

# **INDEPENDENT QUALITY OF SERVICE** **SURVEY OF ROADS IN PAKISTAN**

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FIRST QUARTER 2021

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# 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 on Sixteen (16) different Motorways / Highways / Inter Cities Roads of Punjab, Sindh and Khyber Pakhtunkhwa (KPK). The name of Motorways / Highways / Inter Cities Roads along with survey dates are shown in **Table 1.1: QoS Survey Dates:**

S. #	Province	Motorways / Highways / Inter Cities Roads
1.	Punjab	Rawalpindi to Attock
2.		M-3 Motorway (Lahore to Multan)
3.		Multan to Kot Addu
4.		Rawalpindi to Chakwal
5.		Multan to Abdul Hakeem
6.		Multan to Bahawalpur
7.		Lahore to Pattoki
8.		Lahore to Mianwali
9.		Lahore to Narowal
10.	Sindh	Karachi to Nawabshah
11.		Sukkur to Nawabshah
12.		Sukkur to Larkana
13.		Karachi to Sanghar
14.		Hyderabad to Badin
15.		Hyderabad to Mirpur Khas
16.	Khyber Pakhtunkhwa & Punjab	GT Road (Peshawar to Rawalpindi)

Table 1.1: QoS Survey Dates and Samples

## DRIVE TEST DETAILS

2.1. The QoS survey was carried out using the newly procured Automated QoS Monitoring & Benchmarking Tool i.e. "SmartBenchmarker". During Voice Calls, SMS and Data Sessions, both A-Party and B-Party mobile handsets were kept in auto detect mode. A Call of 120 seconds was made followed by an SMS from Party-A to Party-B.

## MOBILE NETWORK COVERAGE

3.1. 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 zero, 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 on broadband speed and sustainability can be seen in **Table3.1: 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

Table3.1: Signal Strength and Broadband Speed

3.2. **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, licensees are required to meet the threshold of -100dBm or above of Reference Signal Receive Power (RSRP) with 90% confidence level. The analysis of recorded signal strength revealed following:

- a. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	6	Karachi to Nawabshah, Hyderabad to Mirpur Khas, Multan to Bahawalpur, Multan to Abdul Hakeem, Lahore to Multan, Lahore to Pattoki
2.	Telenor	7	Hyderabad to Badin, Lahore to Multan, Lahore to Pattoki, Lahore to Narowal, Lahore to Mianwali, Rawalpindi to Chakwal, GT Road Peshawar to Rawalpindi
3.	Ufone	3	Rawalpindi to Chakwal, Rawalpindi to Attock, GT Road Peshawar to Rawalpindi
4.	ZonG	12	Karachi to Nawabshah, Hyderabad to Mirpur Khas, Hyderabad to Badin, Multan to Bahawalpur, Multan to Abdul Hakeem, Lahore to Multan, Lahore to Pattoki, Lahore to Narowal, Lahore to Mianwali, Rawalpindi to Chakwal, Rawalpindi to Attock, GT Road Peshawar to Rawalpindi

**Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength**

- b. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 3.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	10	Sukkur to Larkana, Sukkur to Nawabshah, Karachi to Sanghar, Hyderabad to Badin, Multan to Kot Addu, Lahore to Narowal, Lahore to Mianwali, Rawalpindi to Chakwal, Rawalpindi to Attock, GT Road Peshawar to Rawalpindi
2.	Telenor	9	Sukkur to Larkana, Sukkur to Nawabshah, Karachi to Sanghar, Karachi to Nawabshah, Hyderabad to Mirpur Khas, Multan to Kot Addu, Multan to Bahawalpur, Multan to Abdul Hakeem, Rawalpindi to Attock
3.	Ufone	13	Sukkur to Larkana, Sukkur to Nawabshah, Karachi to Sanghar, Karachi to Nawabshah, Hyderabad to Mirpur Khas, Hyderabad to Badin, Multan to Kot Addu, Multan to Abdul Hakeem, Lahore to Multan, Lahore to Pattoki, Lahore to Narowal, Lahore to Mianwali, Multan to Bahawalpur
4.	ZonG	4	Sukkur to Larkana, Sukkur to Nawabshah, Karachi to Sanghar, Multan to Kot Addu

**Table 3.3: Non-Compliance of 4G/LTE (RSRP) Signal Strength**

3.3. **3G SIGNAL STRENGTH.** During the survey 3G signal strength samples were recorded on survey routes. As per Next Generation Mobile Service (NGMS) licenses awarded, licensees are required to meet the threshold of -100dBm or above of Received Signal Code Power (RSCP) with 90% confidence level. The analysis of recorded signal strength revealed that all CMOs remained compliant of the said threshold value at all 16 x surveyed Motorways / Highways / Inter Cities Roads.

## MOBILE BROADBAND SERVICE

4.1. **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 and 256Kbps of 3G User Data Throughput. The analysis User Data Throughput revealed that all **CMOs remained compliant of the minimum of 2Mbps threshold value on all 16 x surveyed Motorways / Highways / Inter Cities Roads.**

## VOICE SERVICE

5.1. 7 x QoS KPIs have been measured while testing voice services. The results of voice QoS KPIs are as under:

- a. **NETWORK ACCESSIBILITY.** Except Ufone at Rawalpindi to Attock road, other CMOs have achieved the QoS KPI **Network Accessibility > 99%** on all 16 x surveyed Motorways / Highways / Inter Cities Roads.
- b. **SERVICE ACCESSIBILITY.** The analysis of QoS KPI **Service Accessibility of > 98%** on 16 x surveyed Motorways / Highways / Inter Cities Roads revealed following.
  - i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 5.1: Compliance of Service Accessibility > 98%**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	1	Hyderabad to Badin
2.	Telenor	4	GT Road Peshawar to Rawalpindi, Lahore to Pattoki, Multan to Bahawalpur, Hyderabad to Mirpur Khas
3.	Ufone	2	Multan to Bahawalpur, Hyderabad to Badin
4.	ZonG	8	Rawalpindi to Chakwal, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Bahawalpur, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Sanghar, Sukkur to Nawabshah

**Table 5.1: Compliance of Service Accessibility > 98%**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 5.2: Non-Compliance of Service Accessibility > 98%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	15	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
2.	Telenor	12	Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Multan, Multan to Abdul Hakeem, Multan to Kot Addu, Hyderabad to Badin, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
3.	Ufone	14	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem,

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
			Multan to Kot Addu, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
4.	ZonG	8	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Lahore to Mianwali, Lahore to Narowal, Lahore to Multan, Multan to Kot Addu, Karachi to Nawabshah, Sukkur to Larkana

**Table 5.2: Non-Compliance of Service Accessibility > 98%**

c. **CALL CONNECTION TIME.** The analysis of QoS KPI **Call Connection Time of < 6.5 Seconds** in all the surveyed Motorways / Highways / Inter Cities Roads revealed following.

i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 5.3: Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	5	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Lahore to Pattoki, Hyderabad to Badin, Hyderabad to Mirpur Khas
2.	Telenor	15	Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
3.	Ufone	13	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Lahore to Mianwali, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
4.	ZonG	14	Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana

**Table 5.3: Compliance of Call Connection Time < 6.5 Seconds**

ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 5.4: Non-Compliance of Call Connection Time < 6.5 Seconds.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	11	Rawalpindi to Attock, Lahore to Mianwali, Lahore to Narowal, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
2.	Telenor	1	GT Road Peshawar to Rawalpindi
3.	Ufone	3	Rawalpindi to Chakwal, Lahore to Narowal, Multan to Kot Addu
4.	ZonG	2	GT Road Peshawar to Rawalpindi, Lahore to Mianwali

**Table 5.4: Non-Compliance of Call Connection Time < 6.5 Seconds**

- d. **CALL COMPELETION RATIO.** The analysis of QoS KPI **Call Completion Ratio of > 98%** in surveyed Motorways / Highways / Inter Cities Roads revealed following:
- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 5.5: Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	10	Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Karachi to Nawabshah, Sukkur to Larkana
2.	Telenor	9	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Mirpur Khas, Sukkur to Larkana
3.	Ufone	8	GT Road Peshawar to Rawalpindi, Lahore to Mianwali, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Bahawalpur, Hyderabad to Mirpur Khas, Sukkur to Nawabshah, Sukkur to Larkana
4.	ZonG	13	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Nawabshah, Sukkur to Larkana

**Table 5.5: Compliance of Call Completion Ratio > 98%**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 5.6: Non-Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	6	GT Road Peshawar to Rawalpindi, Lahore to Mianwali, Lahore to Multan, Hyderabad to Mirpur Khas, Karachi to Sanghar, Sukkur to Nawabshah
2.	Telenor	7	Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Hyderabad to Badin, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah
3.	Ufone	8	Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Multan, Multan to Kot Addu, Hyderabad to Badin, Karachi to Nawabshah, Karachi to Sanghar
4.	ZonG	3	Lahore to Mianwali, Lahore to Narowal, Karachi to Sanghar

**Table 5.6: Non-Compliance of Call Completion Ratio > 98%**

- e. **END-TO-END SPEECH QUALITY / MEAN OPINION SCORE.** None of the CMOs have achieved the QoS KPI **End-to-End Speech Quality/ Mean Opinion Score of > 3** in all the surveyed Motorways / Highways / Inter Cities Roads revealed following:
- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 5.7: Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	9	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Pattoki, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar
2.	Telenor	5	Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar
3.	Ufone	12	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Multan to Bahawalpur, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
4.	ZonG	16	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana

**Table 5.7: Compliance of Mean Opinion Score > 3**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 5.8: Non-Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	7	Lahore to Mianwali, Lahore to Narowal, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Sukkur to Nawabshah, Sukkur to Larkana
2.	Telenor	11	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Hyderabad to Badin, Sukkur to Nawabshah, Sukkur to Larkana
3.	Ufone	4	Lahore to Multan, Multan to Abdul Hakeem, Multan to Kot Addu, Hyderabad to Badin

**Table 5.8: Non-Compliance of Mean Opinion Score > 3**

- f. **INTER SYSTEM HANDOVER OF CIRCUIT SWITCHED VOICE.** The analysis of QoS KPI **Inter System Handover of Circuit Switched Voice > 98%** in all 16 x surveyed Motorways / Highways/ Inter Cities Roads revealed following:

- i. **COMPLIANCE.** The towns where CMOs remained compliant is mentioned in **Table 5.9: ISHO for Circuit Switched Voice ≥ 98%.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	13	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Larkana

S. #.	Operator	Towns	
		Count	Names
2.	Telenor	14	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
3.	Ufone	11	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Larkana
4.	ZonG	16	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana

**Table 5.9: ISHO for Circuit Switched Voice  $\geq$  98%.**

- ii. **NON-COMPLIANCE.** The towns where CMOs remained non-compliant is mentioned in **Table 5.1.1: ISHO for Circuit Switched Voice  $\geq$  98%.**

S. #.	Operator	Towns	
		Count	Names
1.	Jazz	3	Rawalpindi to Attock, Karachi to Sanghar, Sukkur to Nawabshah
2.	Telenor	2	Lahore to Mianwali, Hyderabad to Badin
3.	Ufone	5	Rawalpindi to Chakwal, Lahore to Multan, Multan to Bahawalpur, Karachi to Sanghar, Sukkur to Nawabshah

**Table 5.1.1: ISHO for Circuit Switched Voice  $\geq$  98%.**

- g. **RAB SETUP SUCCESS RATE.** All CMOs have achieved the QoS KPI **RAB Setup Success Rate > 98%** in all 16 x surveyed Motorways / Highways / Inter Cities Roads.

## **SMS SERVICE**

6.1. 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 16 x surveyed Motorways / Highways / Inter Cities Roads and roads revealed following:
- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 6.1: Compliance of SMS Success Rate > 99%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	5	Multan to Abdul Hakeem, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Larkana
2.	Telenor	5	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Multan to Abdul Hakeem, Hyderabad to Badin, Sukkur to Larkana



S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
3.	Ufone	8	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Bahawalpur, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Larkana
4.	ZonG	13	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana

**Table 6.1: Compliance of SMS Success Rate > 99%**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 6.2: Non-Compliance of SMS Success Rate > 99%**.

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	11	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Bahawalpur, Multan to Kot Addu, Karachi to Sanghar, Sukkur to Nawabshah
2.	Telenor	11	Rawalpindi to Attock, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah
3.	Ufone	8	Rawalpindi to Attock, Lahore to Mianwali, Lahore to Narowal, Lahore to Multan, Multan to Kot Addu, Hyderabad to Badin, Karachi to Sanghar, Sukkur to Nawabshah
4.	ZonG	4	Rawalpindi to Attock, Lahore to Mianwali, Multan to Kot Addu, Karachi to Nawabshah

**Table 6.2: 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 16 x surveyed Motorways / Highways / Inter Cities Roads, revealed following:

- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant is mentioned in **Table 6.3: Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	13	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Pattoki, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Sukkur to Nawabshah, Sukkur to Larkana
2.	Telenor	9	Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana
3.	Ufone	9	Rawalpindi to Attock, Lahore to Mianwali, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
			to Mirpur Khas, Karachi to Nawabshah, Sukkur to Nawabshah, Sukkur to Larkana
4.	ZonG	16	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Multan to Abdul Hakeem, Multan to Bahawalpur, Multan to Kot Addu, Hyderabad to Badin, Hyderabad to Mirpur Khas, Karachi to Nawabshah, Karachi to Sanghar, Sukkur to Nawabshah, Sukkur to Larkana

**Table 6.3: Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant is mentioned in **Table 6.4: Non-Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	3	Lahore to Narowal, Lahore to Multan, Karachi to Sanghar
2.	Telenor	7	GT Road Peshawar to Rawalpindi, Rawalpindi to Attock, Rawalpindi to Chakwal, Lahore to Mianwali, Lahore to Narowal, Multan to Bahawalpur, Multan to Kot Addu
3.	Ufone	7	GT Road Peshawar to Rawalpindi, Rawalpindi to Chakwal, Lahore to Narowal, Lahore to Pattoki, Lahore to Multan, Hyderabad to Badin, Karachi to Sanghar

**Table 6.4: Non-Compliance of SMS End-To-End Delivery Time  $\leq$  12 Seconds**

## **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 & Annex-C** on Motorways / Highways and Inter-Cities Roads of Punjab, Sindh & Khyber Pakhtunkhwa 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> 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 and 3G Networks on Surveyed Motorways / Highways and Inter Cities Roads is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage.**

S. #.	Operator	Compliance Level – Number of Motorways / Highways / Inter Cities Roads		Standing
		Compliant	Non-Compliant	
1.	ZonG	28	4	1 <sup>st</sup>
2.	Jazz	22	10	2 <sup>nd</sup>
3.	Telenor	20	12	3 <sup>rd</sup>
4.	Ufone	19	13	4 <sup>th</sup>

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

- b. **MOBILE BROADBAND SERVICE.** In each surveyed city, CMOs have been ranked as 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> as per the highest to lowest obtained User Data Throughput in 4G/LTE and 3G Networks on Surveyed Motorways / Highways and Inter Cities Roads is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service.**

S. #.	Operator	4G Highest Throughput on Motorways / Highways / Roads				Standing
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	
1.	ZonG	13	3	-	-	1 <sup>st</sup>
2.	Jazz	3	13	-	-	2 <sup>nd</sup>
3.	Telenor	-	-	9	7	3 <sup>rd</sup>
4.	Ufone	-	-	7	9	4 <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 on Surveyed Motorways / Highways and Inter Cities Roads is shown in **Table 8.3: CMOs Standing in Voice Service.**

S. #.	Operator	Voice QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	ZonG	99	13	1 <sup>st</sup>
2.	Telenor	79	33	2 <sup>nd</sup>
3.	Ufone	77	35	3 <sup>rd</sup>
4.	Jazz	70	42	4 <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 on Surveyed Motorways / Highways and Inter Cities Roads is shown in **Table 8.4: CMOs Standing in SMS Service**

S. #.	Operator	SMS QoS KPIs		Standing
		Compliant	Non-Compliant	
1.	ZonG	29	3	1 <sup>st</sup>
2.	Telenor	14	18	2 <sup>nd</sup>
3.	Ufone	17	15	3 <sup>rd</sup>
4.	Jazz	18	14	4 <sup>th</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.**

