

# **INDEPENDENT QUALITY OF SERVICE** **SURVEY IN AZAD JAMMU & KASHMIR**

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FIRST QUARTER 2021

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

# INDEPENDENT QUALITY OF SERVICE SURVEY REPORT

## INTRODUCTION

1.1. In order to measure the performance and service quality of Cellular Mobile Operators (CMOs), an independent Quality of Service (QoS) Survey has been carried out in Three (03) different cities of Azad Jammu & Kashmir (AJK) and Two (02) roads. The name of cities & roads along with survey dates and testing samples are shown in **Table 1.1: QoS Survey Dates**:

S. #.	City / Road Name	Survey Dates
1.	Islamabad to Muzaffarabad	8 <sup>th</sup> March 2021
2.	Muzaffarabad	9 <sup>th</sup> ~ 10 <sup>th</sup> March 2021
3.	Bagh	16 <sup>th</sup> ~ 17 <sup>th</sup> March 2021
4.	Rawalpindi to Mirpur	22 <sup>nd</sup> March 2021
5.	Mirpur	23 <sup>rd</sup> ~ 25 <sup>th</sup> March 2021

**Table 1.1: QoS Survey Dates**

## DRIVE TEST DETAILS

2.1. The QoS survey was carried out using the newly procured Automated QoS Monitoring & Benchmarking Tool i.e. "SmartBenchmarker". Drive test teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During Voice Calls and SMS Sessions, both A-Party and B-Party mobile handsets were kept in auto detect mode, whereas, in case of Data Sessions the mobile handset were locked in 4G/LTE mode. The Voice Calls and SMS Samples were distributed as 70% ON-NET and 30% OFF-NET.

## VOICE SERVICE

3.1. 5 x QoS KPIs have been measured while testing voice services. The results of voice QoS KPIs are as under:

- a. **NETWORK ACCESSIBILITY.** All CMOs have achieved the QoS KPI **Network Accessibility > 99%** in all surveyed cities and roads.
- b. **SERVICE ACCESSIBILITY.** None of the CMOs have achieved the QoS KPI **Service Accessibility of > 98%** in surveyed cities and roads.
- c. **CALL CONNECTION TIME.** The analysis of QoS KPI **Call Connection Time of < 6.5 Seconds** in all the surveyed cities and roads revealed following:
  - i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 3.1: Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	SCOM	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road
2.	Ufone	1	Islamabad to Mirpur Road

**Table 3.1: Compliance of Call Connection Time < 6.5 Seconds**

- ii. **NON-COMPLIANCE.** The cities and roads where CMOs remained non-compliant is mentioned in **Table 3.2: Non-Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Islamabad to Mirpur Road
2.	Telenor	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Islamabad to Mirpur Road
3.	Ufone	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road
4.	ZonG	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Islamabad to Mirpur Road
5.	SCOM	1	Islamabad to Mirpur Road

**Table 3.2: Non-Compliance of Call Connection Time < 6.5 Seconds**

- d. **CALL COMPELTION RATIO.** The analysis of QoS KPI **Call Completion Ratio of > 98%** in surveyed cities revealed following:
- i. **COMPLIANCE.** The cities and roads where CMOs remained compliant is mentioned in **Table 3.3: Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	2	Mirpur, Bagh
2.	Telenor	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road,
3.	Ufone	2	Muzaffarabad, Bagh
4.	ZonG	3	Muzaffarabad, Bagh, Rawalpindi to Mirpur Road
5.	SCOM	2	Muzaffarabad, Islamabad to Muzaffarabad Road

**Table 3.3: Compliance of Call Completion Ratio > 98%.**

- ii. **NON-COMPLIANCE.** The cities and roads where CMOs remained non-compliant is mentioned in **Table 3.4: Non-Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Cities / Roads	
		Count	Names
1.	Jazz	3	Muzaffarabad, Islamabad to Muzaffarabad Road & Rawalpindi to Mirpur Road
2.	Telenor	1	Rawalpindi to Mirpur Road
3.	Ufone	3	Mirpur, Islamabad to Muzaffarabad Road & Rawalpindi to Mirpur Road
4.	ZonG	2	Mirpur, Islamabad to Muzaffarabad Road
5.	SCOM	2	Mirpur, Bagh

**Table 3.4: Non-Compliance of Call Completion Ratio > 98%**

- e. **END-TO-END SPEECH QUALITY / MEAN OPINION SCORE.**
- i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 3.5: Compliance of Mean Opinion Score > 3.**

S. #	Operator	Cities & Roads	
		Count	Names
1.	Ufone	1	Rawalpindi to Mirpur Road
2.	ZonG	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
3.	SCOM	2	Mirpur, Islamabad to Muzaffarabad Road

**Table 3.5: Compliance of Mean Opinion Score > 3**

- ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 3.6: Non-Compliance of Mean Opinion Score > 3.**

S. #	Operator	Cities & Roads	
		Count	Names
1.	Jazz	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
2.	Telenor	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
	Ufone	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road
4.	ZonG	3	Muzaffarabad, Mirpur & Bagh
5.	SCOM	2	Muzaffarabad & Bagh

**Table 3.6: Non-Compliance of Mean Opinion Score > 3**

## **SMS SERVICE**

4.1. 2 x QoS KPIs i.e. “SMS Success Rate” and “SMS End to End Delivery Time” have been measured and the results are as under:

- a. **SMS SUCCESS RATE.** The analysis of QoS KPI **SMS Success Rate of 99%** in all the 13 x surveyed cities revealed following:

- i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 4.1: Compliance of SMS Success Rate > 99%.**

S. #	Operator	Cities	
		Count	Names
1.	SCOM	1	Bagh

**Table 4.1: Compliance of SMS Success Rate > 99%**

- ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 4.2: Non-Compliance of SMS Success Rate > 99%.**

S. #	Operator	Cities	
		Count	Names
1.	Jazz	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
2.	Telenor	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
3.	Ufone	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
4.	ZonG	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
5.	SCOM	3	Muzaffarabad, Mirpur, Islamabad to Muzaffarabad Road

**Table 4.2: Non-Compliance of SMS Success Rate > 99%**

b. **SMS END-TO-END DELIVERY TIME.** The analysis of QoS KPI **SMS End-to-End Delivery time of 12 Seconds** in all surveyed cities revealed following:

i. **COMPLIANCE.** The cities where CMOs remained compliant is mentioned in **Table 4.3: Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds**

S. #.	Operator	Cities	
		Count	Names
1.	ZonG	1	Rawalpindi to Mirpur Road
2.	SCOM	3	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road

**Table 4.3: Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds**

ii. **NON-COMPLIANCE.** The cities where CMOs remained non-compliant is mentioned in **Table 4.4: Non-Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
2.	Telenor	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
3.	Ufone	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
4.	ZonG	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road

**Table 4.4: Non-Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds**

## **MOBILE BROADBAND SERVICE**

5.1. **4G USER DATA THROUGHPUT.** As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet the threshold of minimum of 2Mbps of 4G User Data Throughput. The analysis of Data Service QoS KPIs i.e. User Data Throughput Survey Results revealed following:

a. **COMPLIANCE.** The cities and roads where CMOs remained compliant is mentioned in **Table 5.1: Compliance of 4G User Data Throughput  $>$  2 Mbps.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
2.	Telenor	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
3.	Ufone	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
4.	ZonG	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
5.	SCOM	3	Mirpur, Bagh, Islamabad to Muzaffarabad Road

**Table 5.1: Compliance of 4G User Data Throughput  $>$  2Mbps**

b. **NON-COMPLIANCE.** The cities and roads where CMOs remained non-compliant is mentioned in **Table 5.2: Non-Compliance of 4G User Data Throughput  $>$  2Mbps.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Muzaffarabad, Mirpur, Bagh
2.	Telenor	3	Muzaffarabad, Mirpur, Bagh
3.	ZonG	3	Muzaffarabad, Mirpur, Bagh
4.	SCOM	1	Muzaffarabad

**Table 5.2: Non-Compliance of 4G User Data Throughput  $>$  2Mbps**

## MOBILE NETWORK COVERAGE

6.1. Mobile Network Signal Strength is measured in decibels (dBm). Signal Strength can range from approximately -30 dBm upto -120 dBm. The closer that number is to -30dBm, the stronger the signal. In general, anything better than -100 decibel is considered a usable signal. The different ranges of signal strength and its effects can be categorized **Table 6.1: Signal Strength and Broadband Speed.**:

S. #.	Signal Strength (dBm)	Signal Strength
1.	-65 to 0	Strong Signal with Maximum Data Speed
2.	-75 to -65	Strong Signal with Good Data Speed
3.	-85 to -75	Fair, Useful & Reliable Data Speed is Attainable
4.	-100 to -85	Marginal Data Speed with Possibility of Drop-Out
5.	-140 to -100	Performance will Drop Drastically

