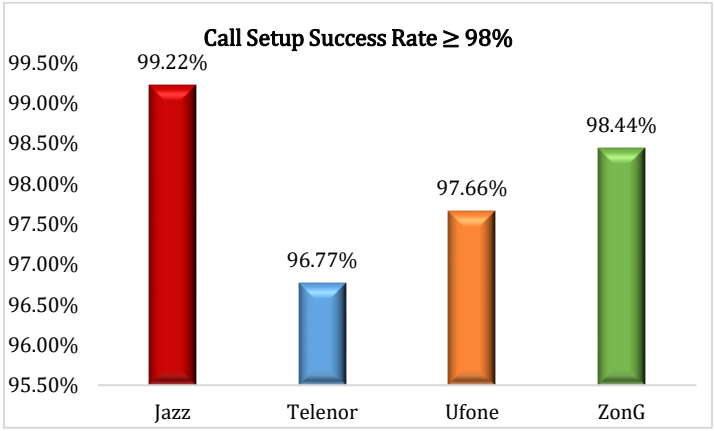
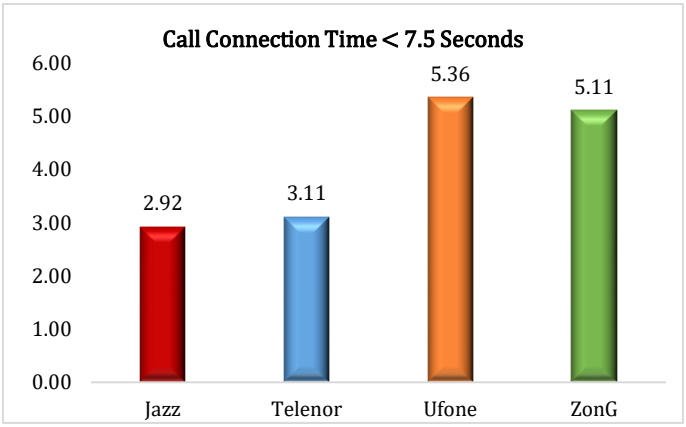


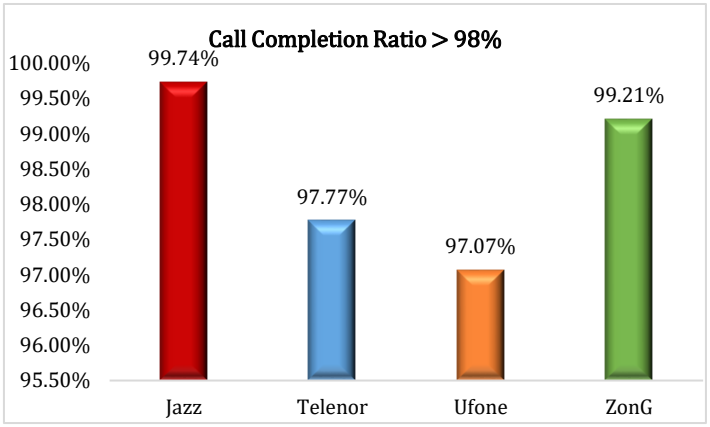


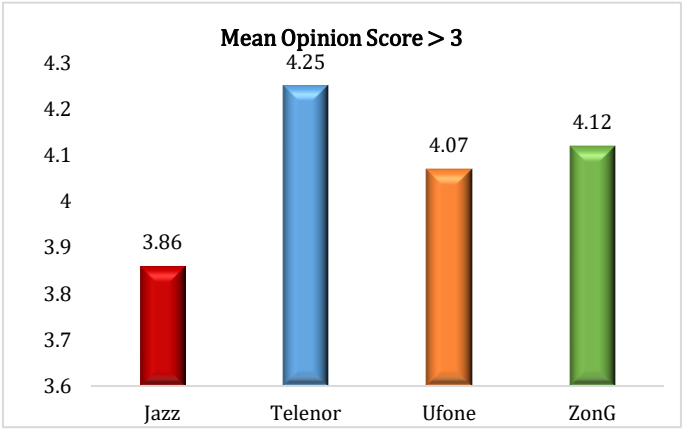
QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI