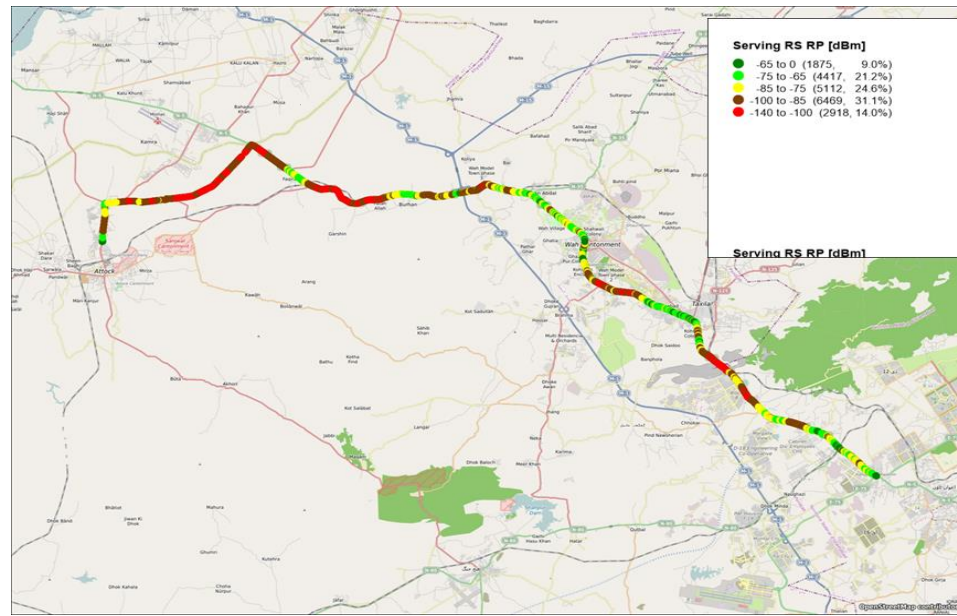
S. #.	Service	STANDING			
		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
1.	Mobile Network Coverage	ZonG	Jazz	Telenor	Ufone
2.	Mobile Broadband	ZonG	Jazz	Telenor	Ufone
3.	Voice	ZonG	Telenor	Ufone	Jazz
4.	SMS	ZonG	Telenor	Ufone	Jazz

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

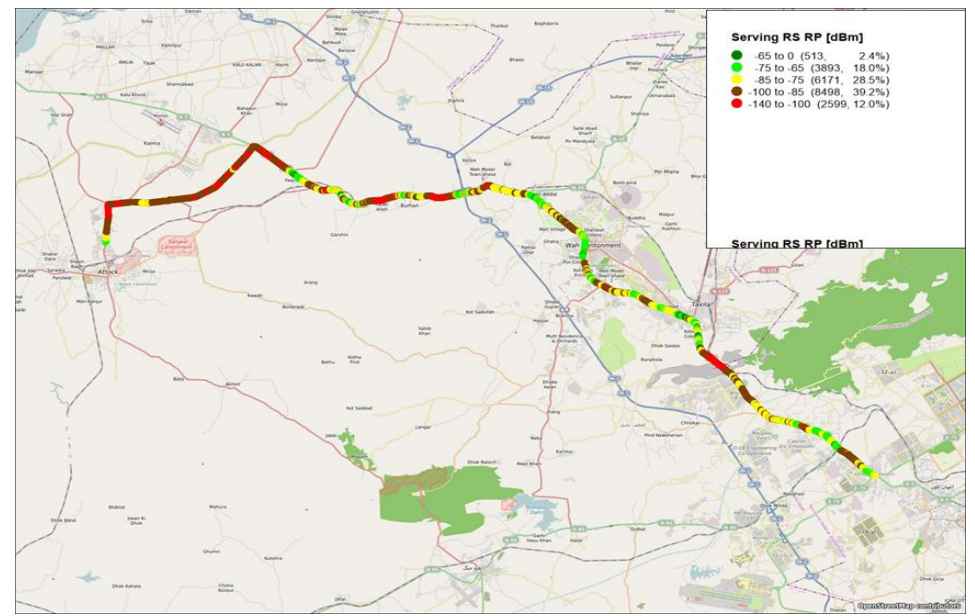
**PUNJAB**

# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

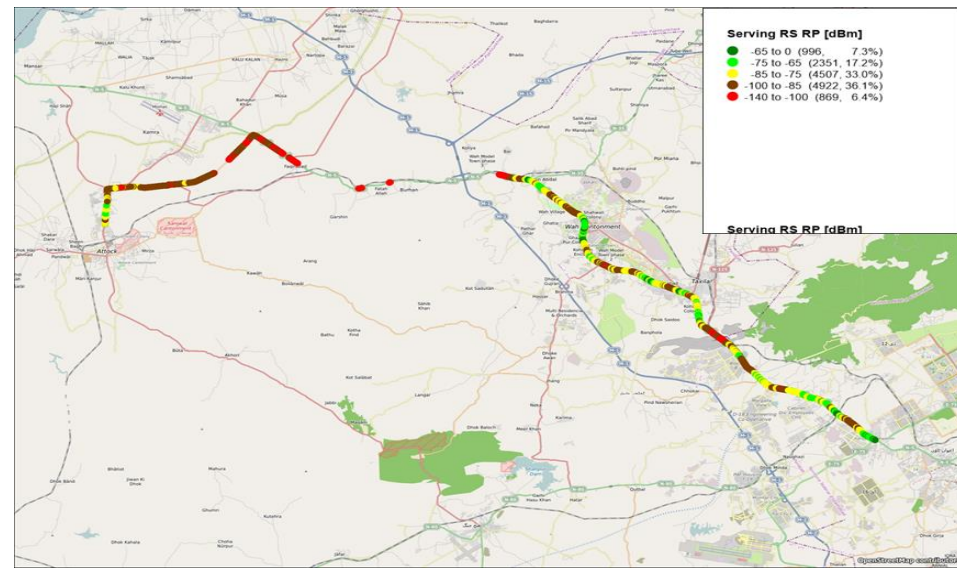
## JAZZ 4G COVERAGE (RSRP) - RAWALPINDI TO ATTOCK



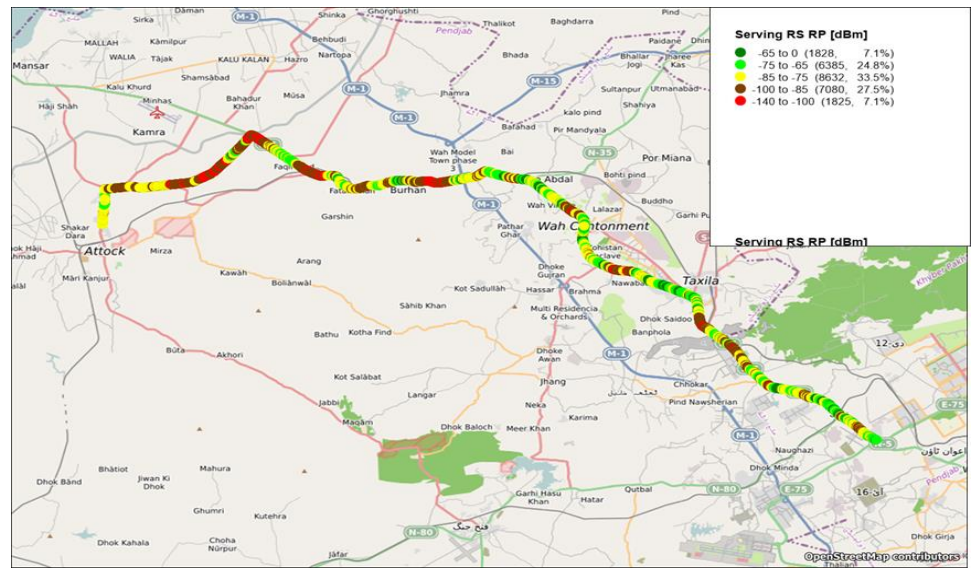
## TELENOR 4G COVERAGE (RSRP) - RAWALPINDI TO ATTOCK



## UFONE 4G COVERAGE (RSRP) - RAWALPINDI TO ATTOCK

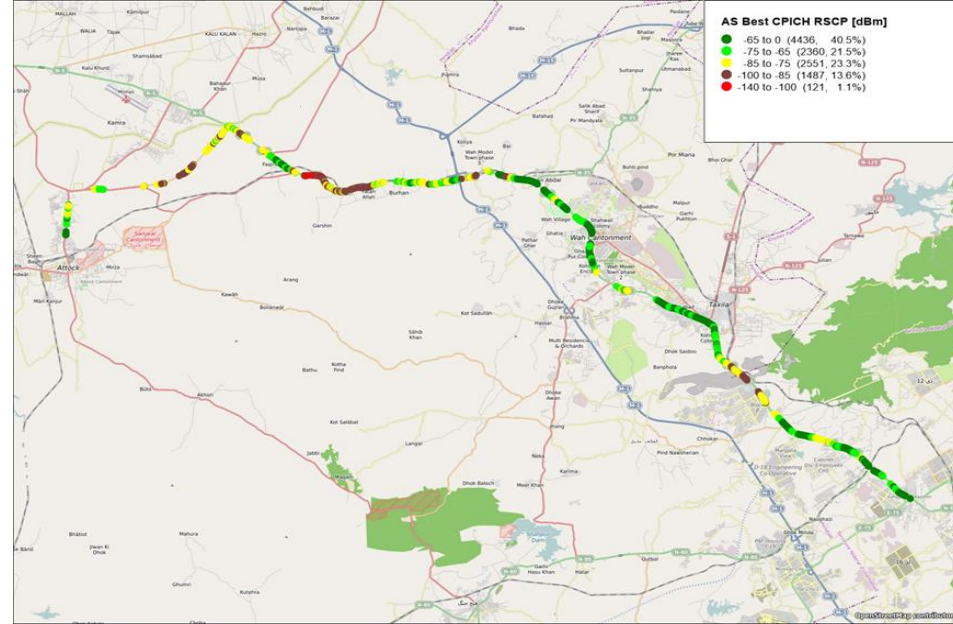


## ZONG 4G COVERAGE (RSRP) - RAWALPINDI TO ATTOCK

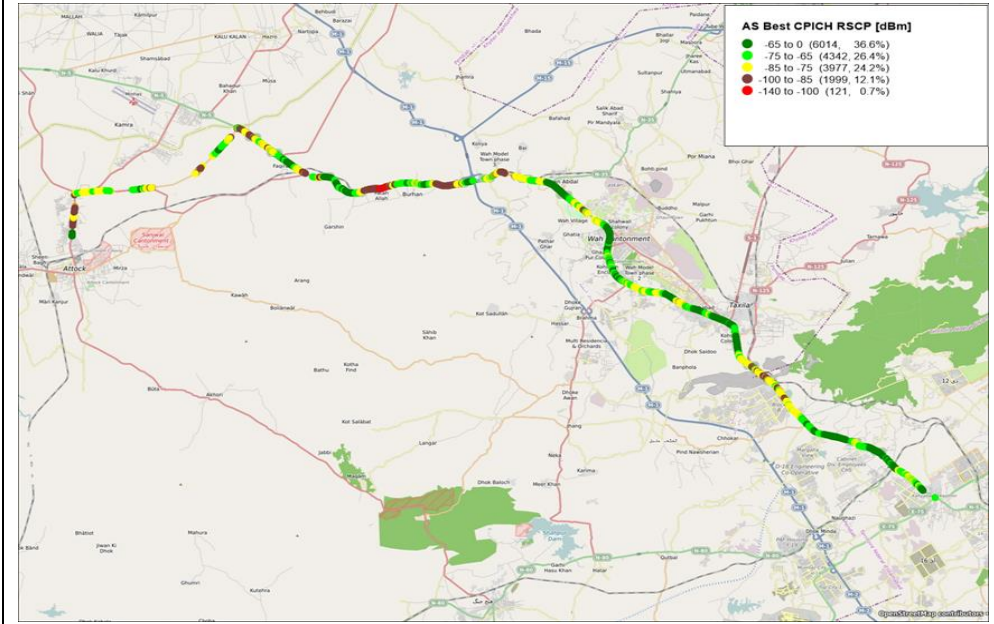


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

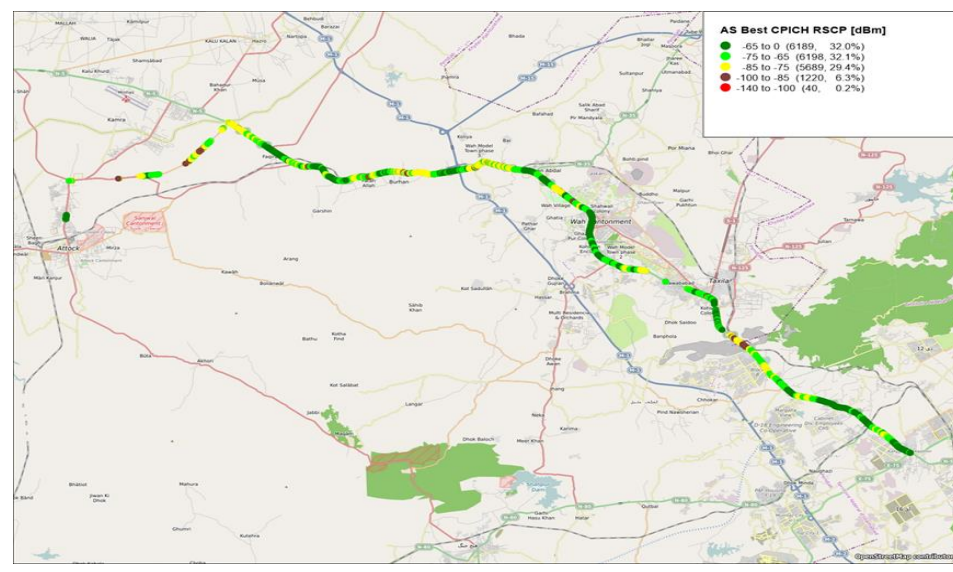
## JAZZ 3G COVERAGE (RSCP) - RAWALPINDI TO ATTOCK



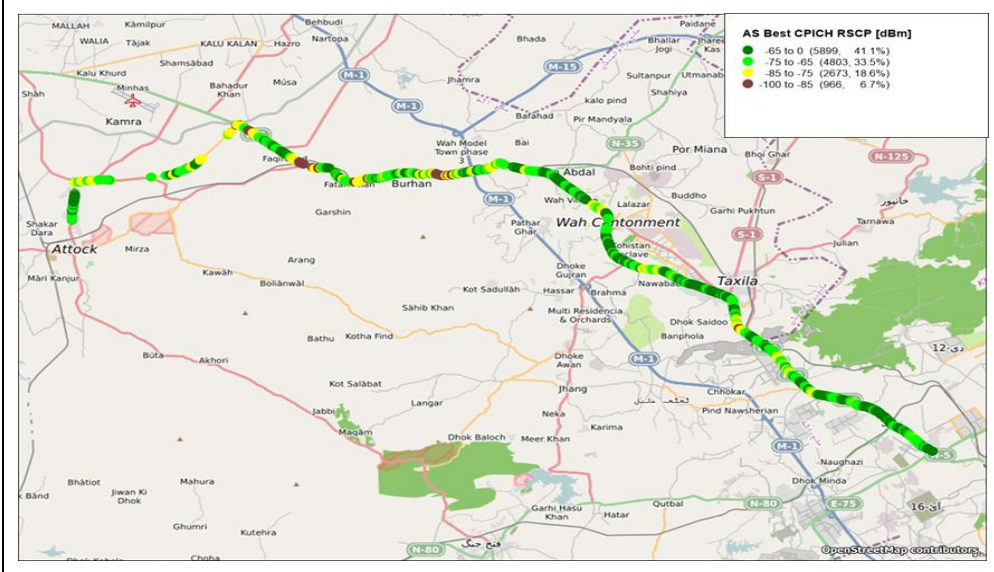
## TELENOR 3G COVERAGE (RSCP) - RAWALPINDI TO ATTOCK



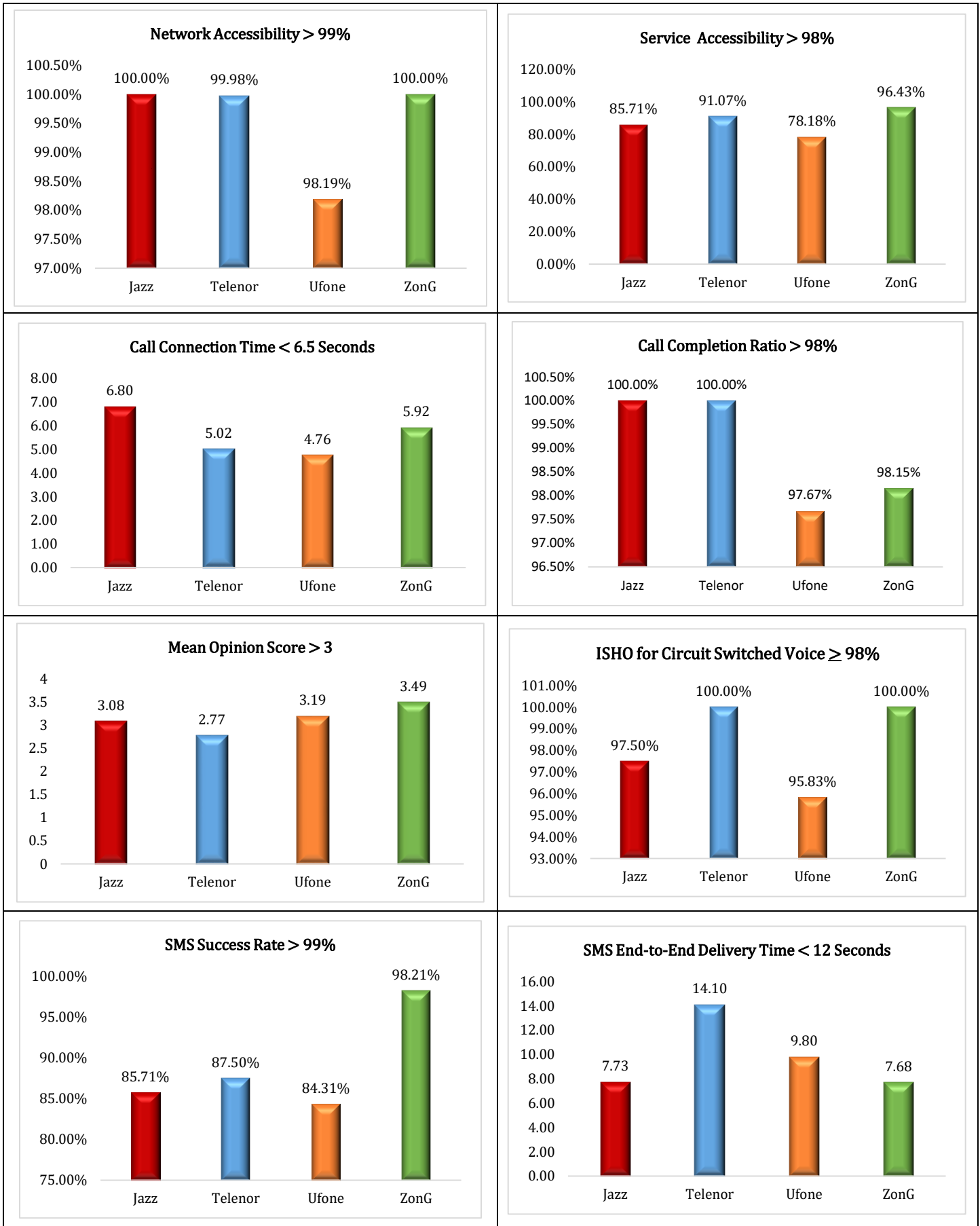
## UFONE 3G COVERAGE (RSCP) - RAWALPINDI TO ATTOCK