**Table 6.1: Signal Strength and Broadband Speed**

6.2. **4G / LTE SIGNAL STRENGTH.** During the survey 4G/LTE signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) licenses awarded in Pakistan, licensees are required to meet **the threshold of -100dBm or above of Reference Signal Receive Power (RSRP) with 90% confidence level.** Keeping in view the same threshold, the analysis of recorded signal strength revealed following:

- a. **COMPLIANCE.** The cities and roads where CMOs remained compliant is mentioned in **Table 6.2: Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	3	Muzaffarabad, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
2.	Telenor	5	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
3.	Ufone	2	Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road
4.	ZonG	4	Muzaffarabad, Mirpur, Bagh, Islamabad to Muzaffarabad Road,
5.	SCOM	4	Muzaffarabad, Mirpur, Islamabad to Muzaffarabad Road, Rawalpindi to Mirpur Road

**Table 6.2: Compliance of 4G/LTE (RSRP) Signal Strength**

- b. **NON-COMPLIANCE.** The cities and roads where CMOs remained non-compliant is mentioned in **Table 6.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #.	Operator	Cities	
		Count	Names
1.	Jazz	2	Mirpur, Bagh
2.	ZonG	1	Rawalpindi to Mirpur Road
3.	SCOM	1	Bagh

**Table 6.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength**

## SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE Signal Strength (RSRP) samples recorded during drive test on survey routes plotted on maps along-with Voice & SMS QoS KPIs survey results in graphical form are placed at **Annex-A & Annex-B** for Cities and Roads respectively.

## STANDING IN SURVEY

8.1. CMOs have been prioritized/ placed at 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> & 5<sup>th</sup> position in each category i.e. Mobile Network Coverage, Mobile Broadband Service, Voice Service and SMS Service, based upon the compliance level against each QoS KPI in each category in surveyed Motorways / Highways / Inter Cities Roads.

- a. **MOBILE NETWORK COVERAGE.** The categorization of CMOs as per QoS KPI i.e. Signal Strength of 4G/LTE in cities and on roads is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage.**

S. #.	Operator	Compliance Level in Cities and Roads	Standing
1.	Telenor	5	1 <sup>st</sup>
2.	ZonG	4	2 <sup>nd</sup>
3.	SCOM	4	2 <sup>nd</sup>
4.	Jazz	3	3 <sup>rd</sup>
5.	Ufone	2	4 <sup>th</sup>

**Table 8.1: CMOs Standing in Mobile Network Coverage**

- b. **MOBILE BROADBAND SERVICE.** The categorization of each CMOs, as per the highest to lowest obtained User Data Throughput in 4G/LTE is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service.**

S. #.	Operator	4G Highest Throughput in Cities & Roads					Standing
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	
1.	SCOM	3	-	1	-	-	1 <sup>st</sup>
2.	ZonG	1	3	1	-	-	2 <sup>nd</sup>
3.	Jazz	1	2	2	-	-	3 <sup>rd</sup>
4.	Telenor	-	-	-	5	-	4 <sup>th</sup>
5.	Ufone	-	-	1	-	1	5 <sup>th</sup>

**Table 8.2: CMOs Standing in Mobile Broadband Service**

- c. **VOICE SERVICE.** The categorization of each CMOs, as per the maximum complaint Voice QoS KPIs is shown in **Table 8.3: CMOs Standing in Voice Service.**

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	SCOM	13	12	1 <sup>st</sup>
2.	Telenor	11	14	2 <sup>nd</sup>
3.	ZonG	10	15	3 <sup>rd</sup>
4.	Ufone	9	16	4 <sup>th</sup>
5.	Jazz	7	18	5 <sup>th</sup>

**Table 8.3: CMOs Standing in Voice Service**

- d. **SMS SERVICE.** The categorization of each CMOs, as per the maximum complaint SMS QoS KPIs which is shown in **Table 8.4: CMOs Standing in SMS Service**

S. #.	Operator	SMS QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	SCOM	4	6	1 <sup>st</sup>
2.	ZonG	1	9	2 <sup>nd</sup>

S. #.	Operator	SMS QoS KPIs		Standing
		Compliant	Non-Compliant	
3.	Jazz	-	10	3 <sup>rd</sup>
4.	Telenor	-	10	3 <sup>rd</sup>
5.	Ufone	-	10	3 <sup>rd</sup>

**Table 8.4: CMOs Standing in SMS Service**

- e. **OVERALL STANDING.** The overall standing of each CMOs in each category of service is mentioned in **Table 8.5: CMOs Overall Standing in QoS Survey.**

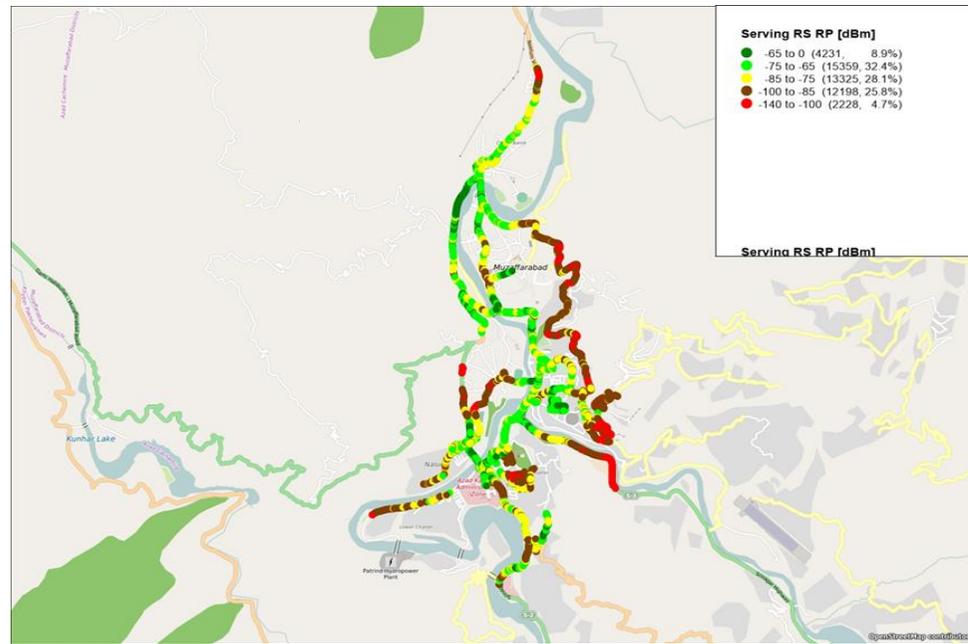
S. #.	Service	STANDING				
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>
1.	Mobile Network Coverage	Telenor	ZonG & SCOM	Jazz	Ufone	-
2.	Mobile Broadband	SCOM	ZonG	Jazz	Telenor	Ufone
3.	Voice	SCOM	Telenor	ZonG	Ufone	Jazz
4.	SMS	SCOM	ZonG	Jazz, Telenor & Ufone	-	-