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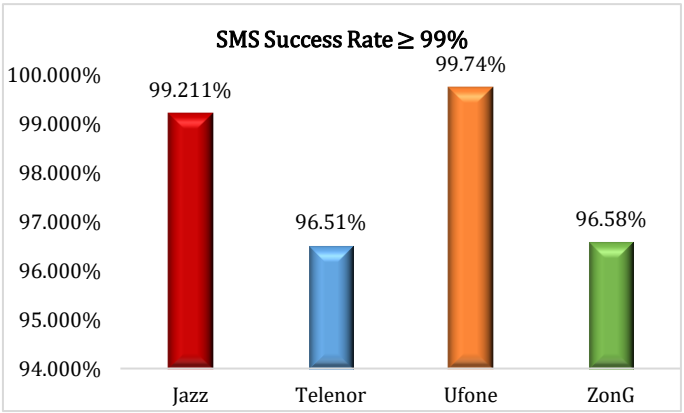
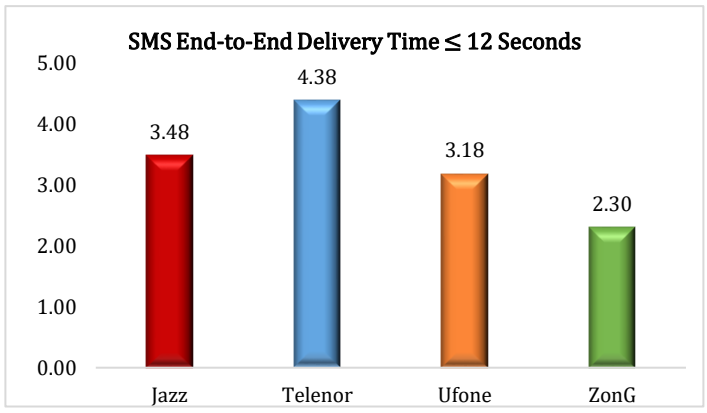
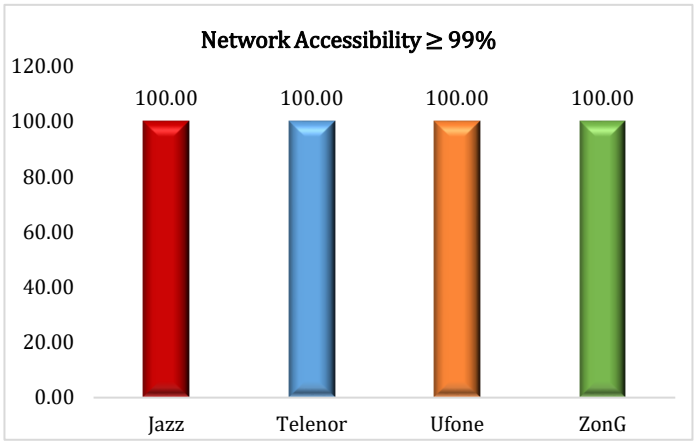
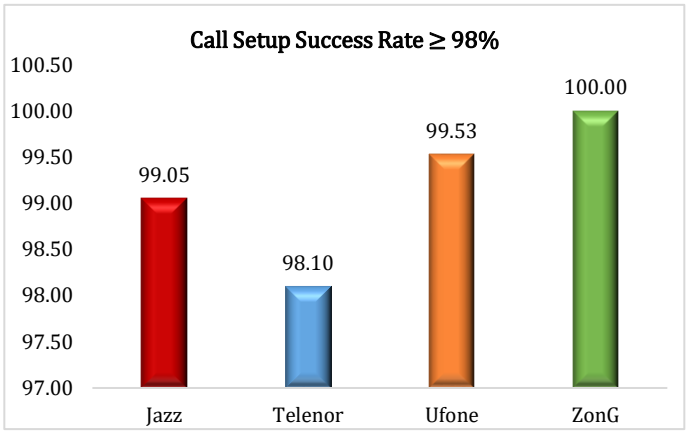
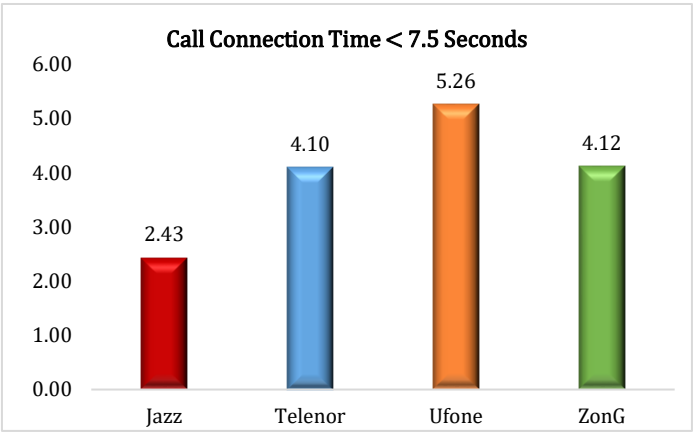