## ZONG 3G COVERAGE (RSCP) - RAWALPINDI TO ATTOCK

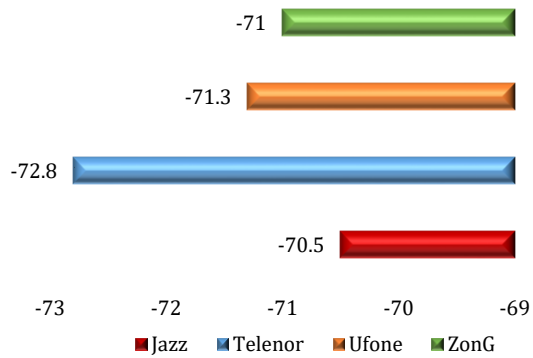


## QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO ATTOCK

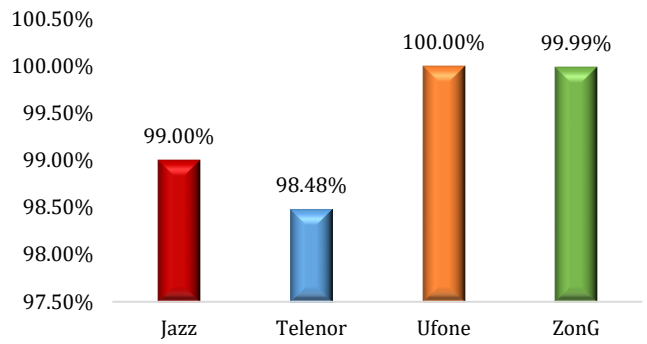


## QUALITY OF SERVICE SURVEY RESULTS –RAWALPINDI TO ATTOCK

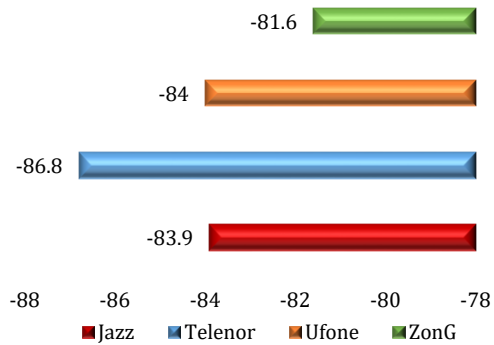
**3G Signal Strength (RSCP) > -100dBm**



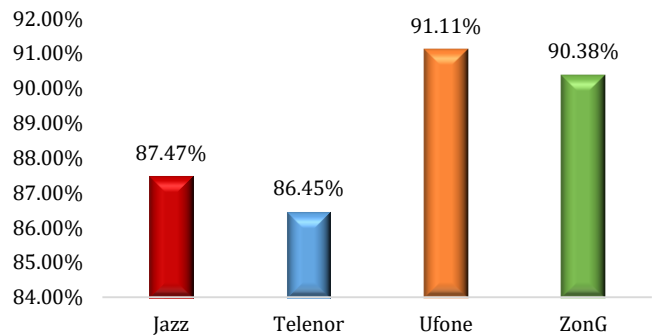
**3G Signal Strength (RSCP) Confidencel Level > 90%**



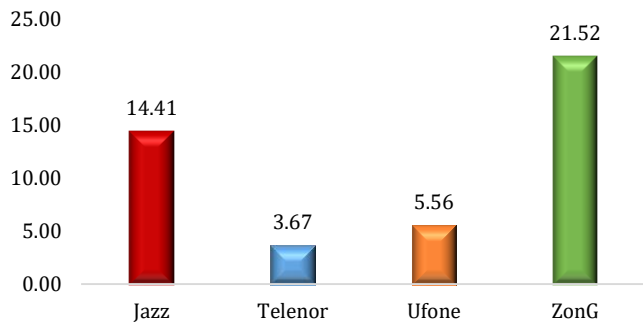
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



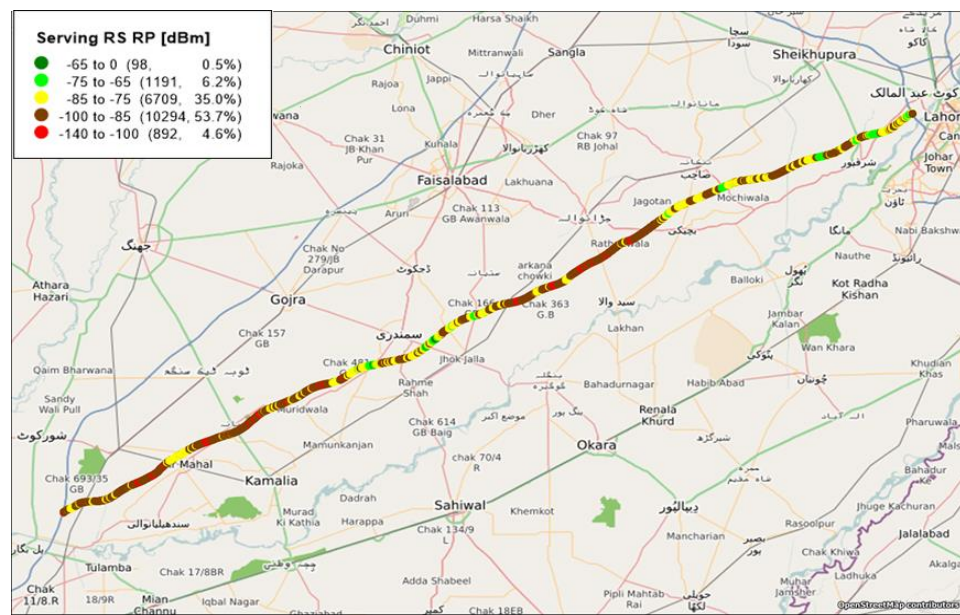
**User Data Throughput (4G) > 2Mbps**



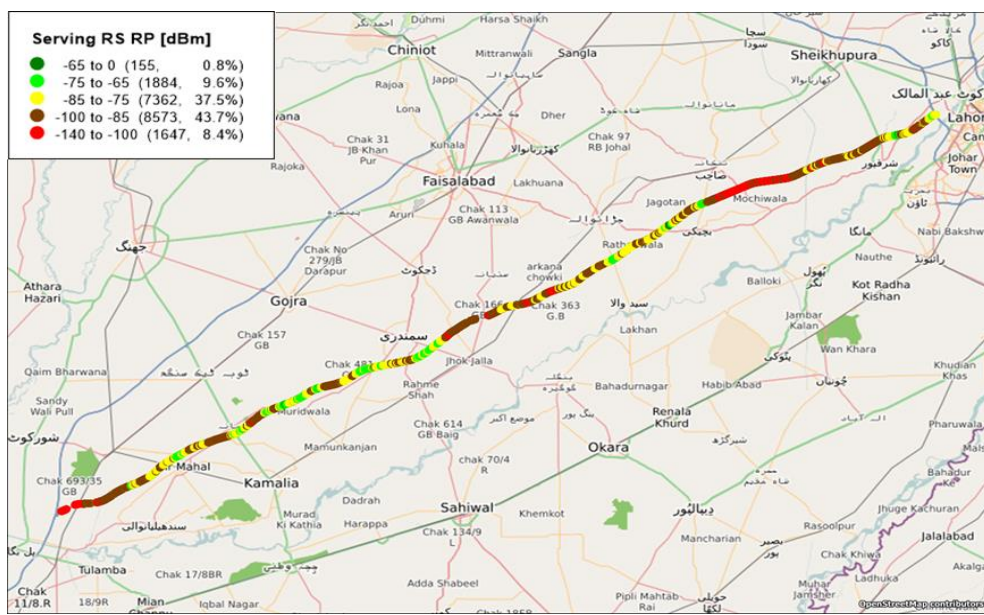


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

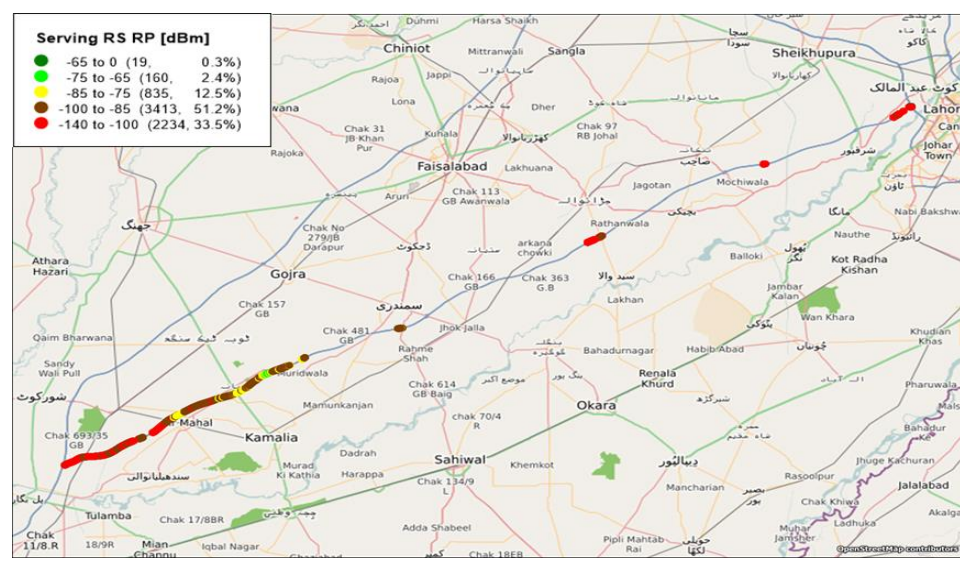
## JAZZ 4G COVERAGE (RSRP) - LAHORE TO MULTAN



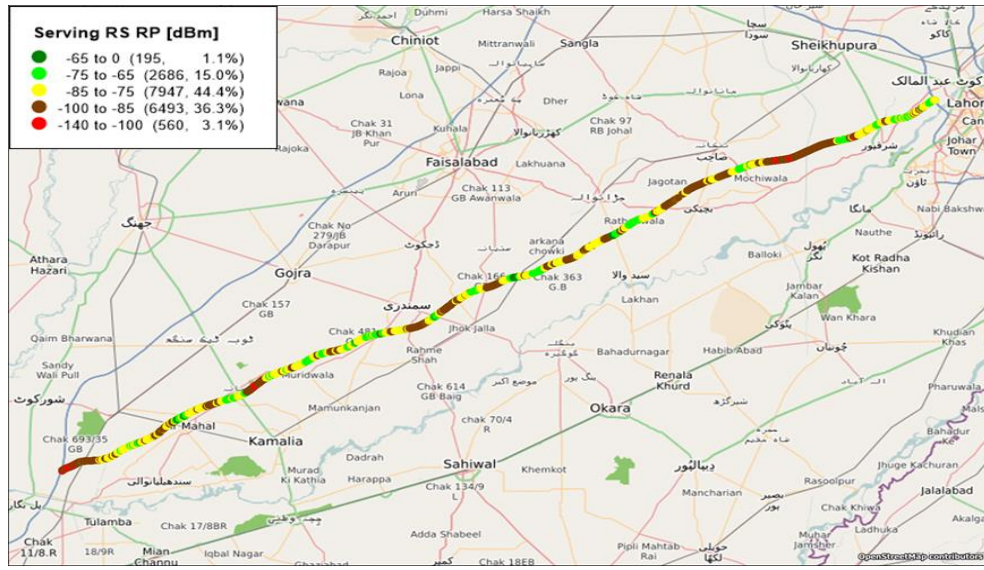
## TELENOR 4G COVERAGE (RSRP) - LAHORE TO MULTAN



## UFONE 4G COVERAGE (RSRP) - LAHORE TO MULTAN

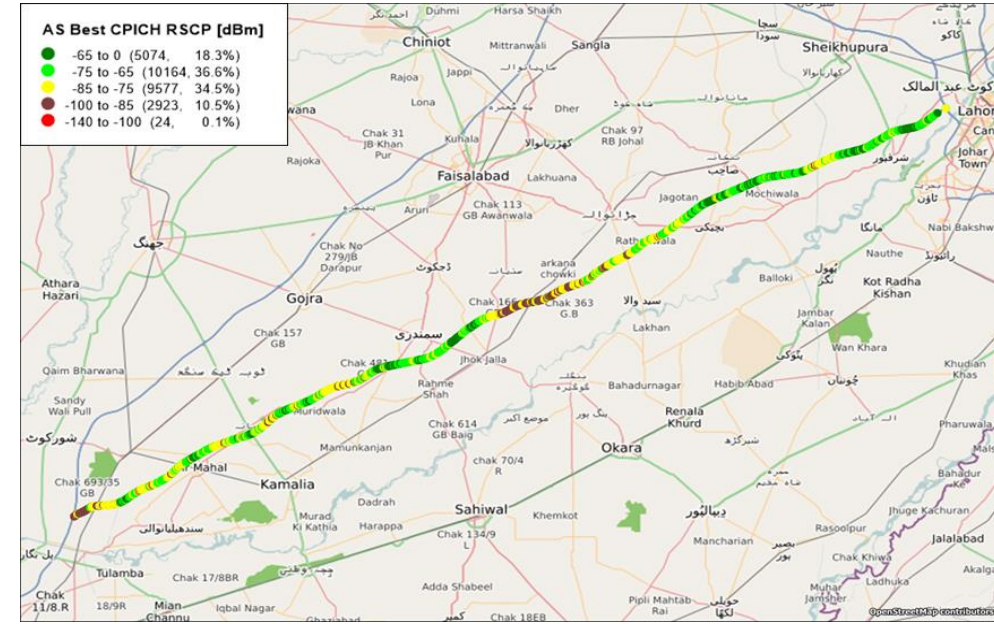


## ZONG 4G COVERAGE (RSRP) - LAHORE TO MULTAN

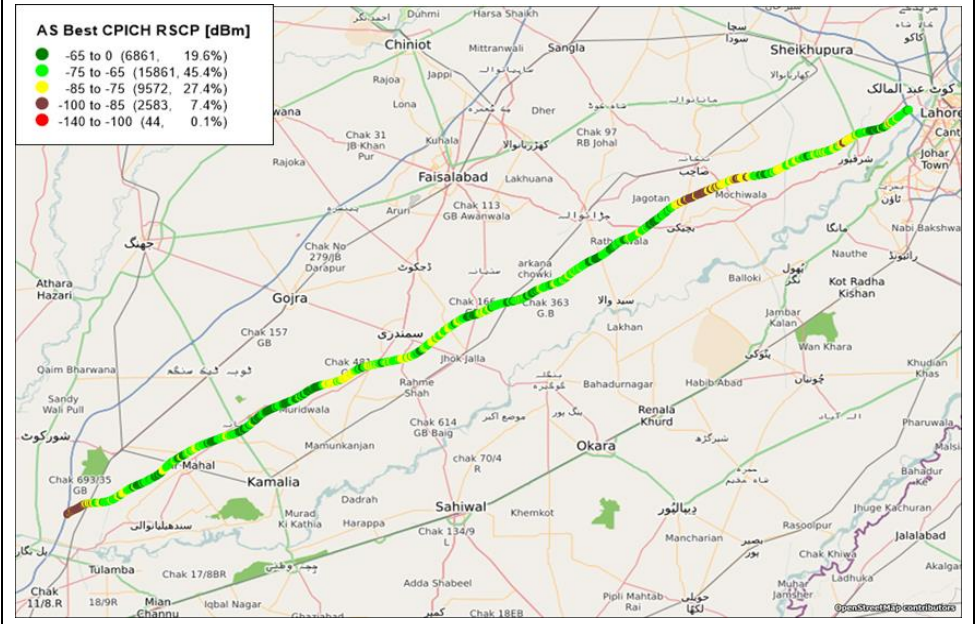


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

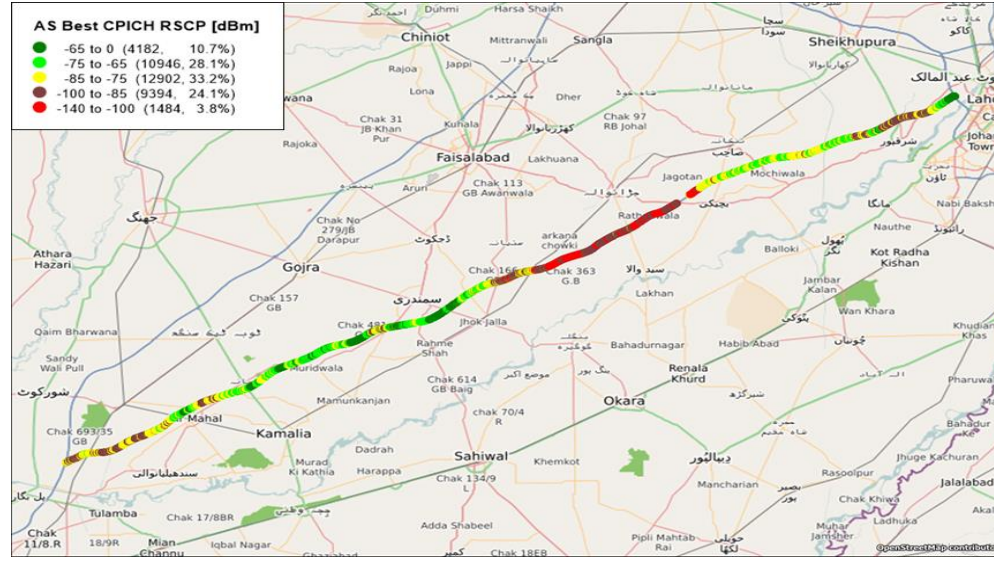
## JAZZ 3G COVERAGE (RSCP) - LAHORE TO MULTAN