**Table 8.5: CMOs Overall Standing in QoS Survey**

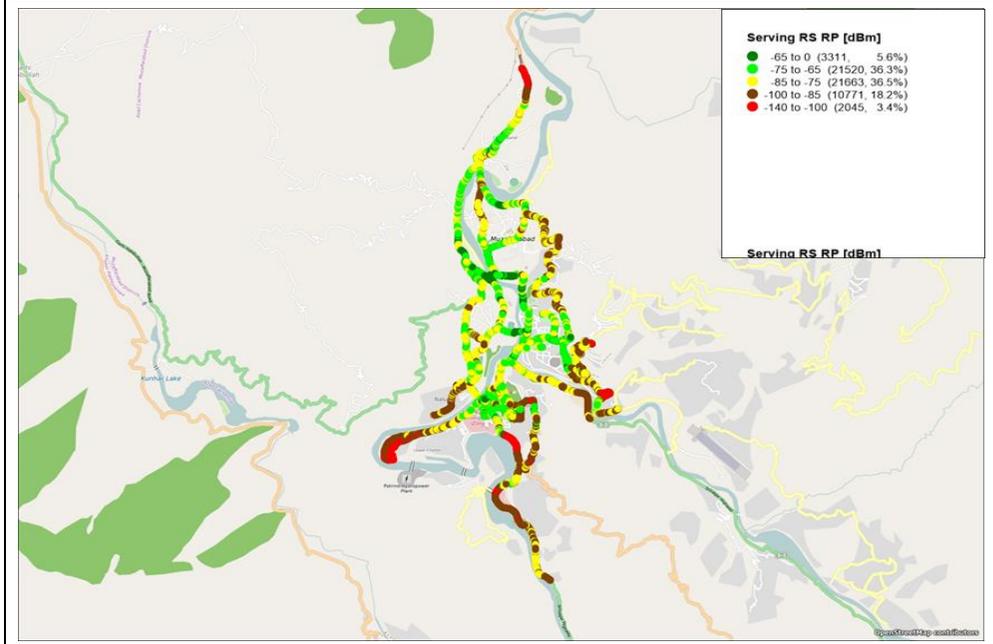
**CITIES**

# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

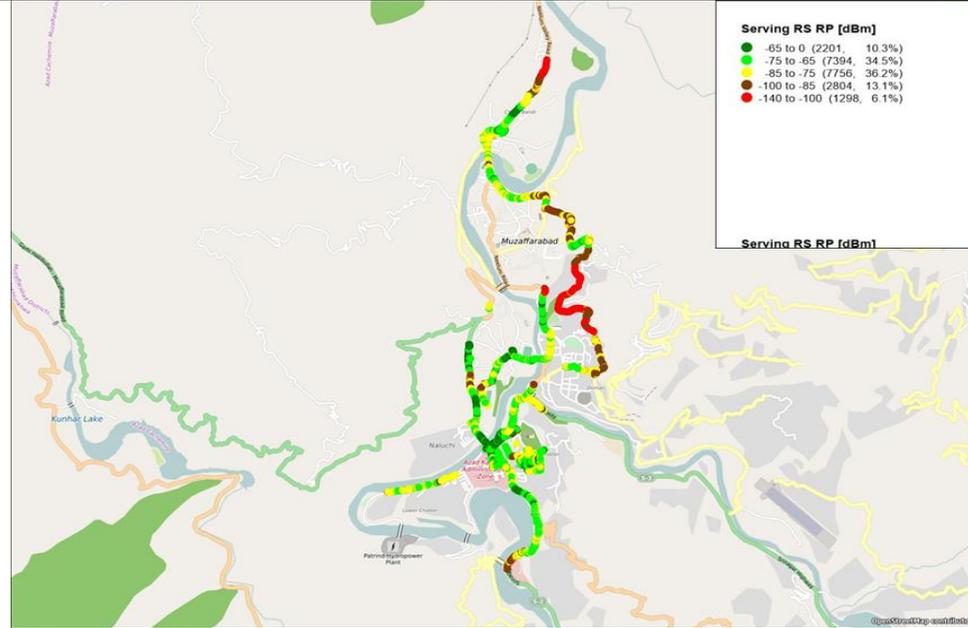
## JAZZ 4G COVERAGE (RSRP) - MUZAFFARABAD



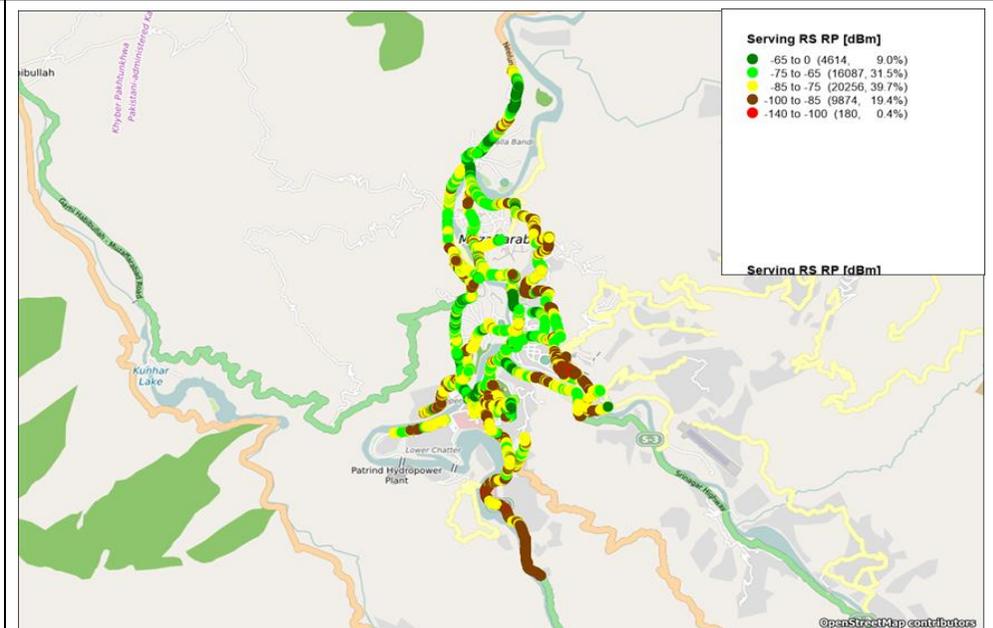
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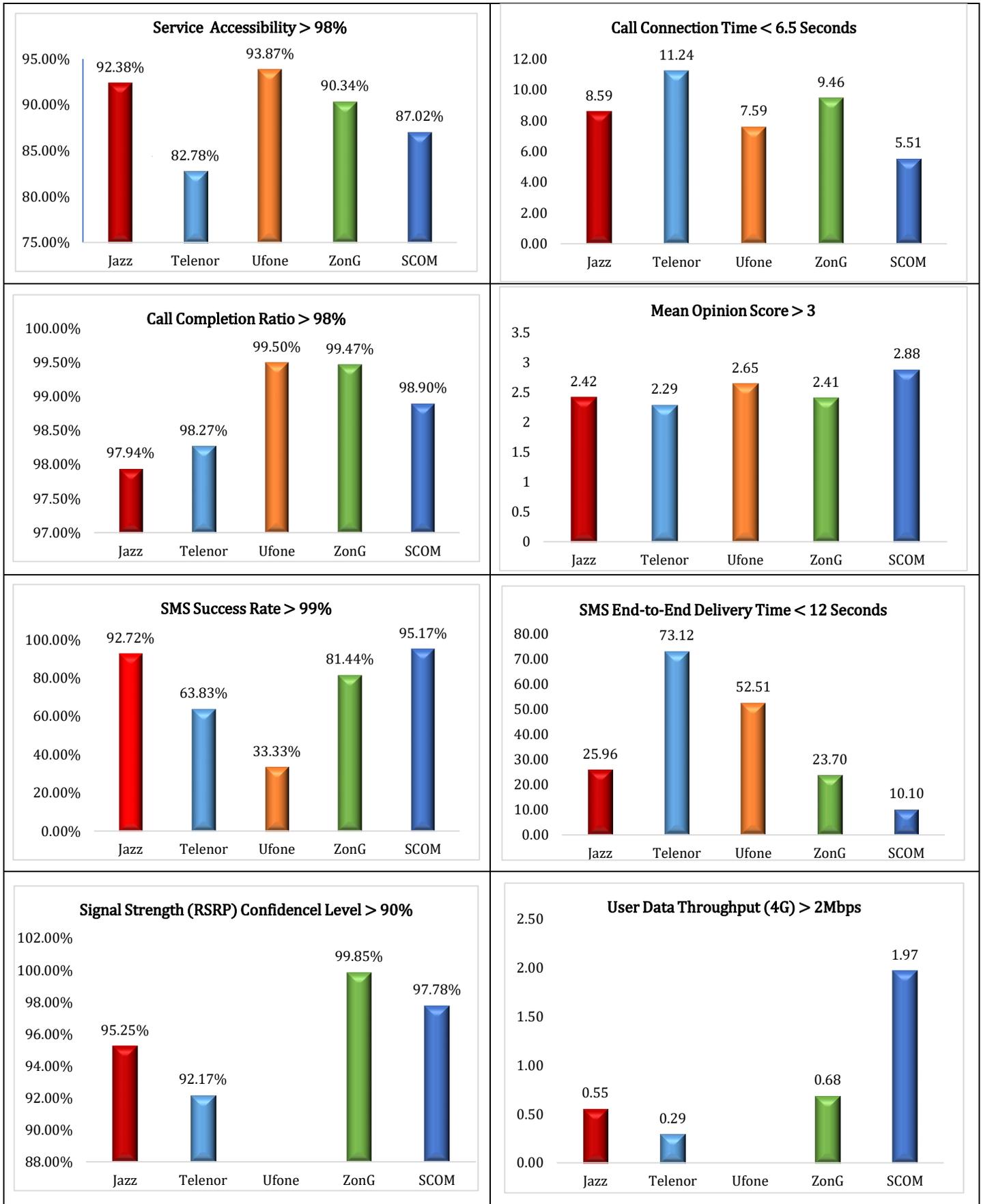
## TELENOR 4G COVERAGE (RSRP) - MUZAFFARABAD