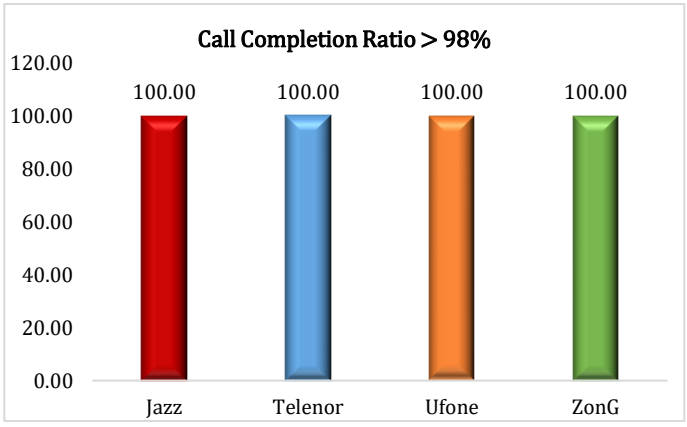


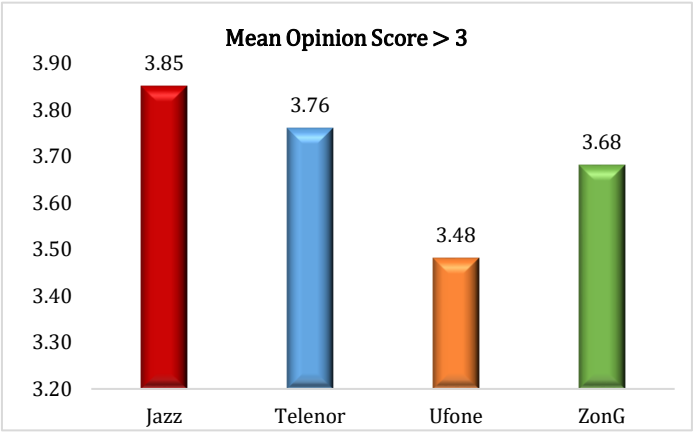
QUALITY OF SERVICE SURVEY RESULTS – SAMUNDARI