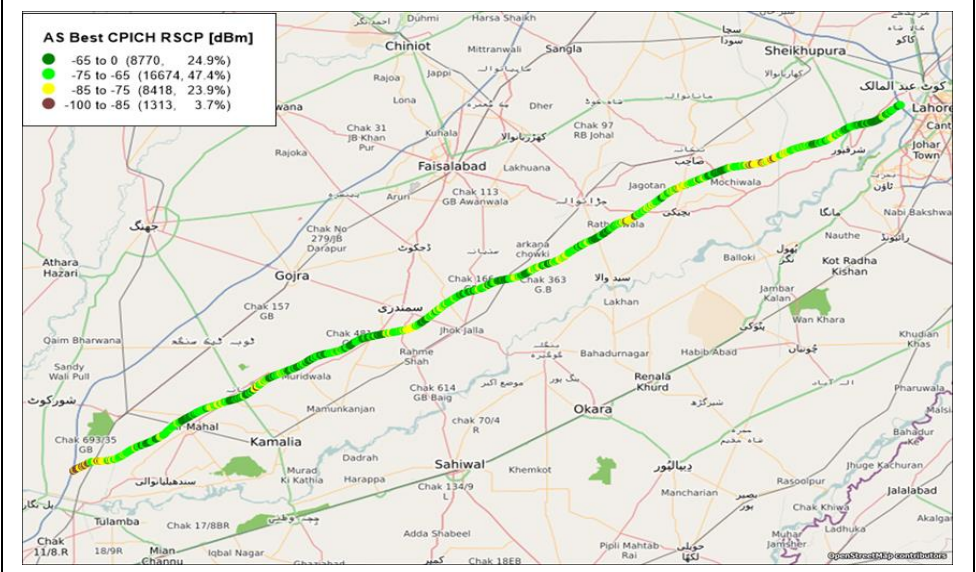
## TELENOR 3G COVERAGE (RSCP) - LAHORE TO MULTAN



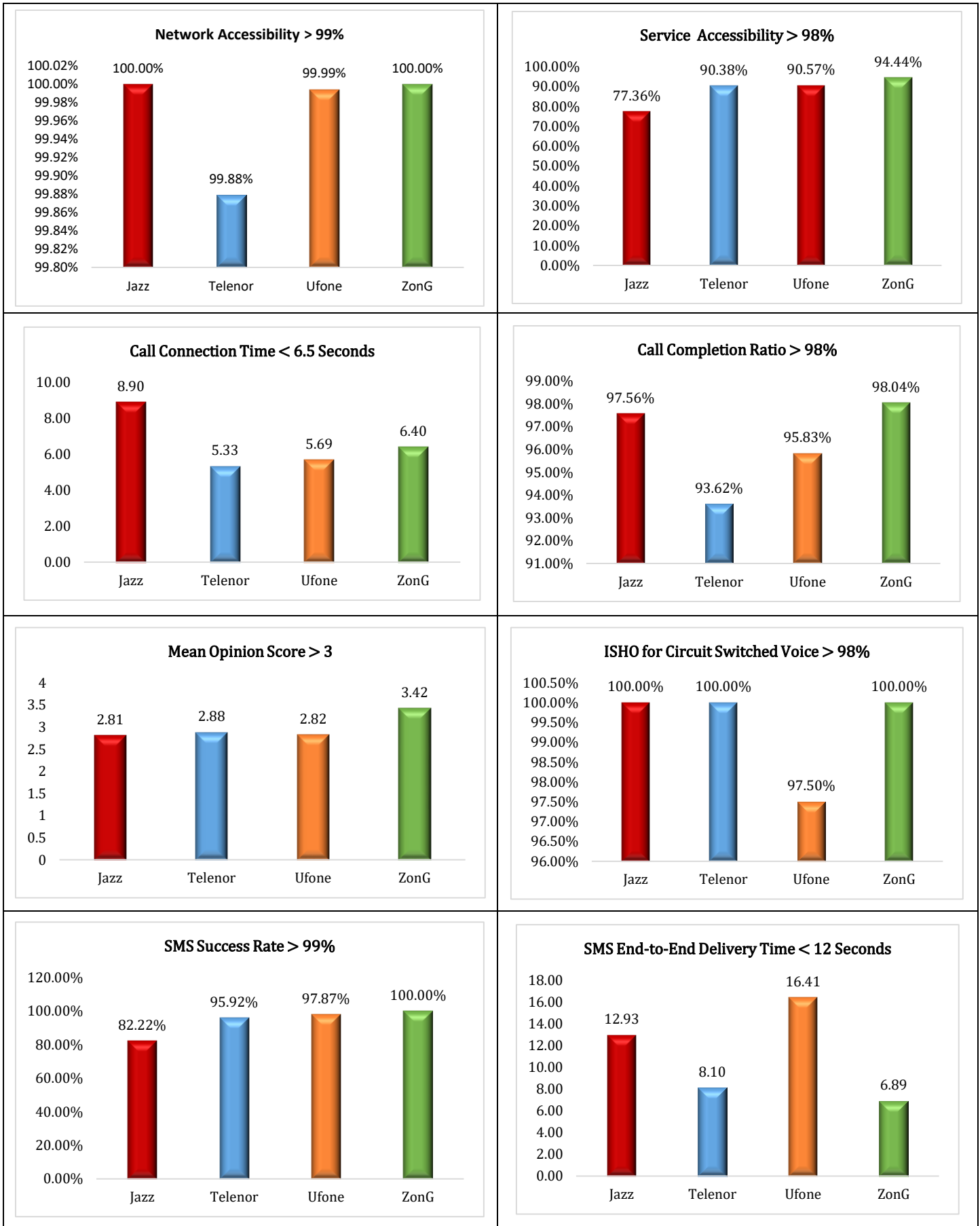
## UFONE 3G COVERAGE (RSCP) - LAHORE TO MULTAN



## ZONG 3G COVERAGE (RSCP) - LAHORE TO MULTAN

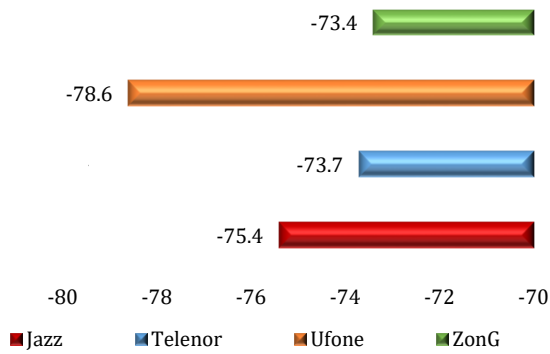


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO MULTAN

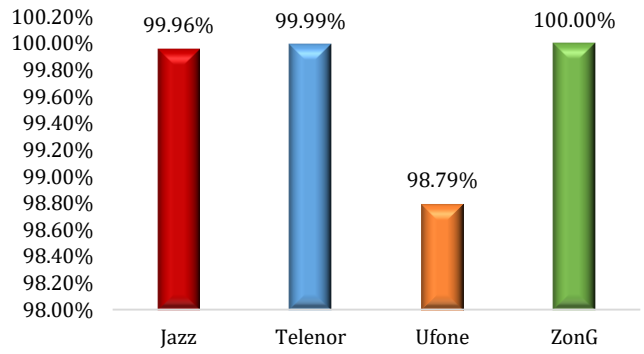


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO MULTAN

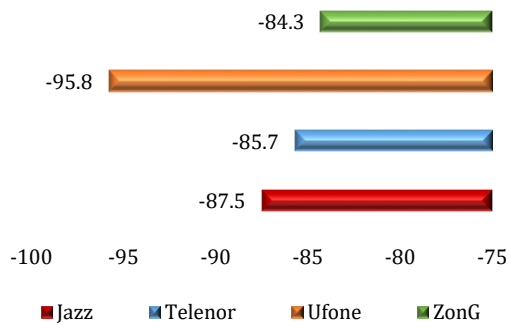
**3G Signal Strength (RSCP) > -100dBm**



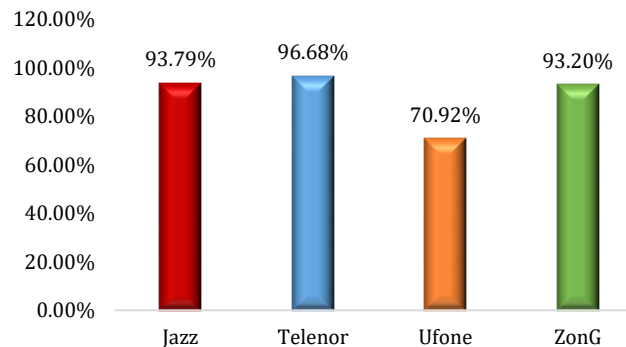
**3G Signal Strength (RSCP) Confidencel Level > 90%**



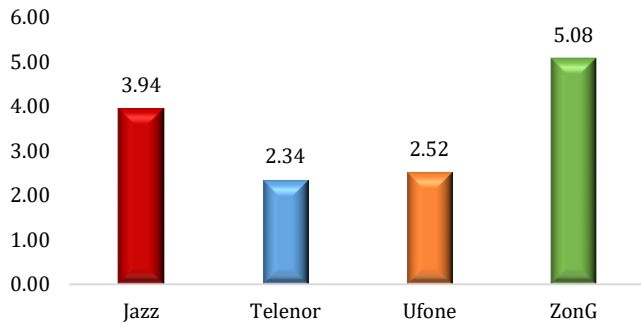
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

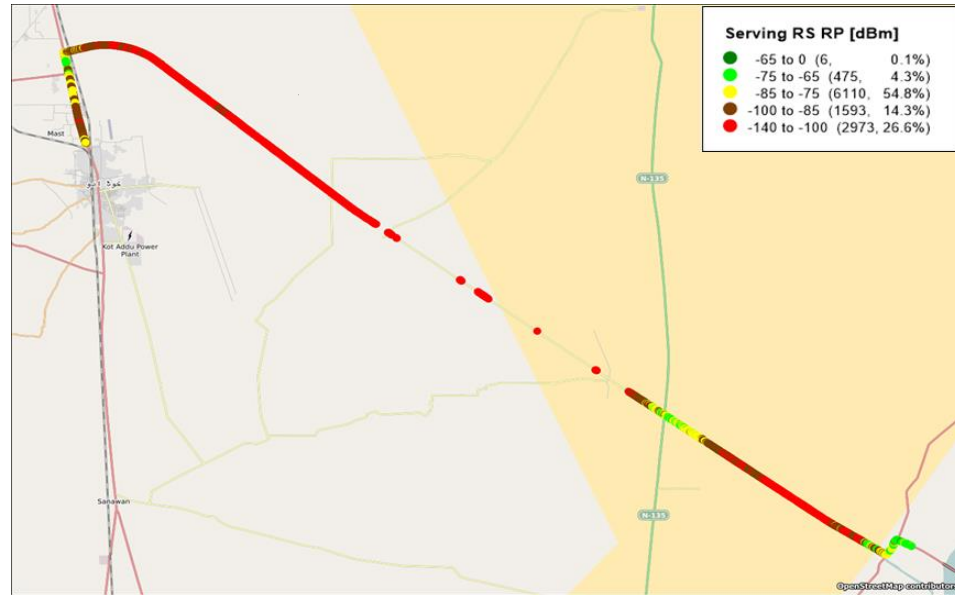


**User Data Throughput (4G) > 2Mbps**

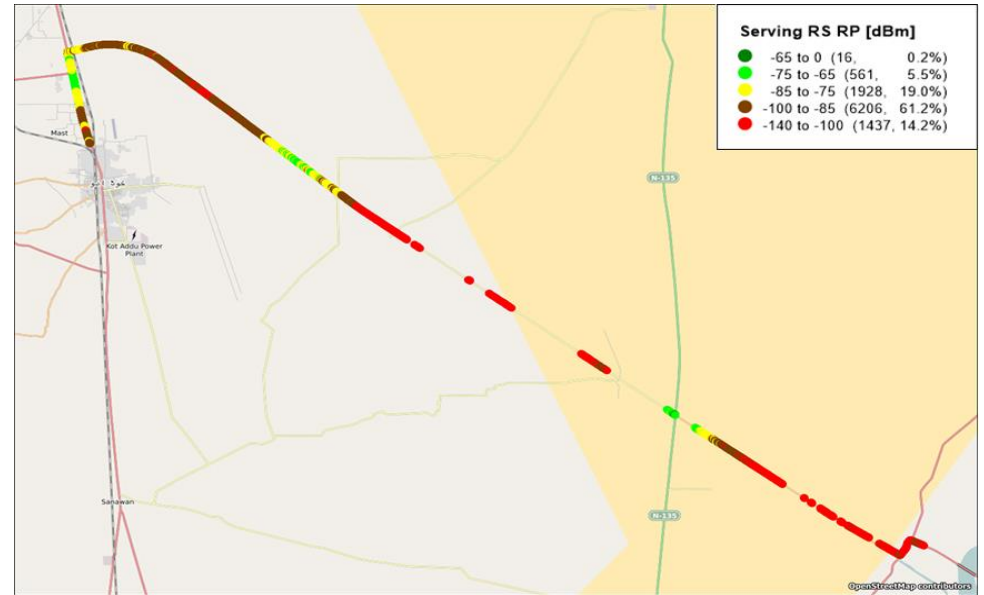


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

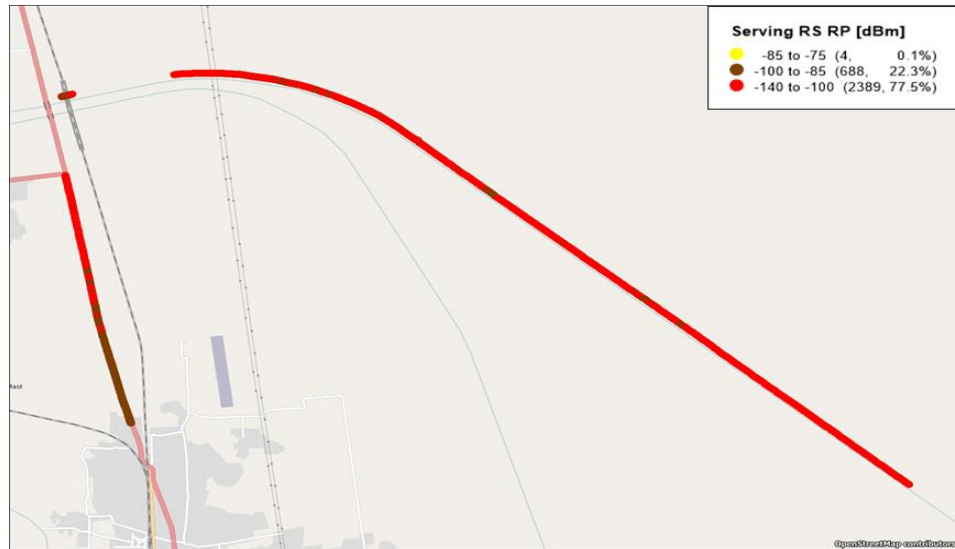
**JAZZ 4G COVERAGE (RSRP) - MULTAN TO KOT ADDU**