## ZONG 4G COVERAGE (RSRP) - MUZAFFARABAD

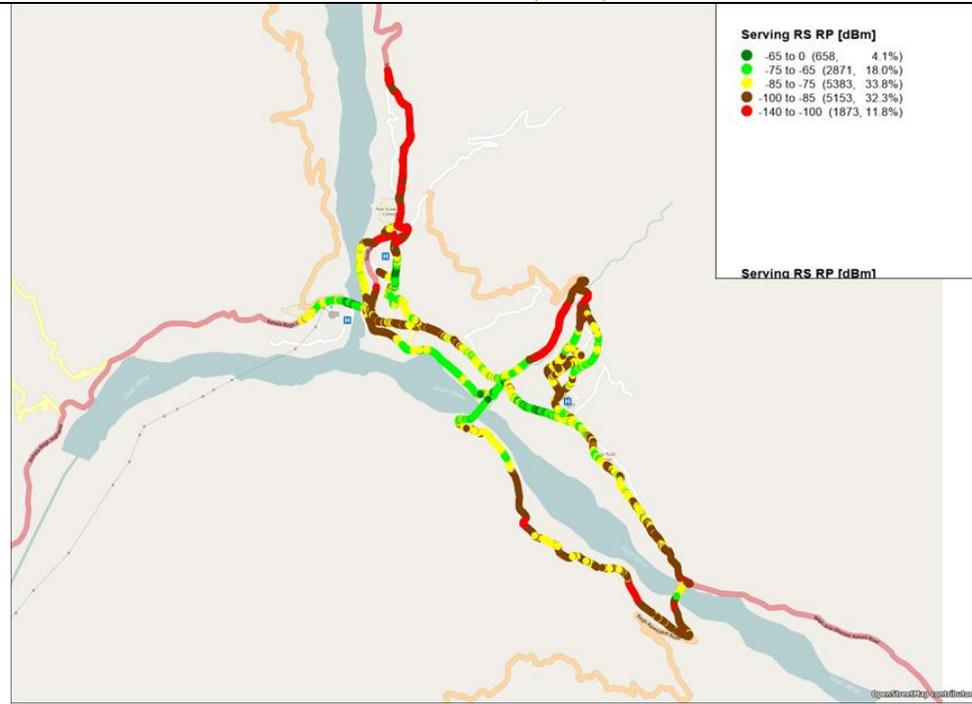


## QUALITY OF SERVICE SURVEY RESULTS – MUZAFFARABAD

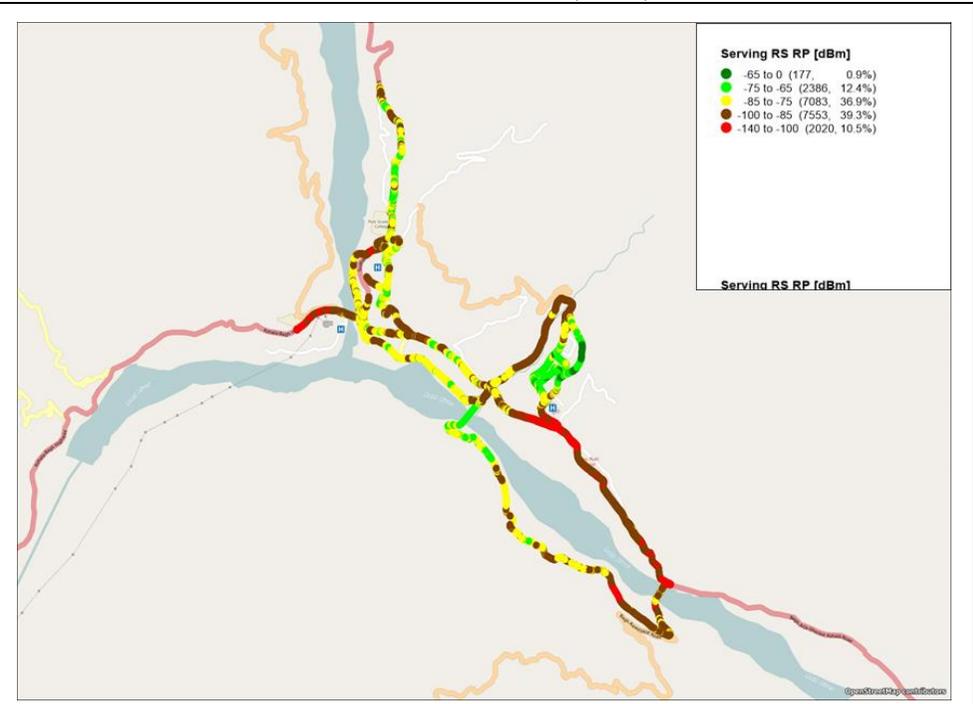


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

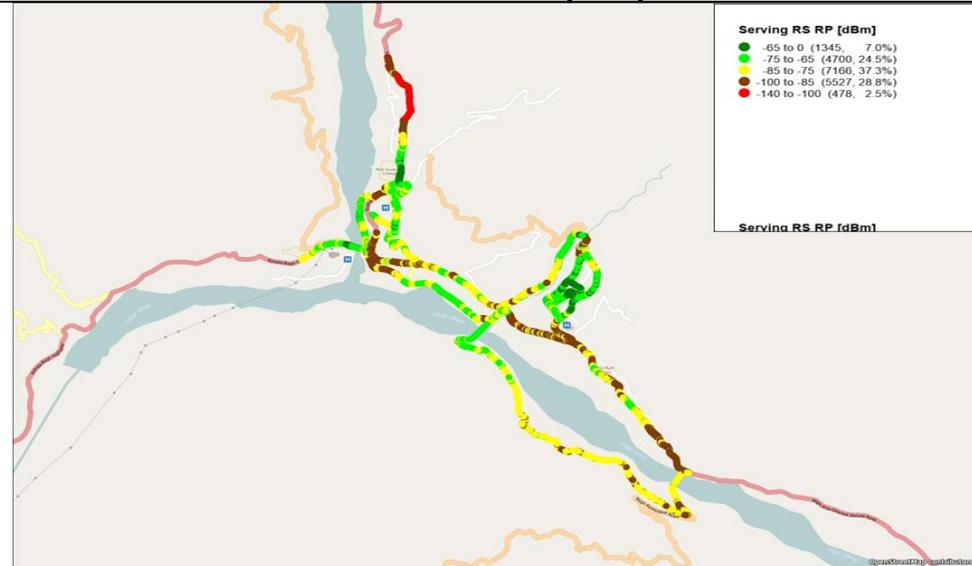
## JAZZ 4G COVERAGE (RSRP) - BAGH



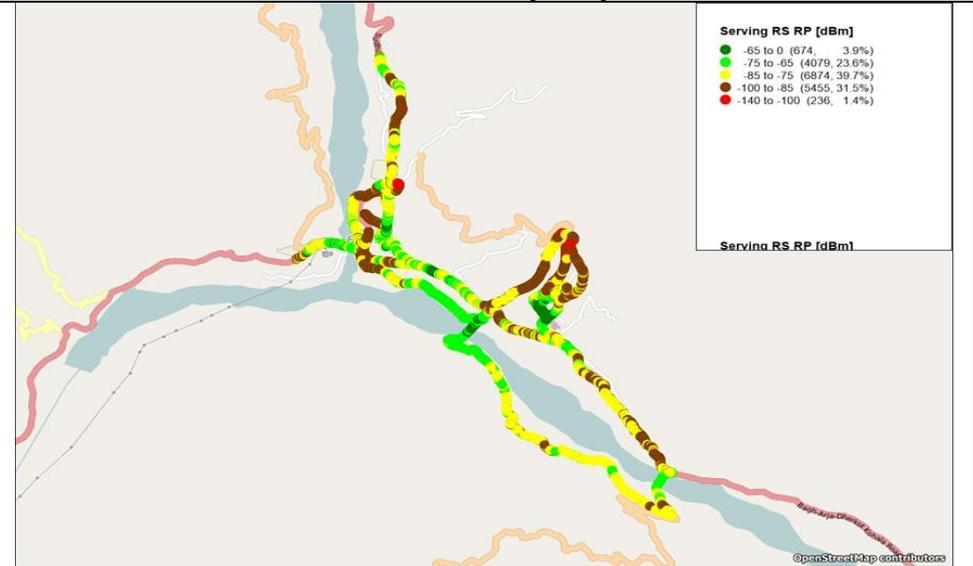