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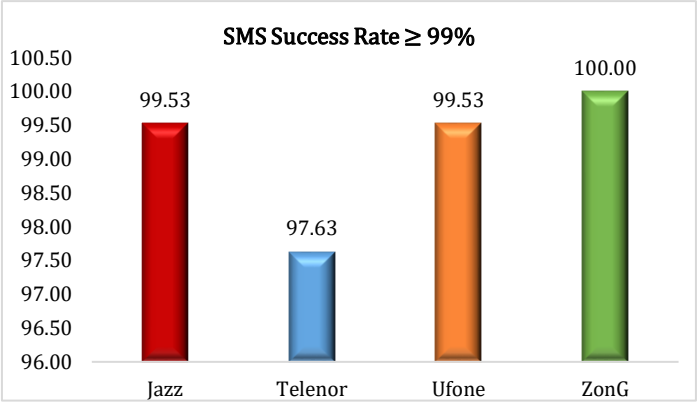
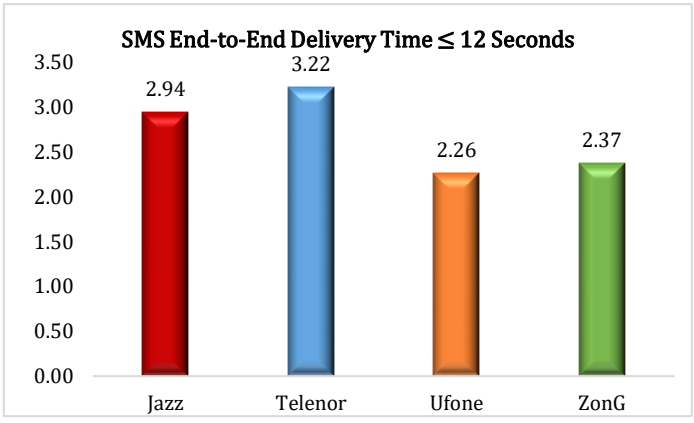
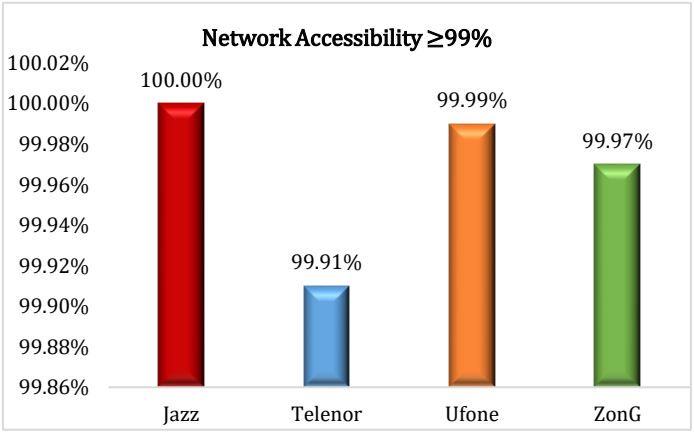
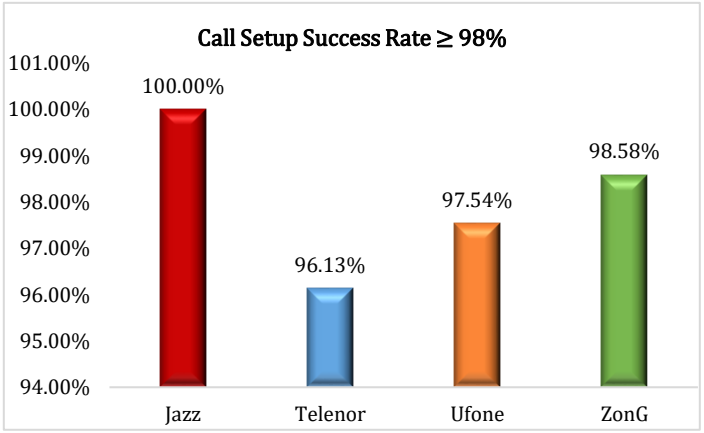
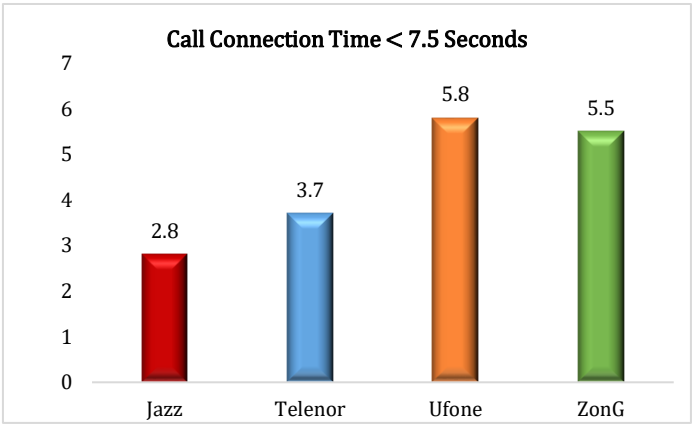