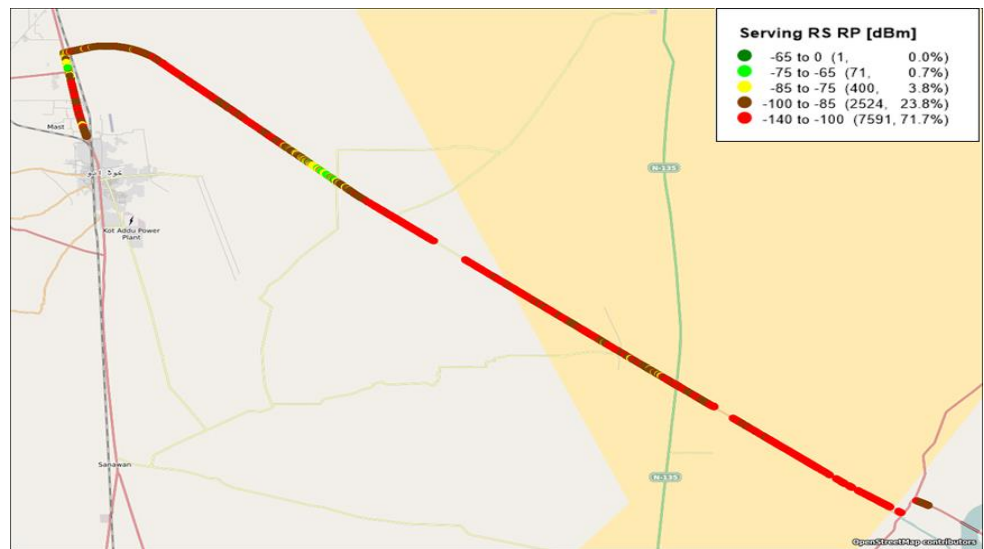
**TELENOR 4G COVERAGE (RSRP) - MULTAN TO KOT ADDU**



**UFONE 4G COVERAGE (RSRP) - MULTAN TO KOT ADDU**

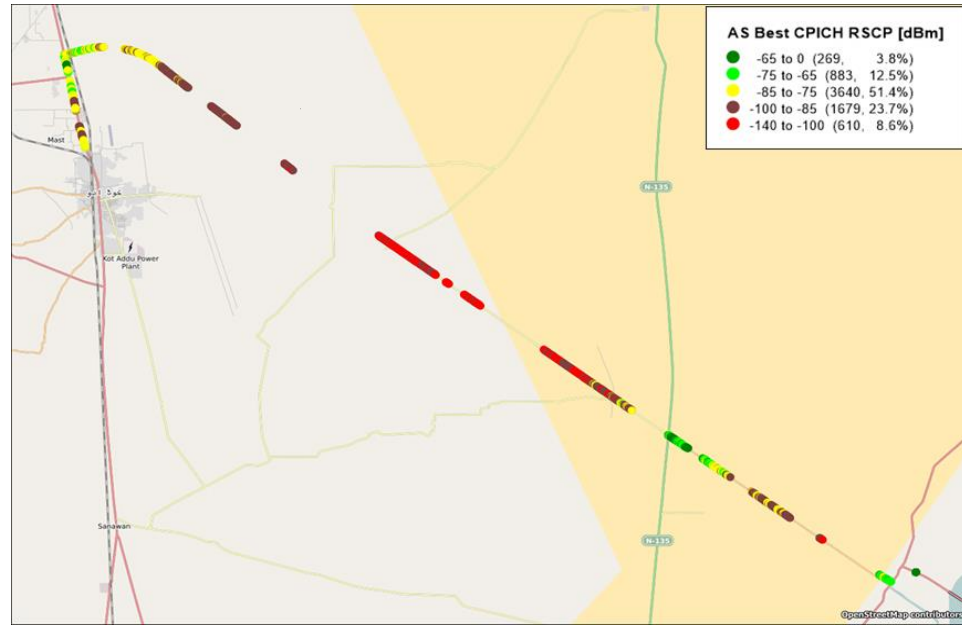


**ZONG 4G COVERAGE (RSRP) - MULTAN TO KOT ADDU**

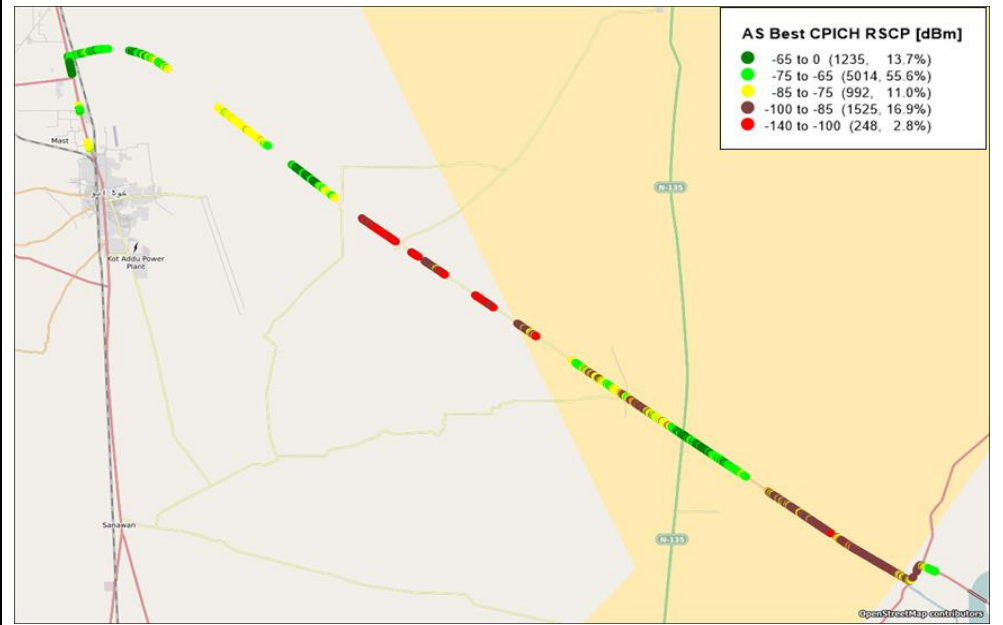


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

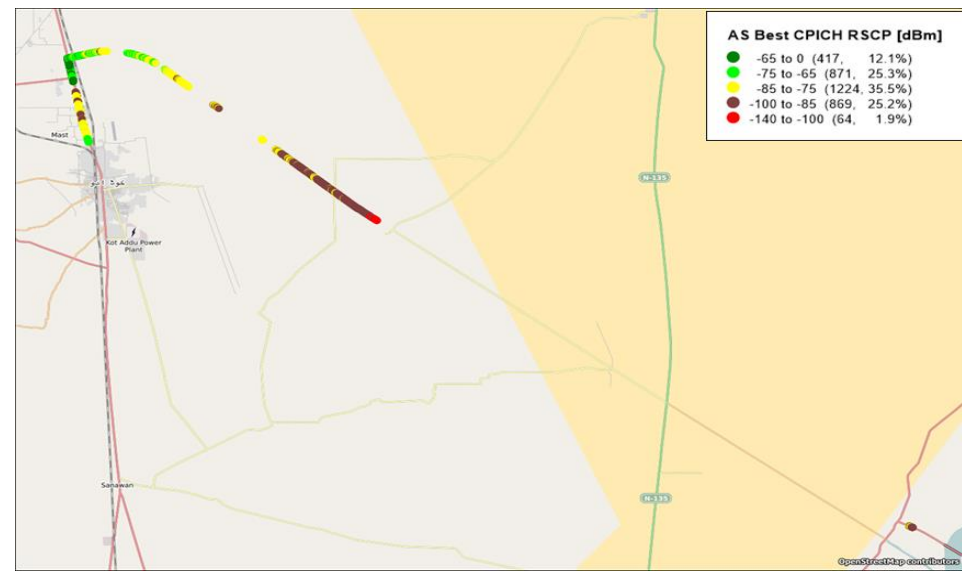
## JAZZ 3G COVERAGE (RSCP) – MULTAN TO KOT ADDU



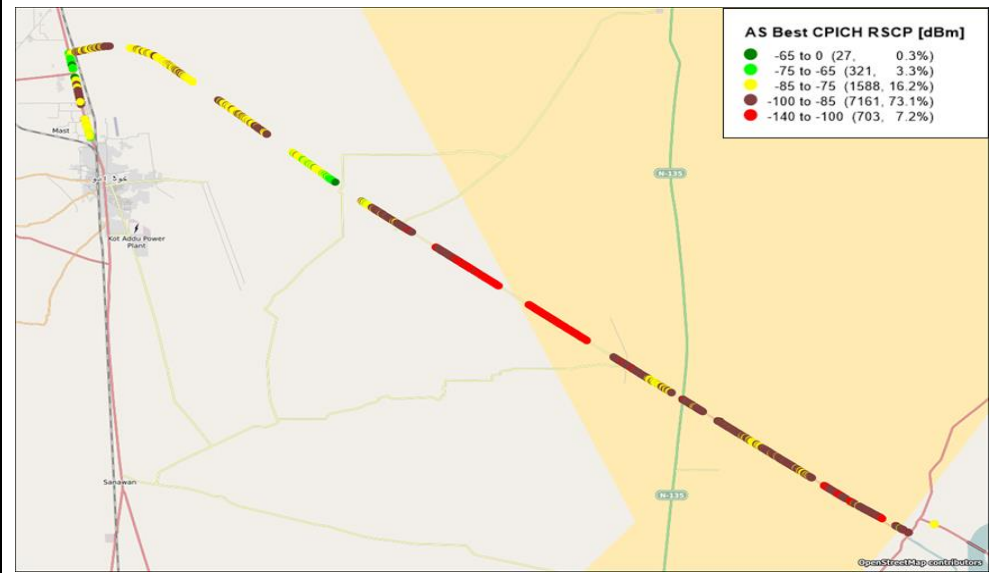
## TELENOR 3G COVERAGE (RSCP) - MULTAN TO KOT ADDU



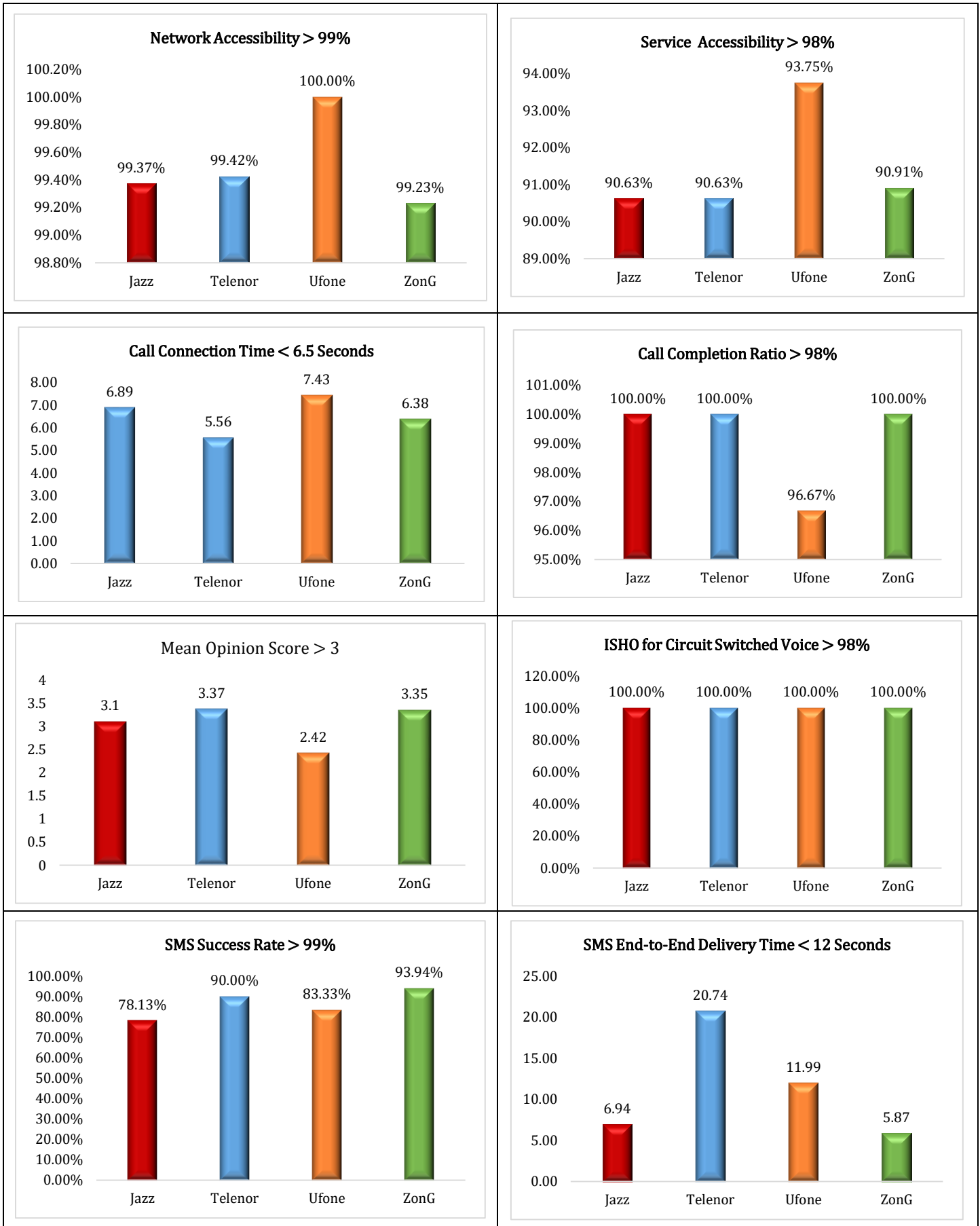
## UFONE 3G COVERAGE (RSCP) - MULTAN TO KOT ADDU



## ZONG 3G COVERAGE (RSCP) - MULTAN TO KOT ADDU

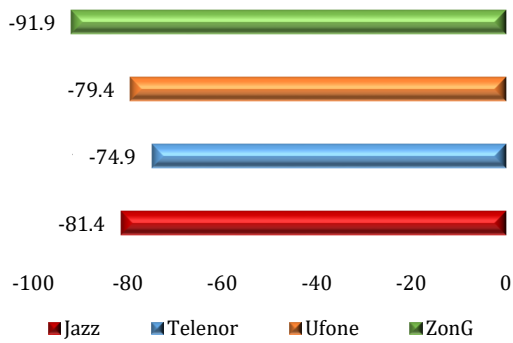


## QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO KOTADDU

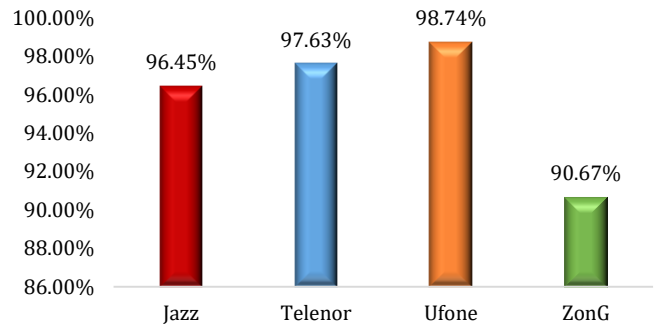


## QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO KOTADDU

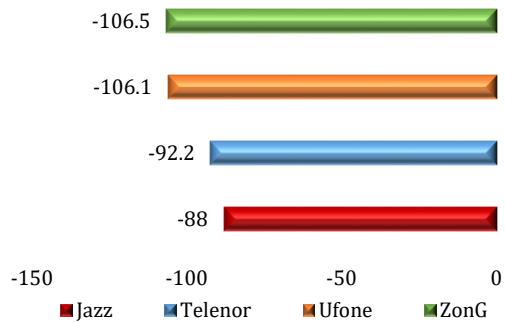
**3G Signal Strength (RSCP) > -100dBm**



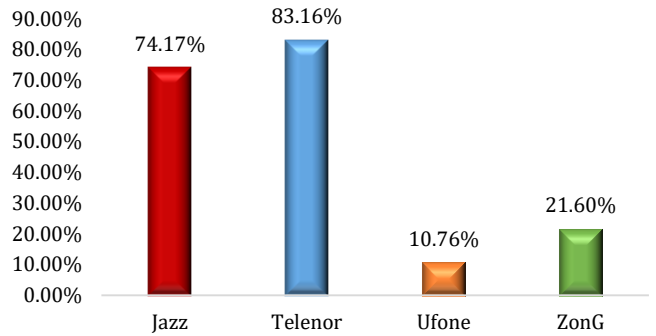
**3G Signal Strength (RSCP) Confidencel Level > 90%**



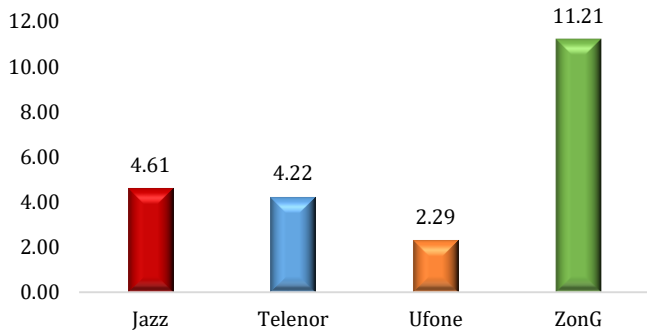
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