## SCO MOBILE 4G COVERAGE (RSRP) - BAGH



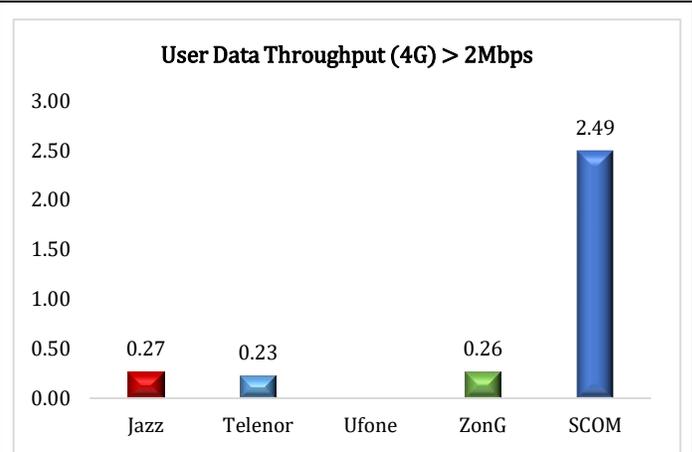
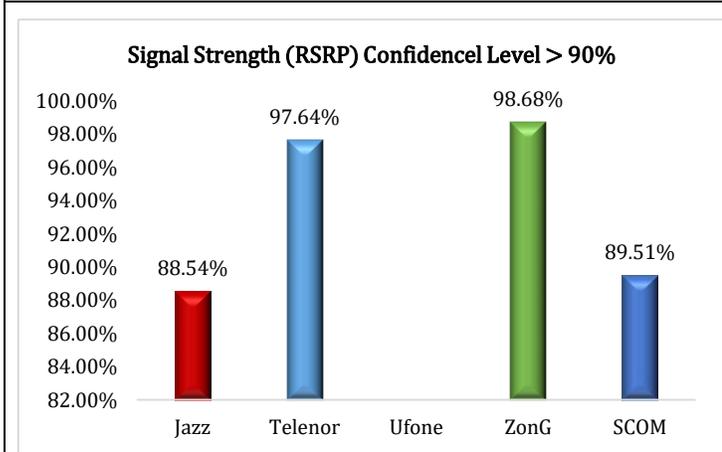
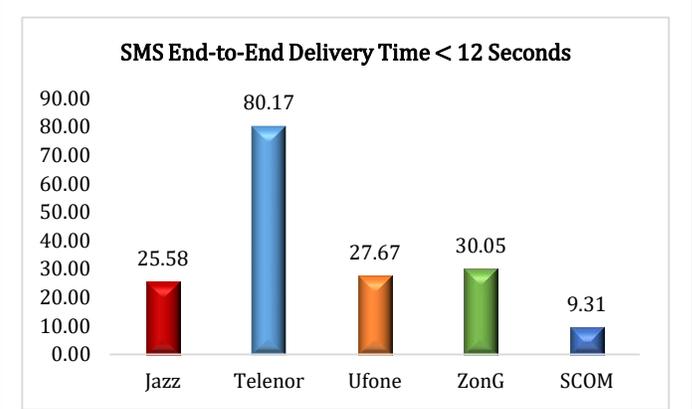
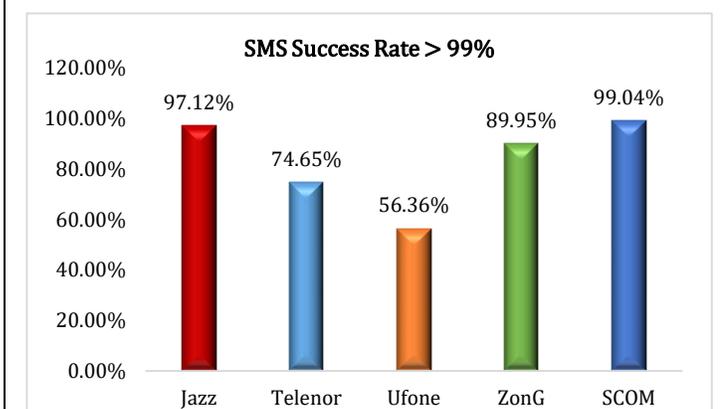
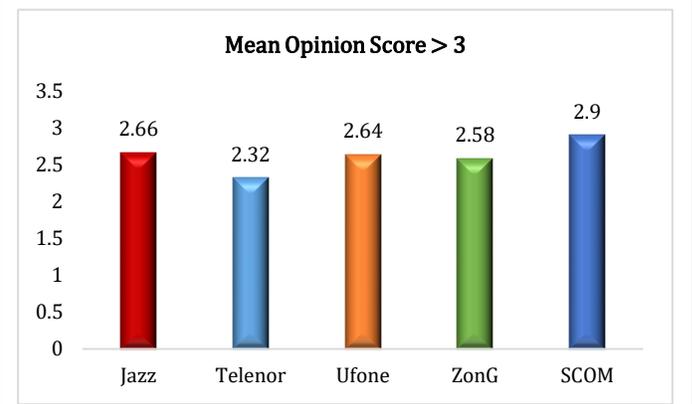
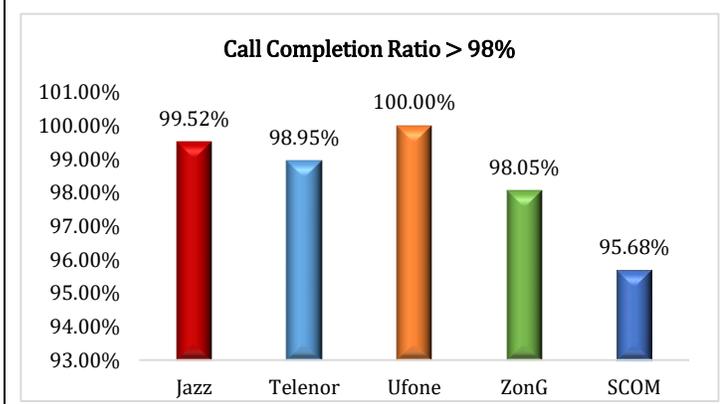
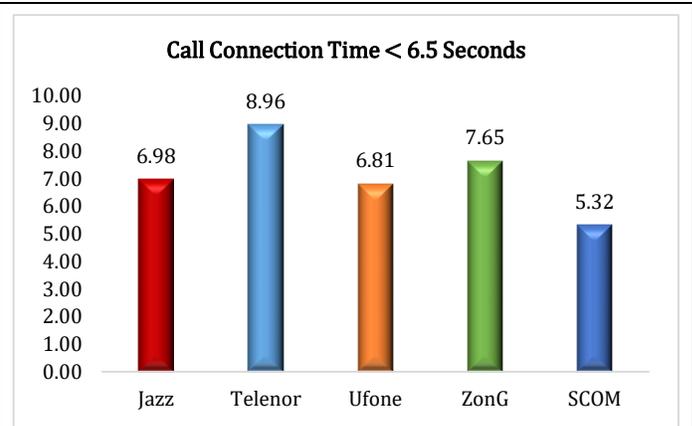
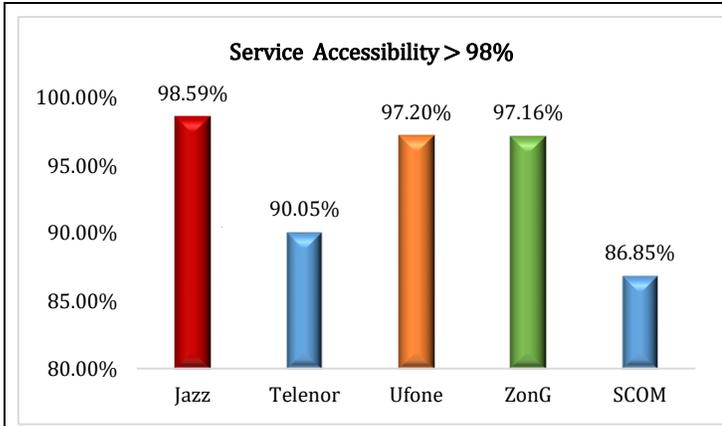
## TELENOR 4G COVERAGE (RSRP) - BAGH