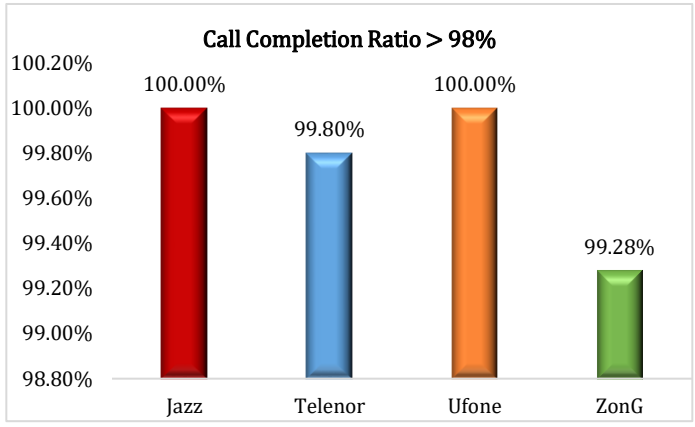


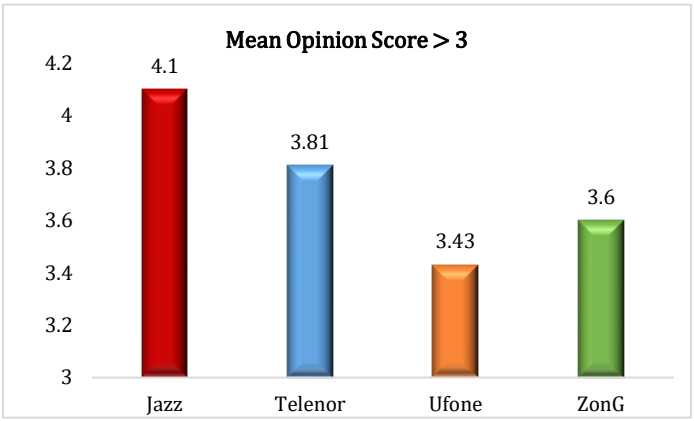
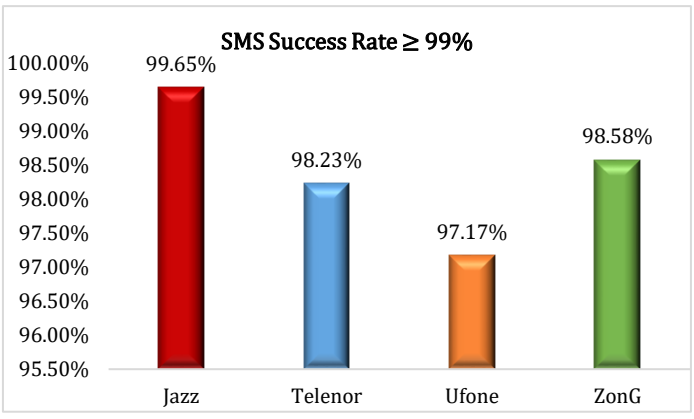
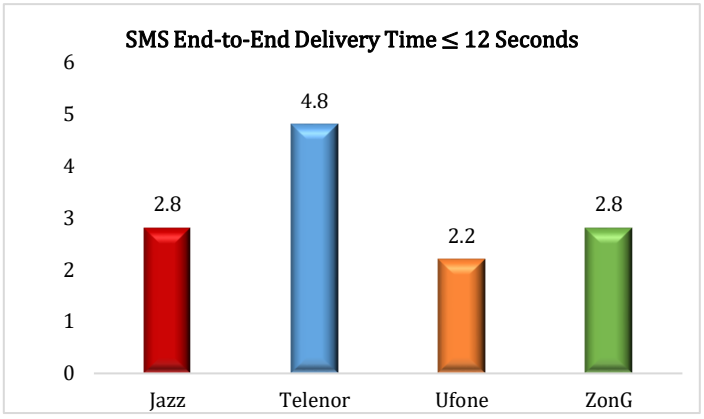
QUALITY OF SERVICE SURVEY RESULTS – SHIKARPUR







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