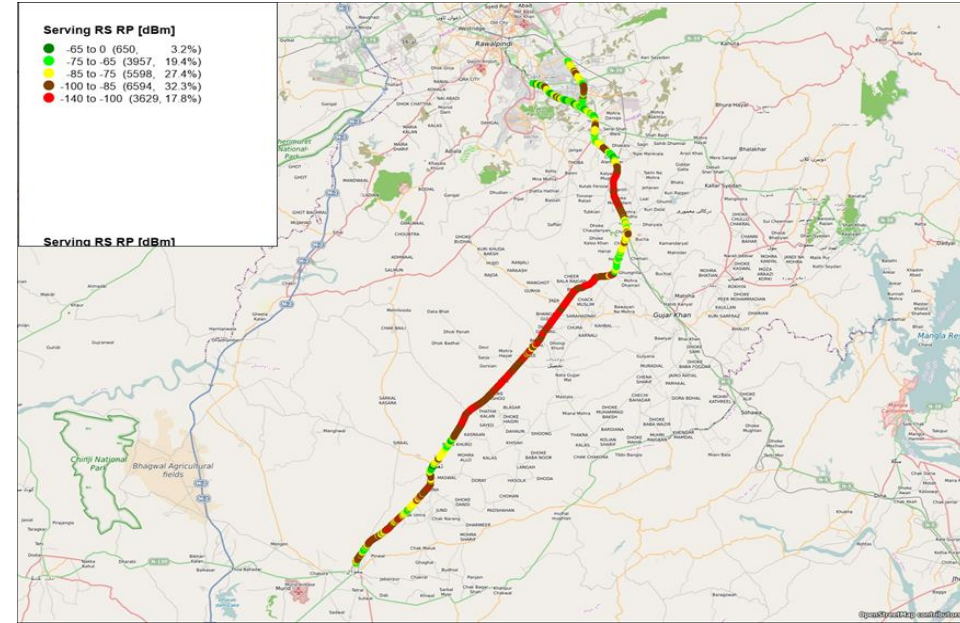
**User Data Throughput (4G) > 2Mbps**



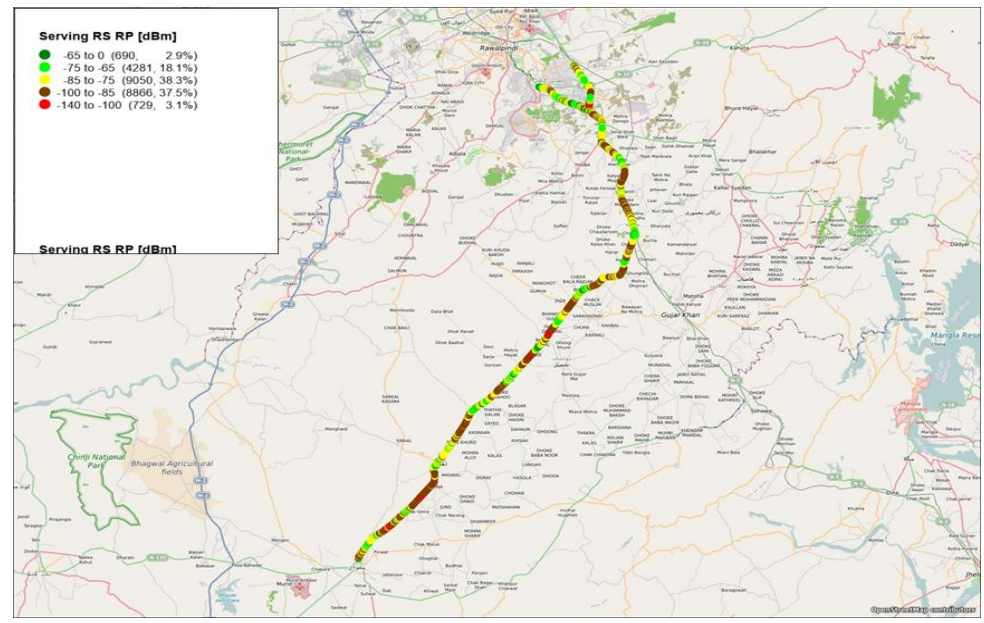


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

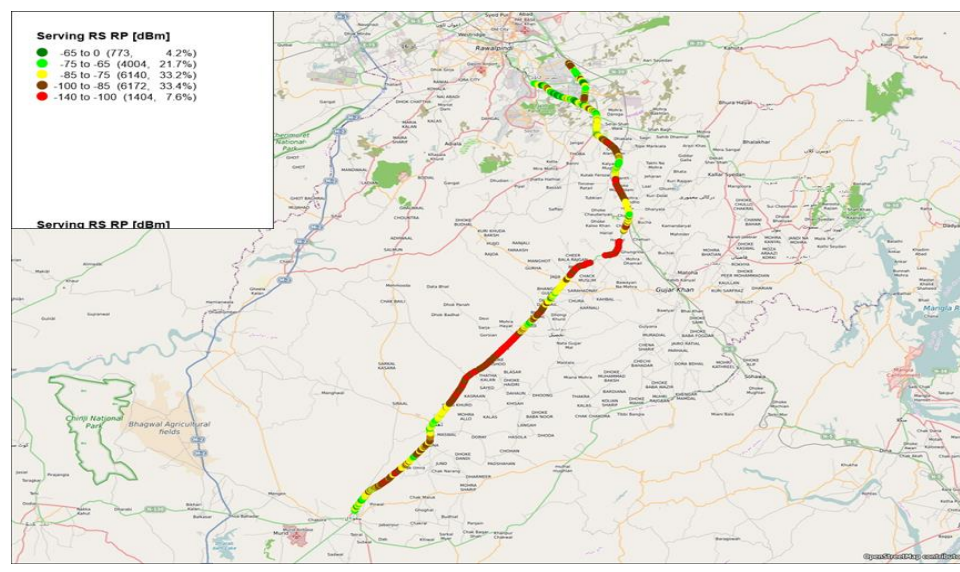
## JAZZ 4G COVERAGE (RSRP) - RAWALPINDI TO CHAKWAL



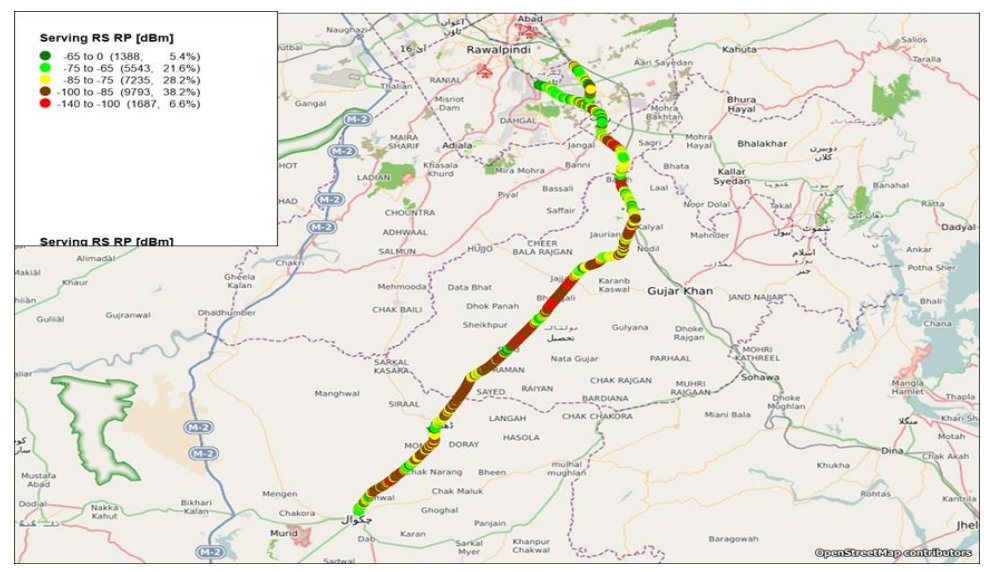
## TELENOR 4G COVERAGE (RSRP) - RAWALPINDI TO CHAKWAL



## UFONE 4G COVERAGE (RSRP) - RAWALPINDI TO CHAKWAL

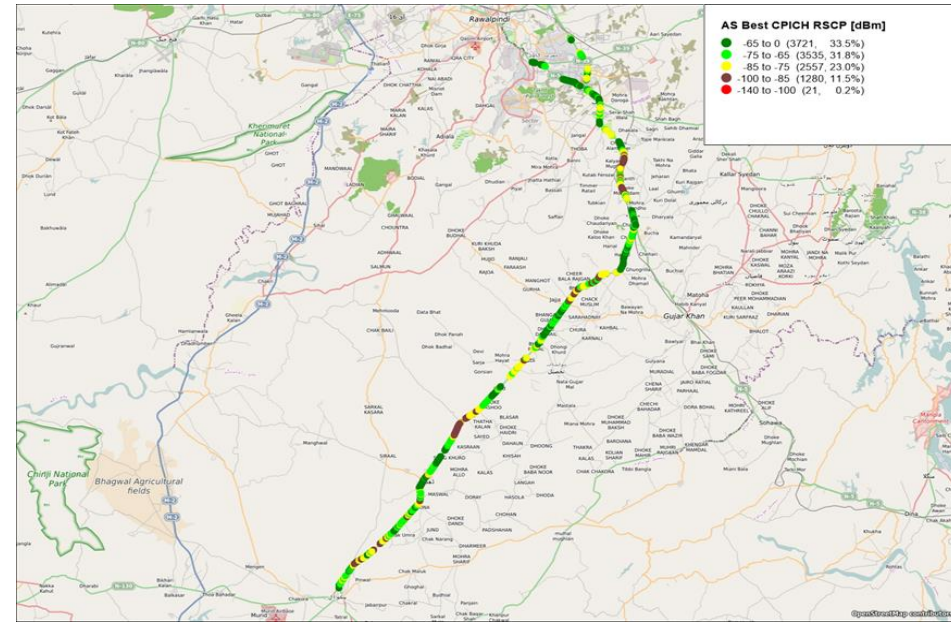


## ZONG 4G COVERAGE (RSRP) - RAWALPINDI TO CHAKWAL

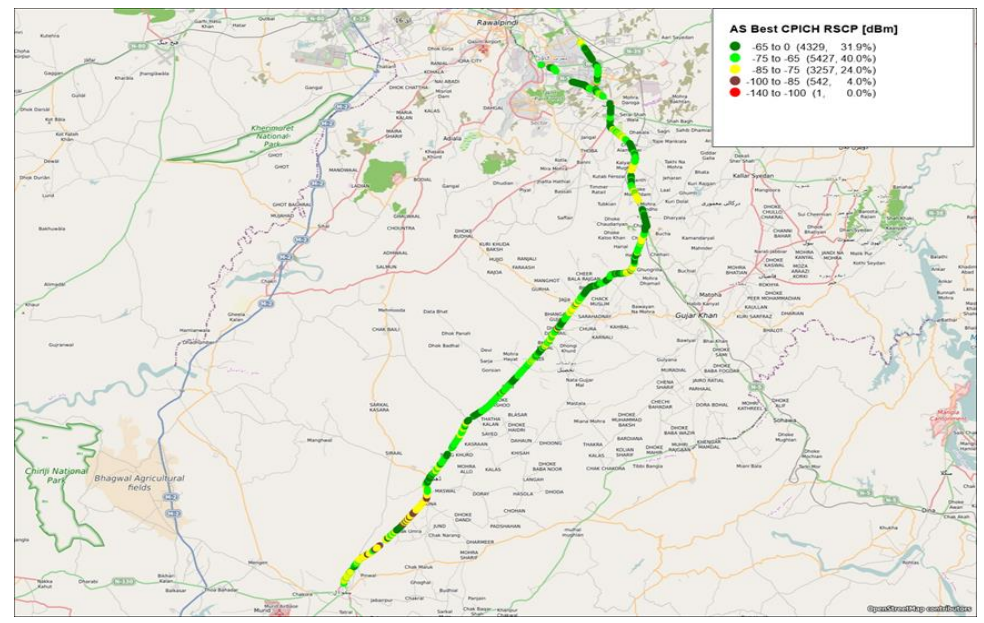


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

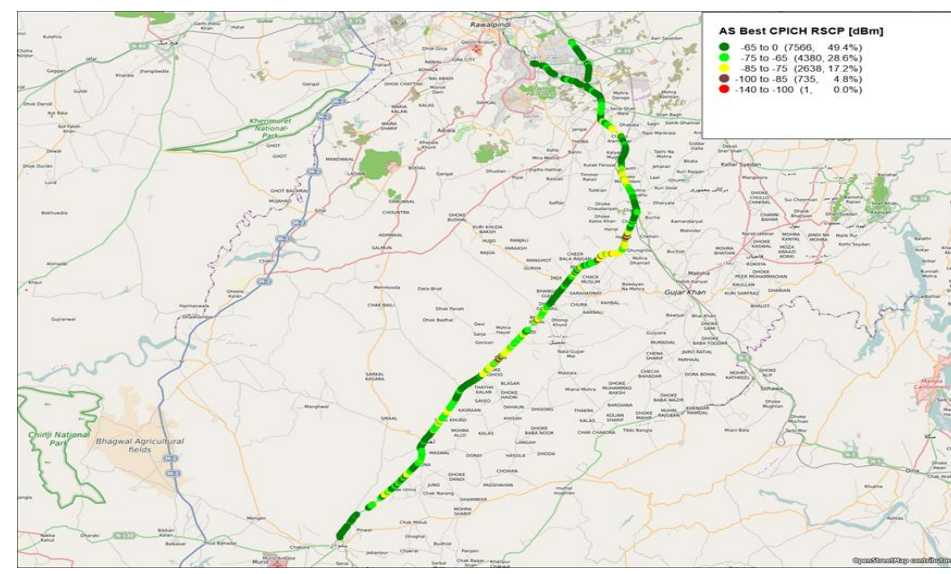
## JAZZ 3G COVERAGE (RSCP) - RAWALPINDI TO CHAKWAL



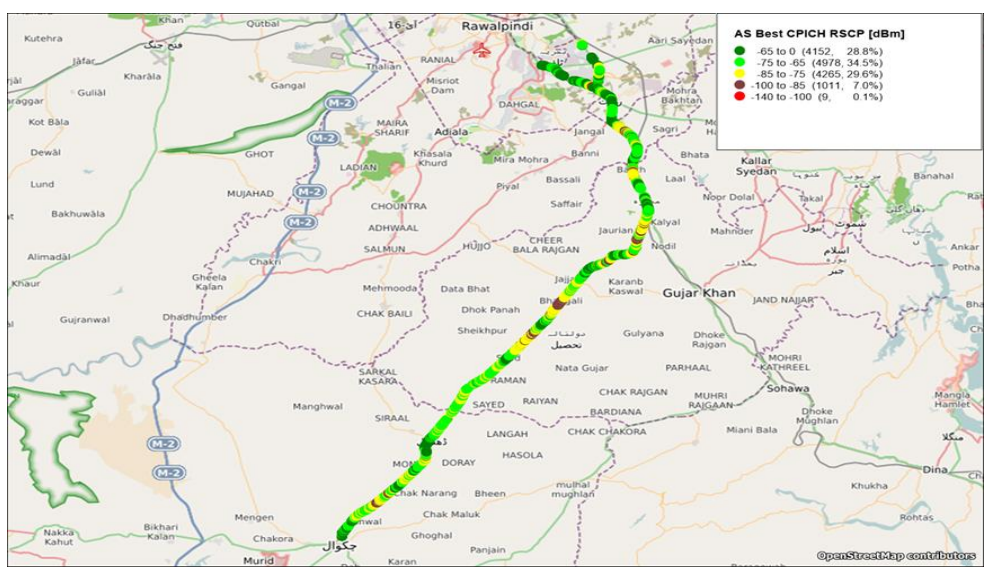
## TELENOR 3G COVERAGE (RSCP) - RAWALPINDI TO CHAKWAL



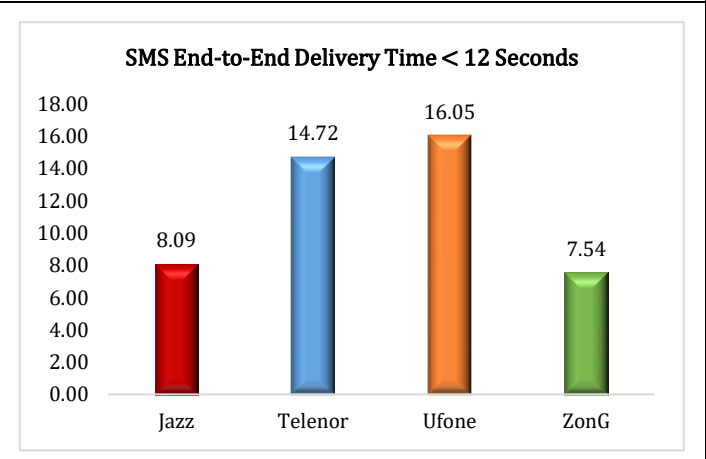