## ZONG 4G COVERAGE (RSRP) - BAGH

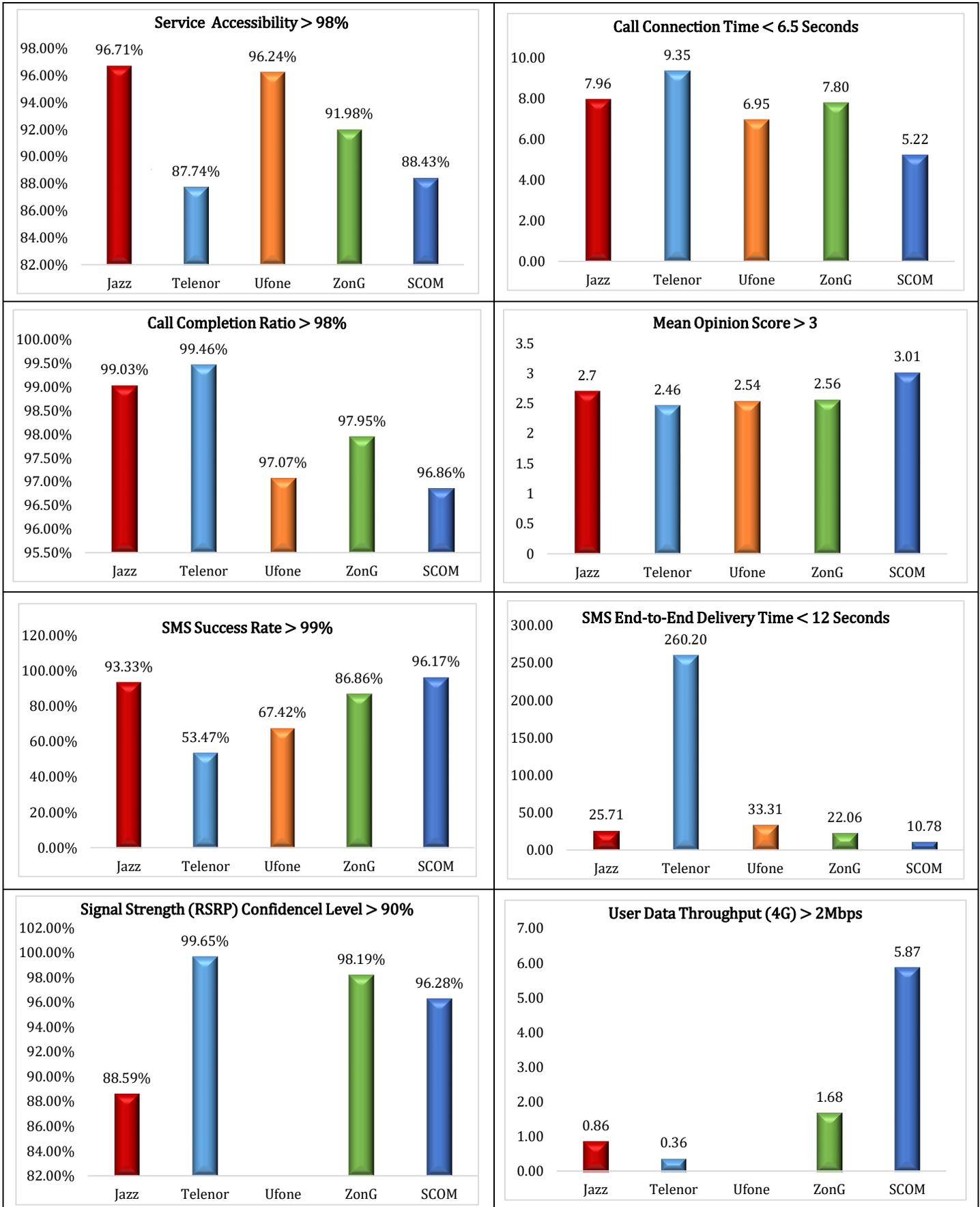


## QUALITY OF SERVICE SURVEY RESULTS – BAGH





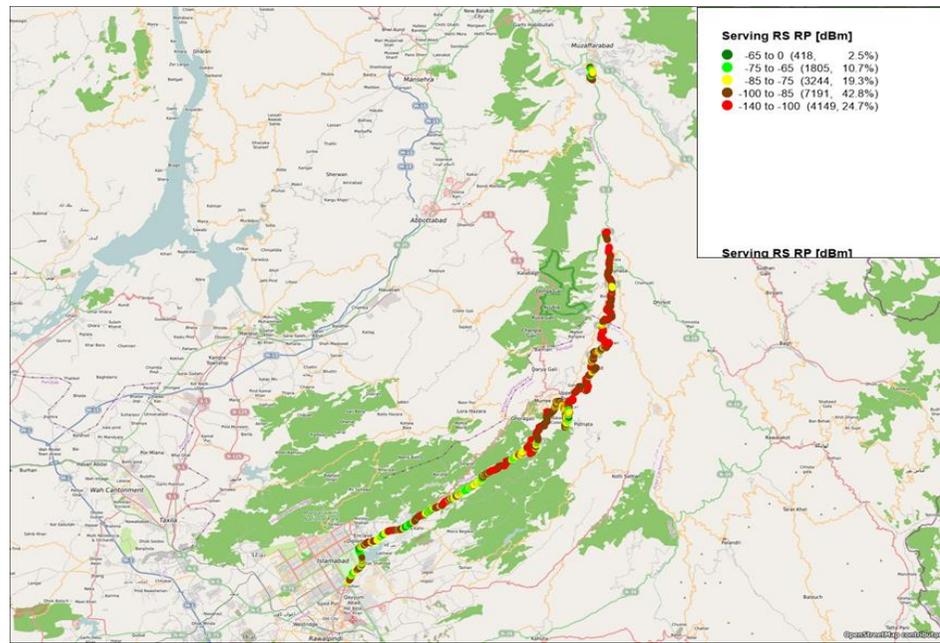
## QUALITY OF SERVICE SURVEY RESULTS – MIRPUR