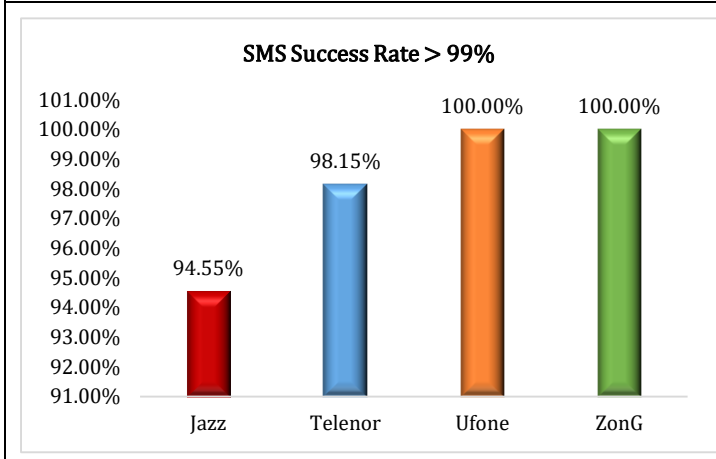
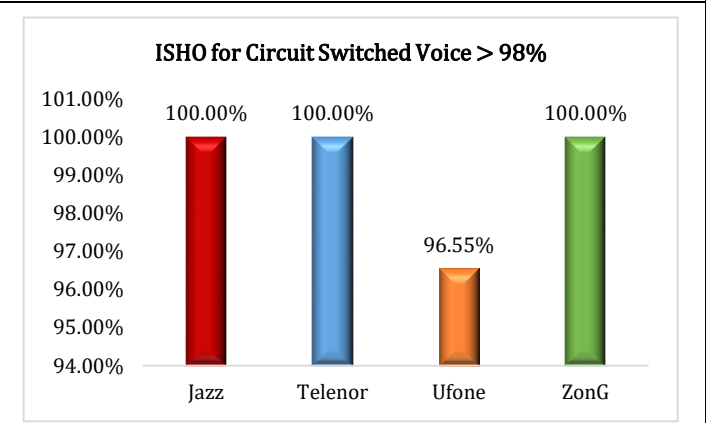
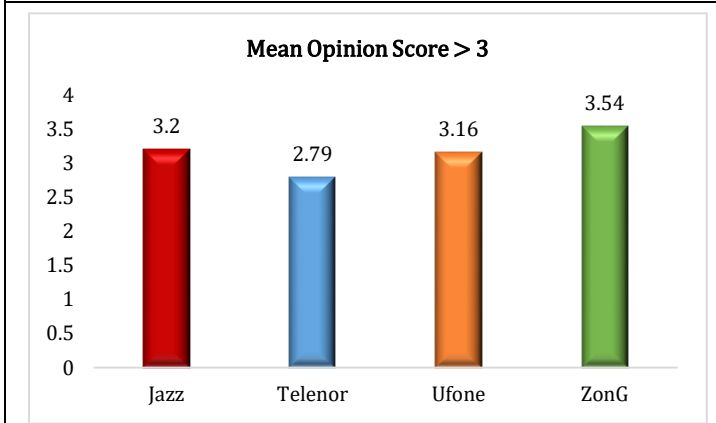
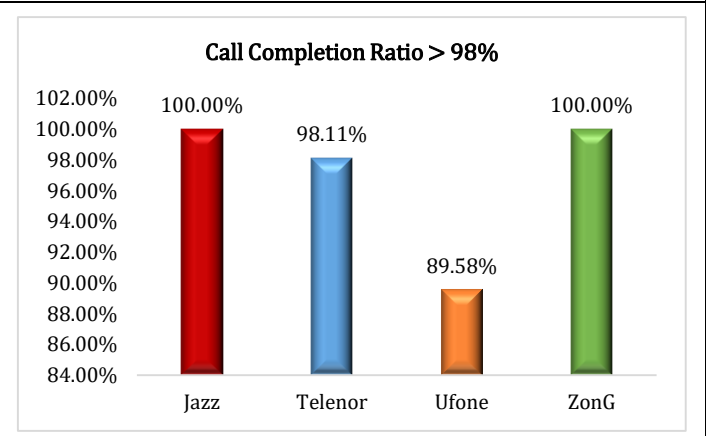
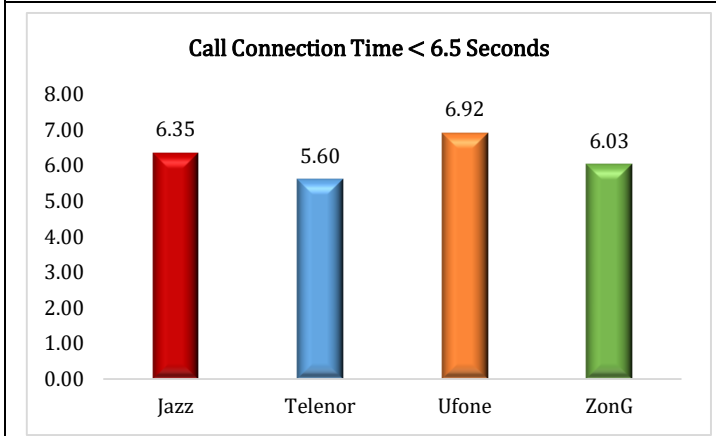
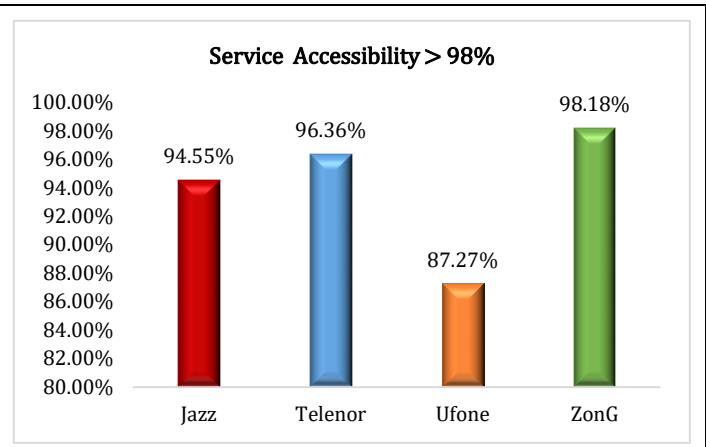
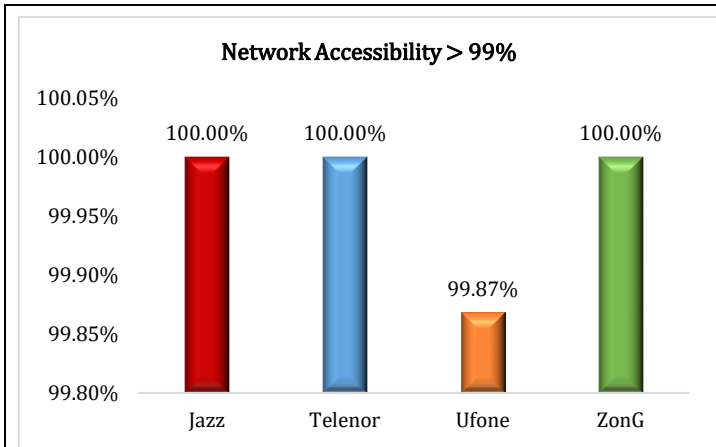
## UFONE 3G COVERAGE (RSCP) - RAWALPINDI TO CHAKWAL



## ZONG 3G COVERAGE (RSCP) - RAWALPINDI TO CHAKWAL

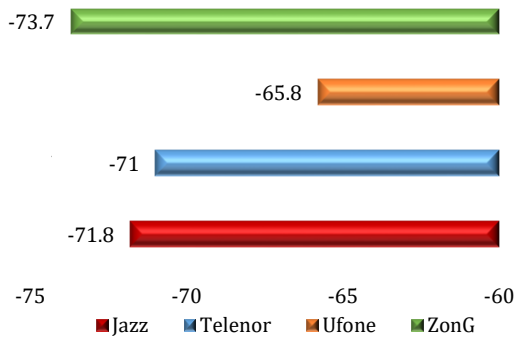


# QUALITY OF SERVICE SURVEY RESULTS – RAWALPINDI TO CHAKWAL

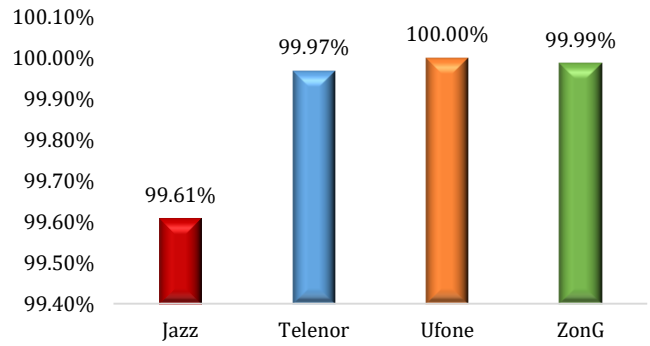


# QUALITY OF SERVICE SURVEY RESULTS –RAWALPINDI TO CHAKWAL

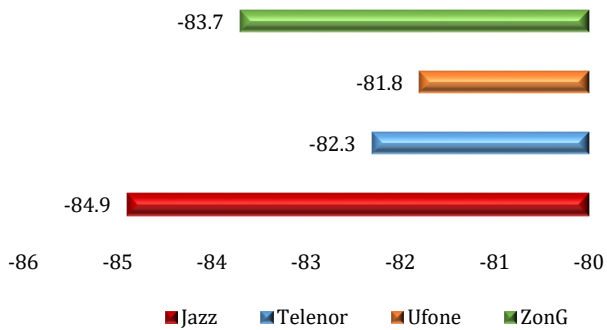
**3G Signal Strength (RSCP) > -100dBm**



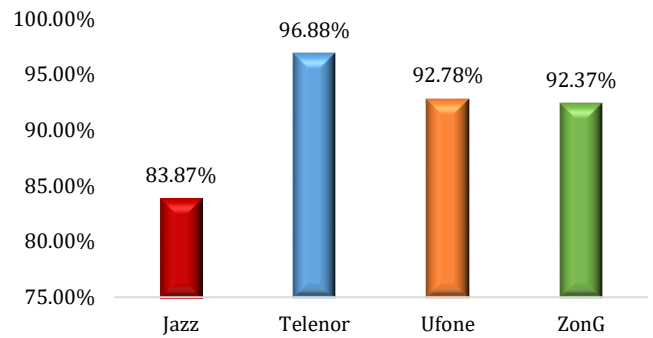
**3G Signal Strength (RSCP) Confidencel Level > 90%**



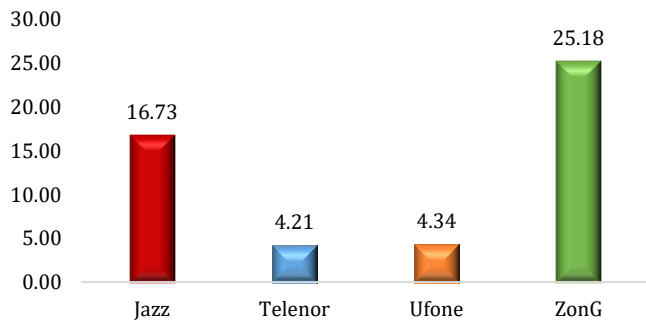
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