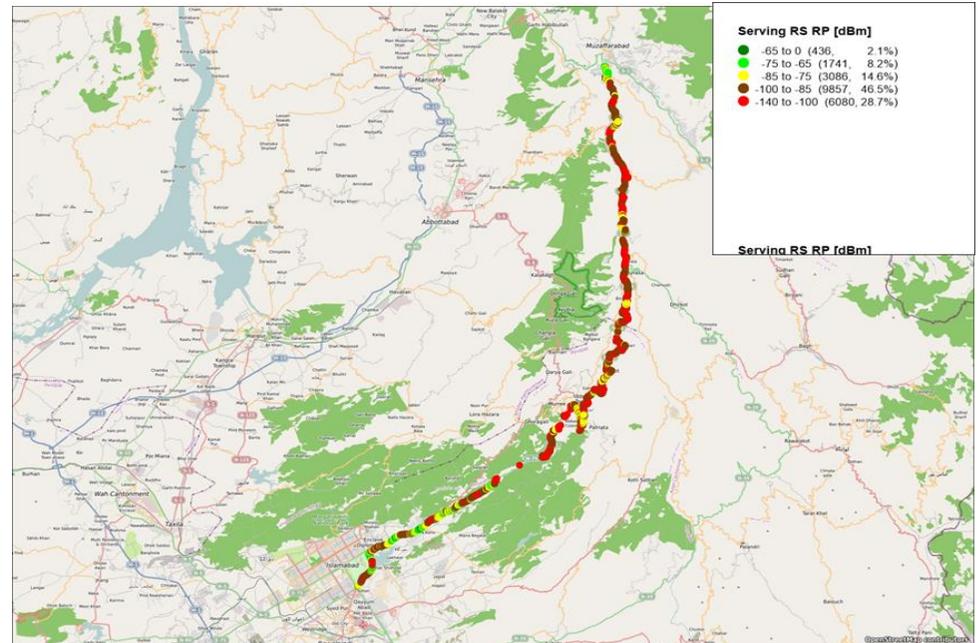
# ROADS

# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

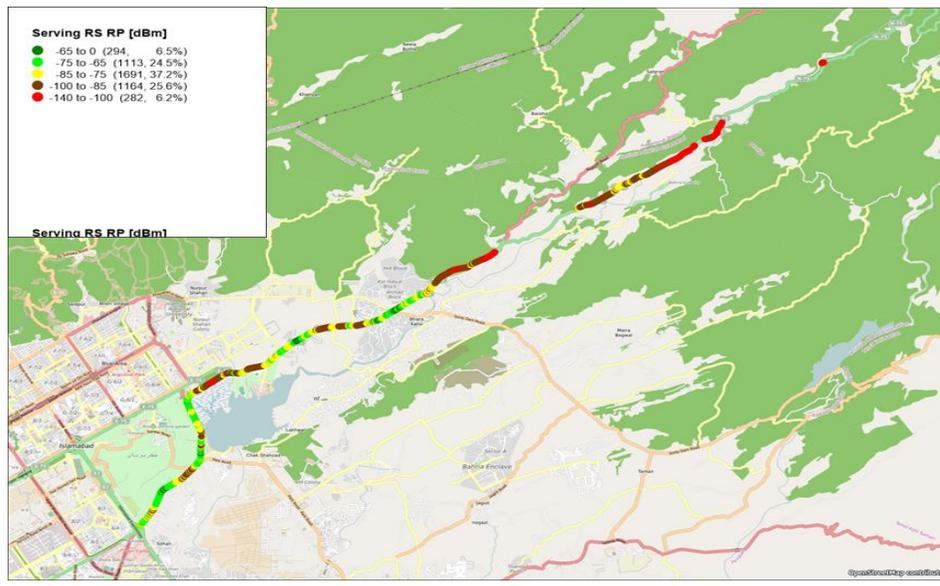
## JAZZ 4G COVERAGE (RSRP) – ISLAMABAD TO MUZAFFARABAD



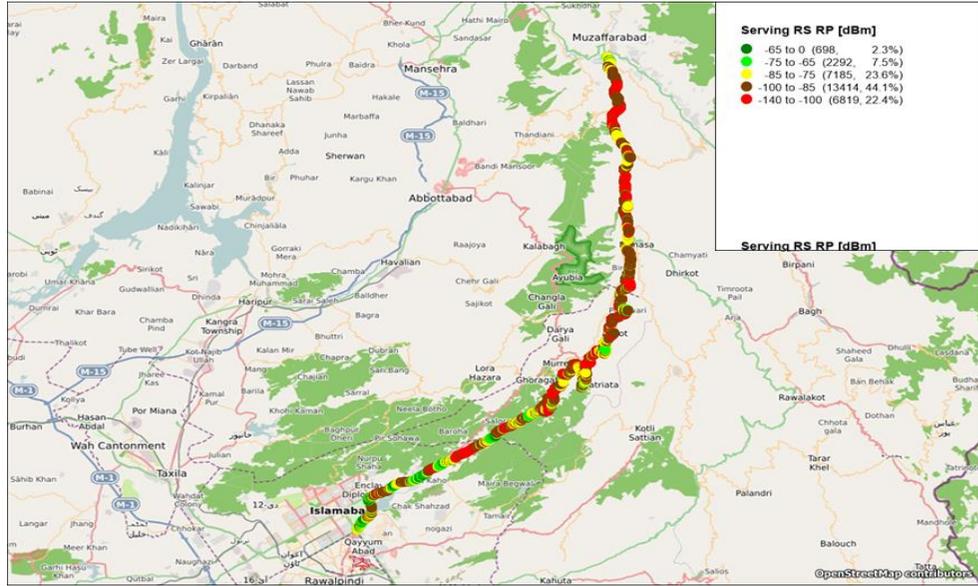
## TELENOR 4G COVERAGE (RSRP) - ISLAMABAD TO MUZAFFARABAD



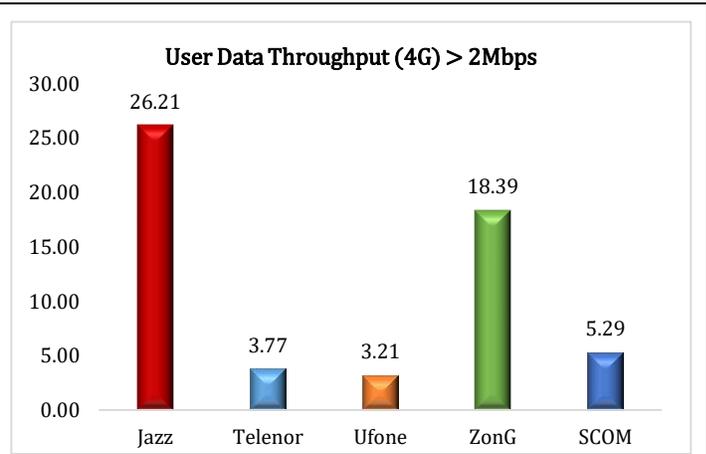
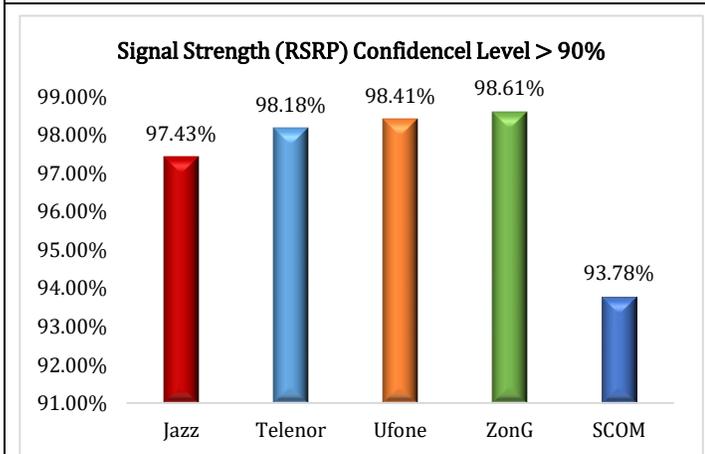
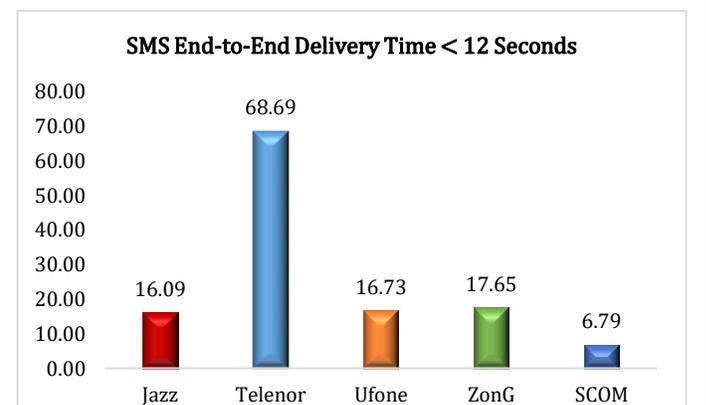
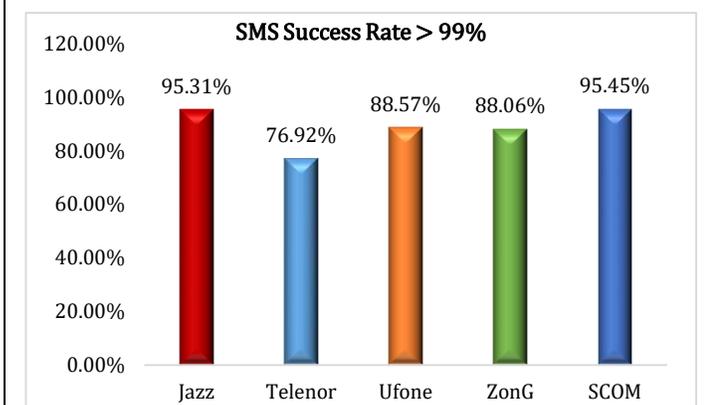
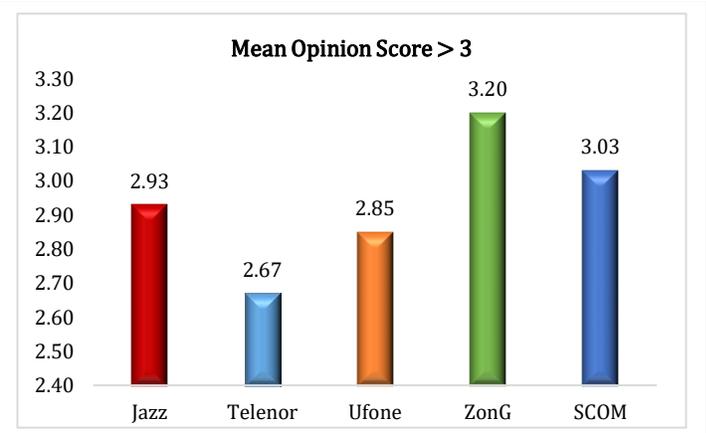
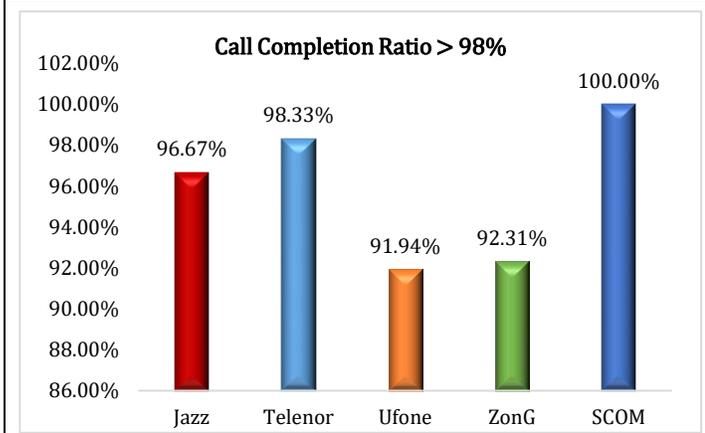
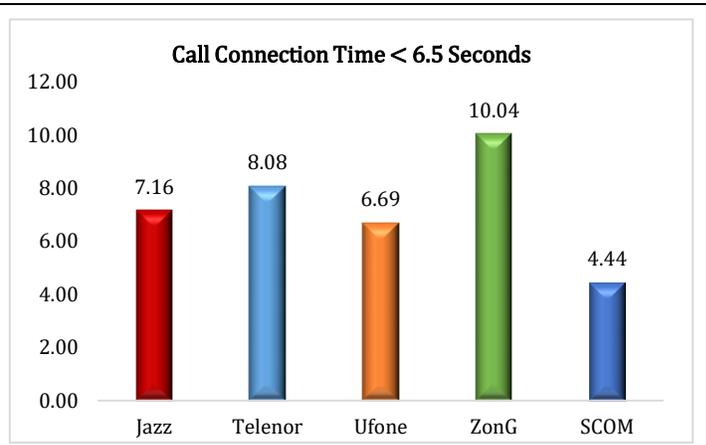
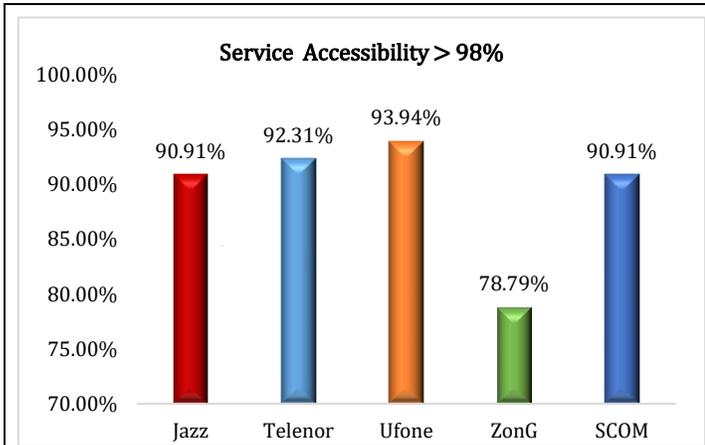
## UFONE 4G COVERAGE (RSRP) - ISLAMABAD TO MUZAFFARABAD



## ZONG 4G COVERAGE (RSRP) - ISLAMABAD TO MUZAFFARABAD

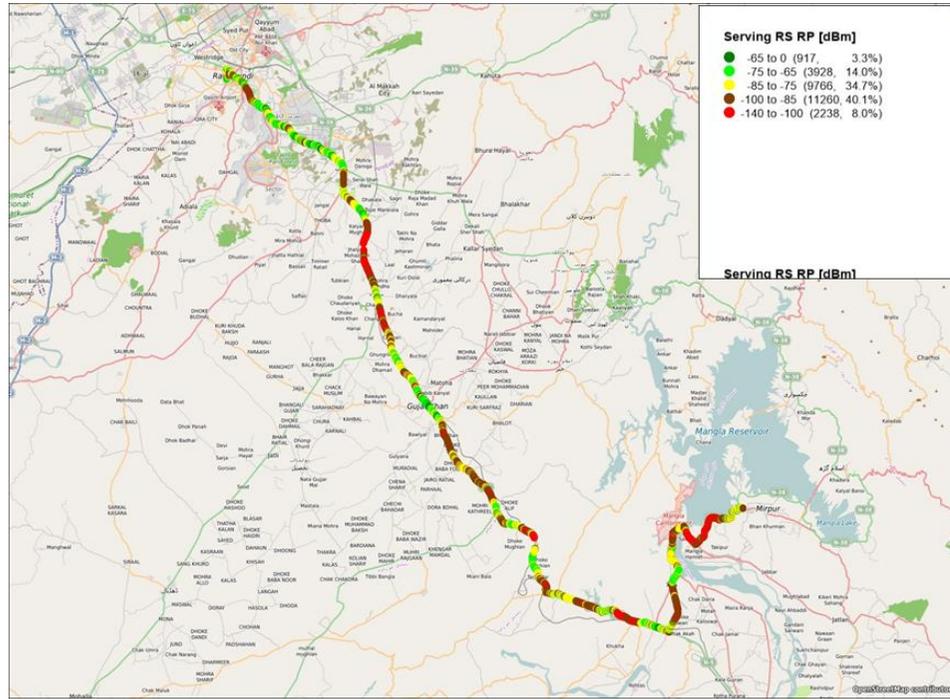


# QUALITY OF SERVICE SURVEY RESULTS – ISLAMABAD TO MUZAFFARABAD

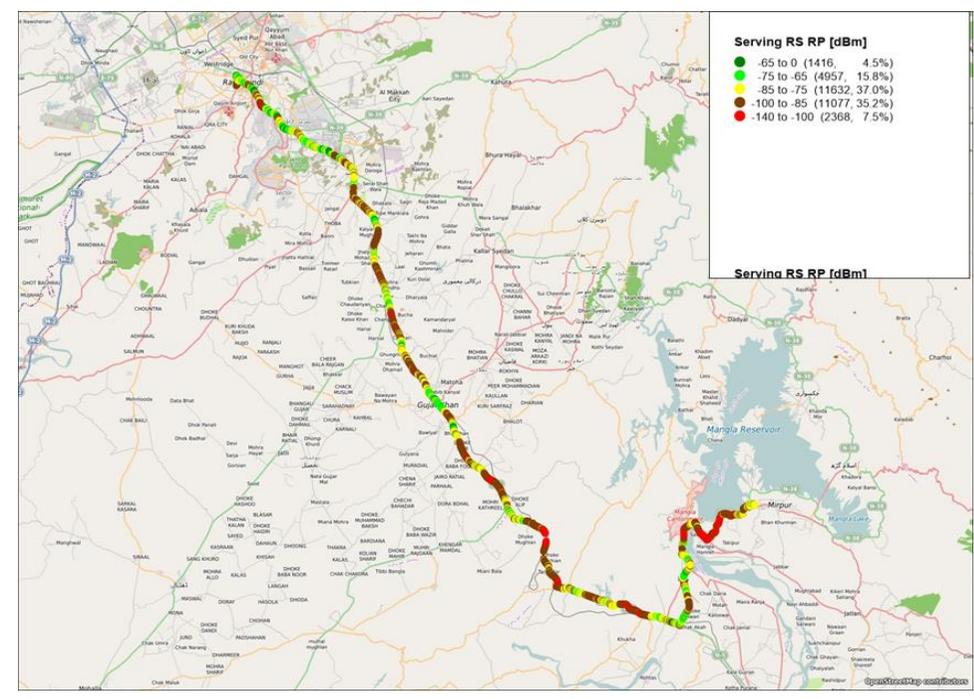


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

## JAZZ 4G COVERAGE (RSRP) – RAWALPINDI TO MIRPUR



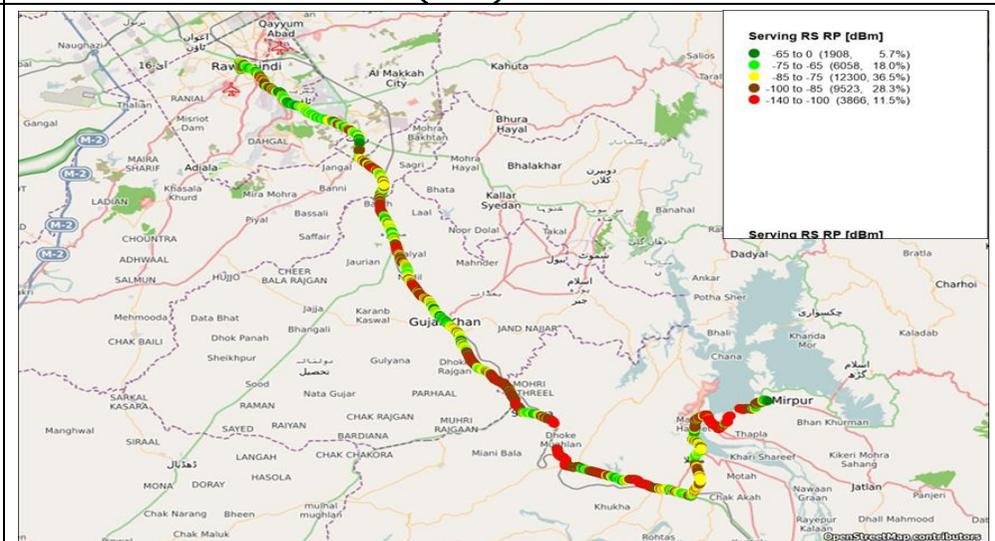
## TELENOR 4G COVERAGE (RSRP) – RAWALPINDI TO MIRPUR



## UFONE 4G COVERAGE (RSRP) – RAWALPINDI TO MIRPUR



## ZONG 4G COVERAGE (RSRP) – RAWALPINDI TO MIRPUR



## QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO MIRPUR