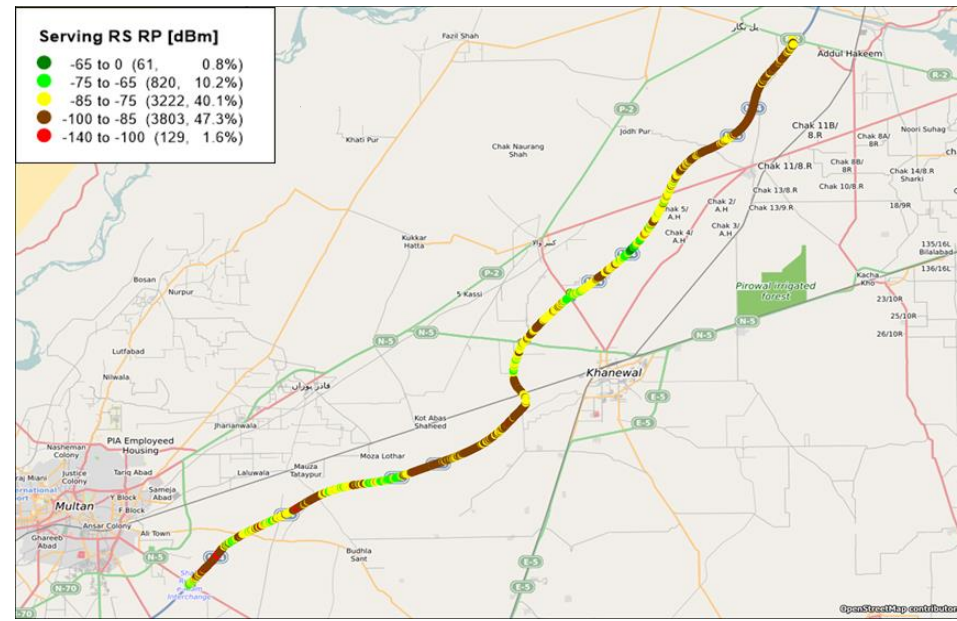


**User Data Throughput (4G) > 2Mbps**

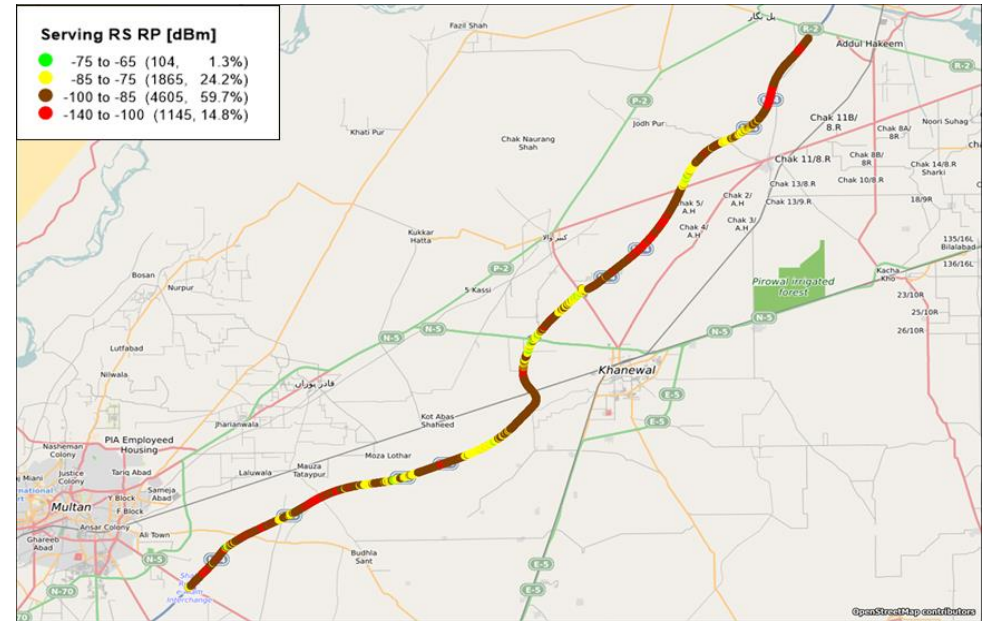


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

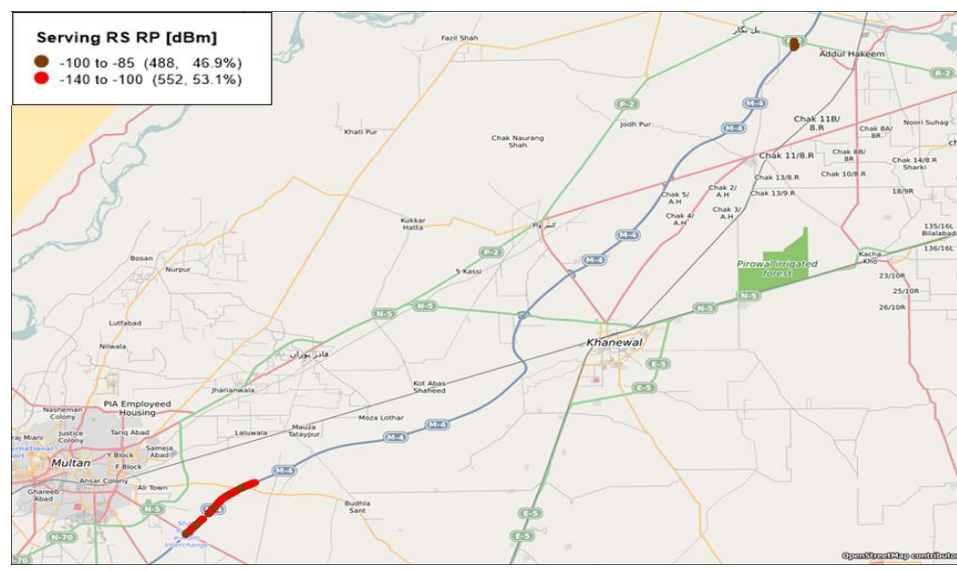
## JAZZ 4G COVERAGE (RSRP) – MULTAN TO ABDUL HAKEEM



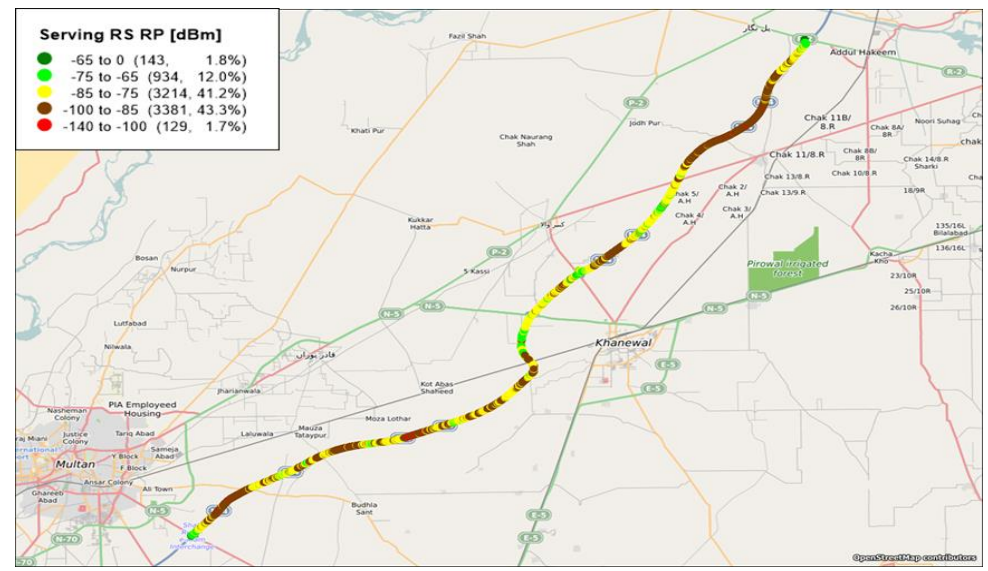
## TELENOR 4G COVERAGE (RSRP) - MULTAN TO ABDUL HAKEEM



## UFONE 4G COVERAGE (RSRP) - MULTAN TO ABDUL HAKEEM

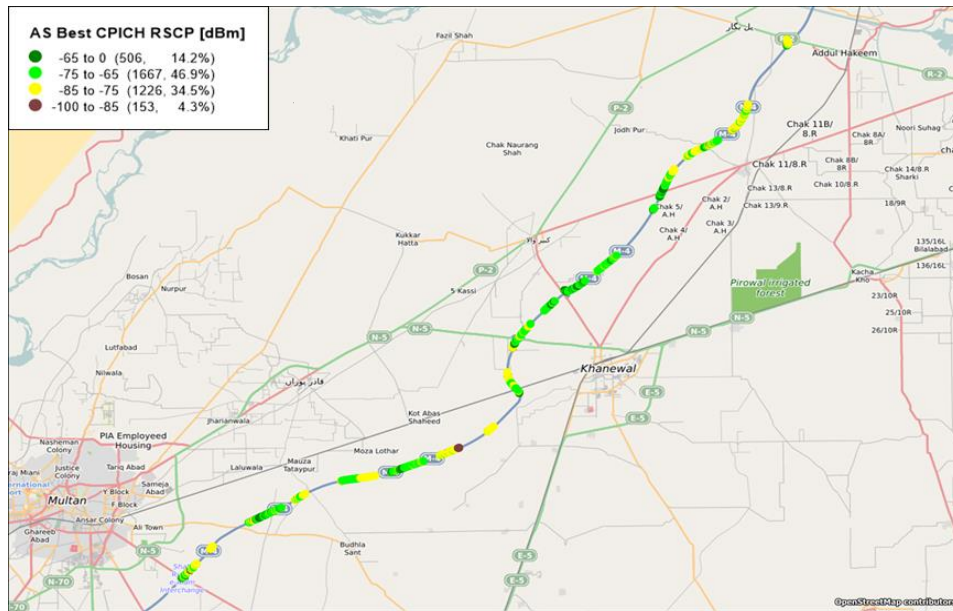


## ZONG 4G COVERAGE (RSRP) - MULTAN TO ABDUL HAKEEM

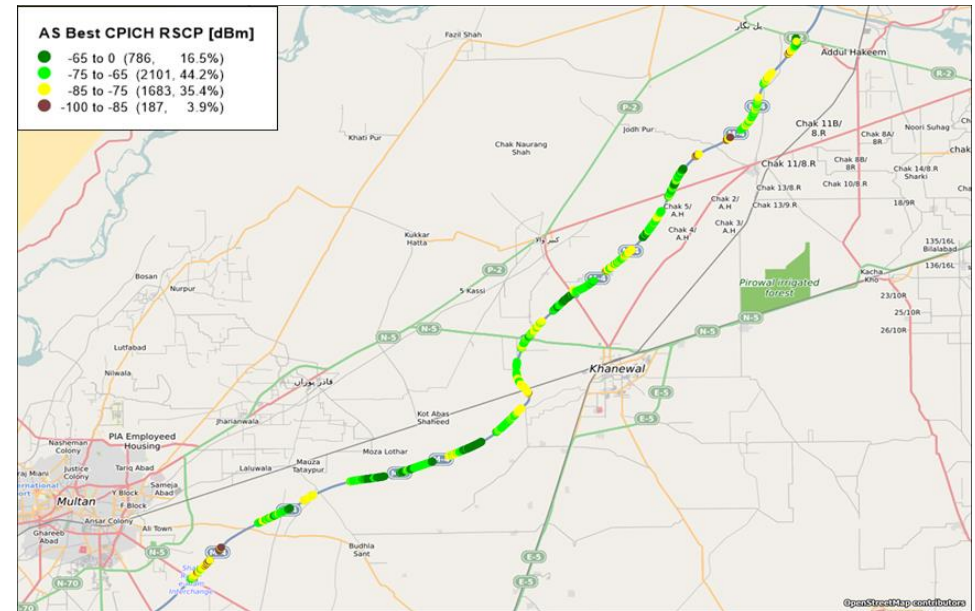


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

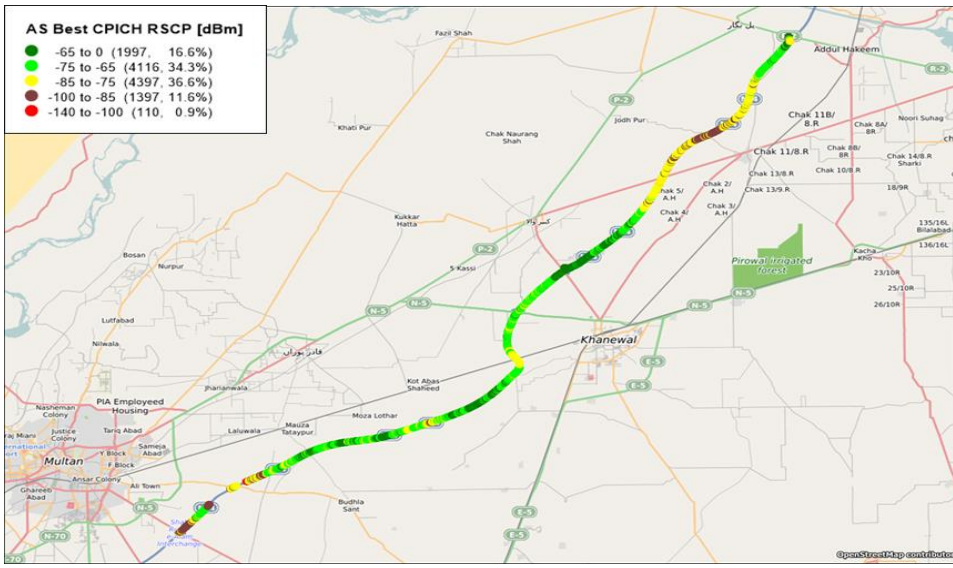
## JAZZ 3G COVERAGE (RSCP) – MULTAN TO ABDUL HAKEEM



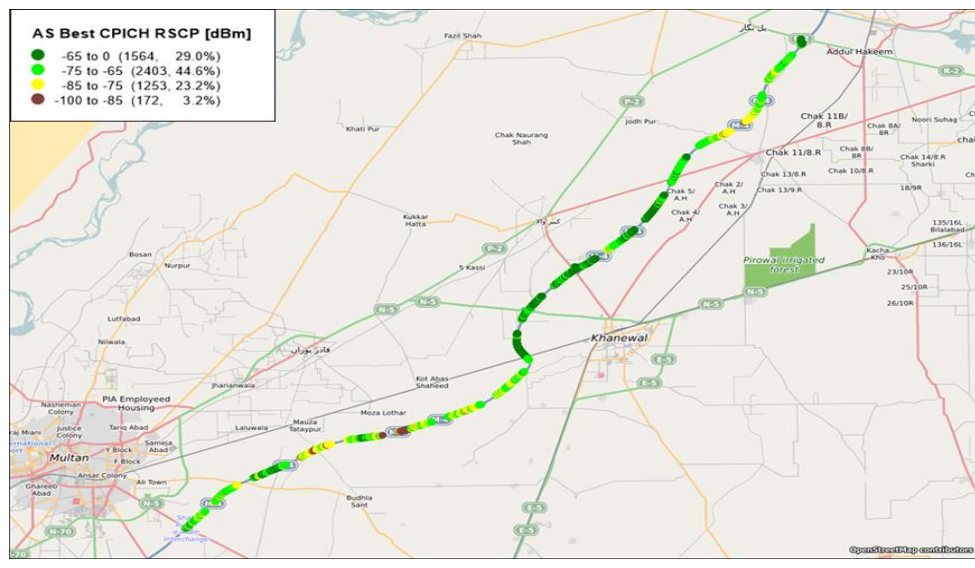
## TELENOR 3G COVERAGE (RSCP) - MULTAN TO ABDUL HAKEEM



## UFONE 3G COVERAGE (RSCP) - MULTAN TO ABDUL HAKEEM

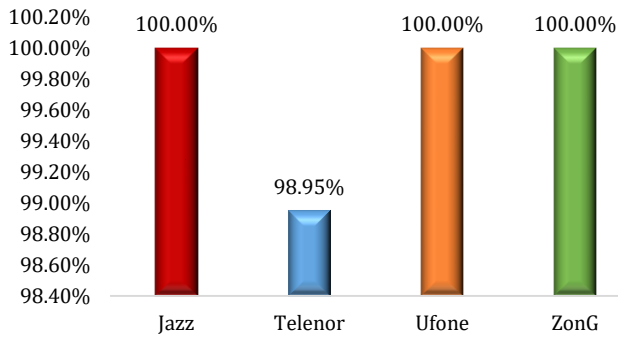


## ZONG 3G COVERAGE (RSCP) - MULTAN TO ABDUL HAKEEM

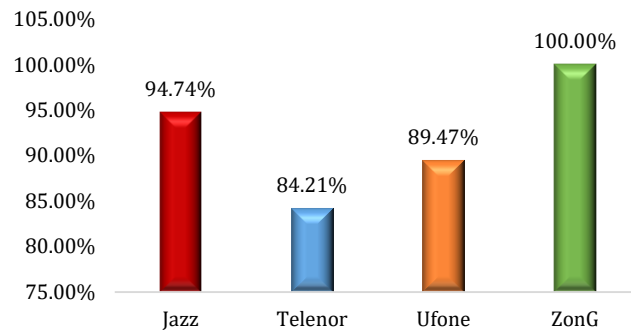


## QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO ABDUL HAKEEM

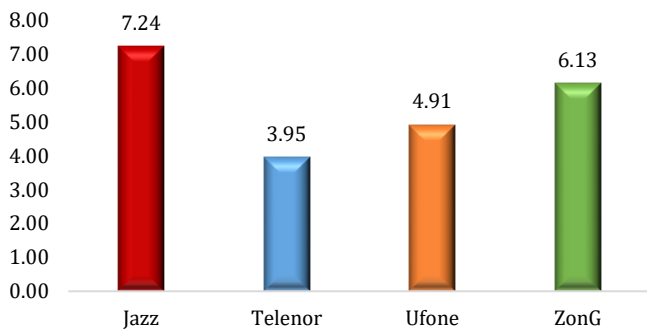
**Network Accessibility > 99%**



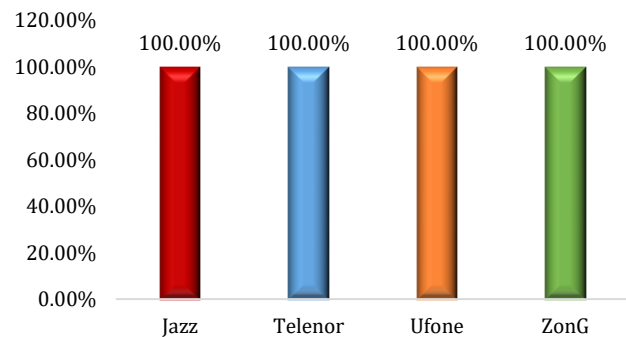
**Service Accessibility > 98%**



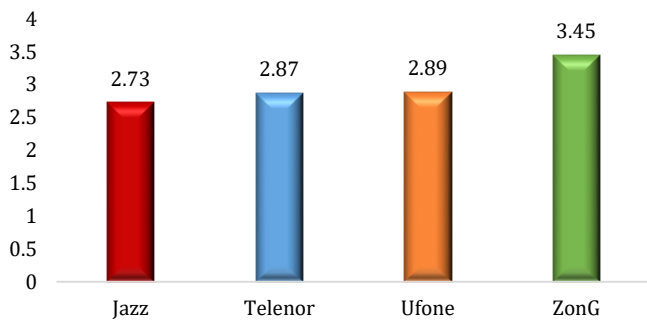
**Call Connection Time < 6.5 Seconds**



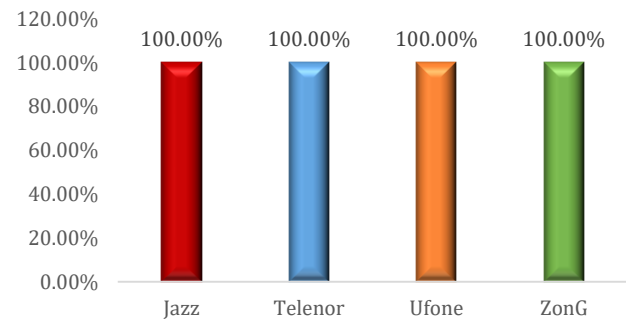
**Call Completion Ratio > 98%**



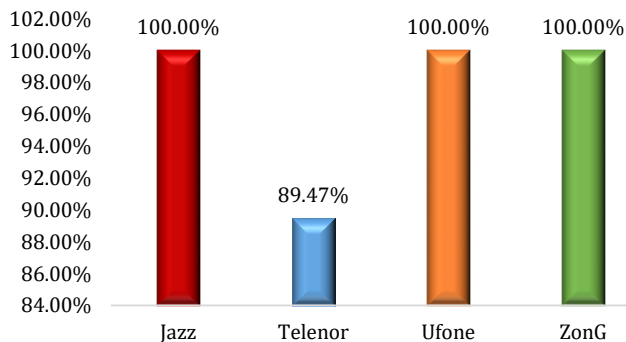
**Mean Opinion Score > 3**



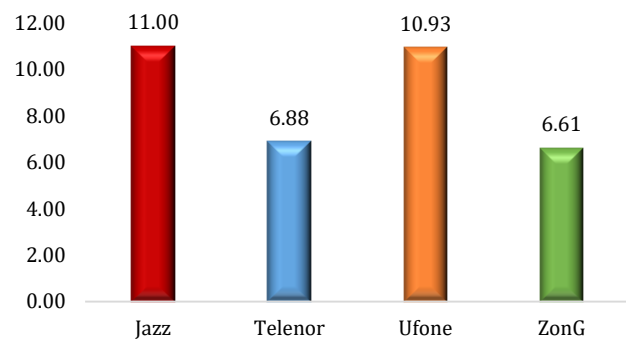
**ISHO for Circuit Switched Voice > 98%**



**SMS Success Rate > 99%**

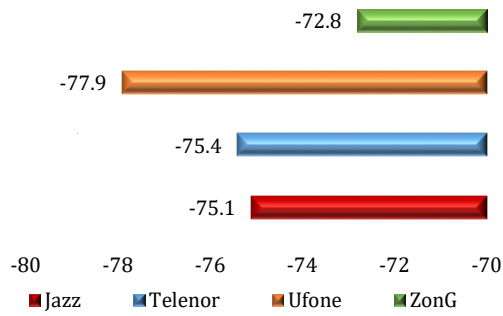


**SMS End-to-End Delivery Time < 12 Seconds**

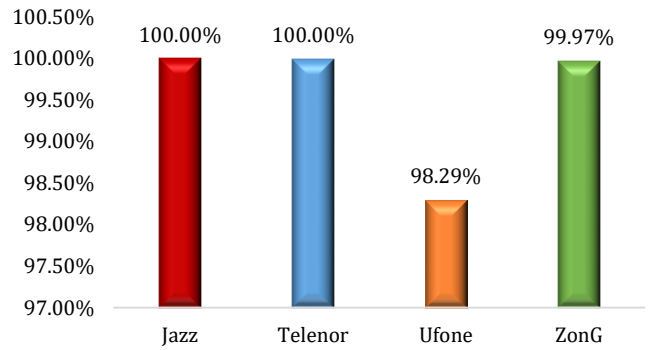


## QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO ABDUL HAKEEM

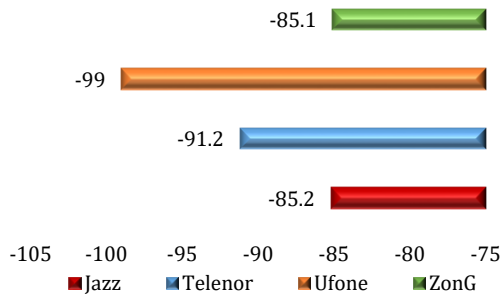
**3G Signal Strength (RSCP) > -100dBm**



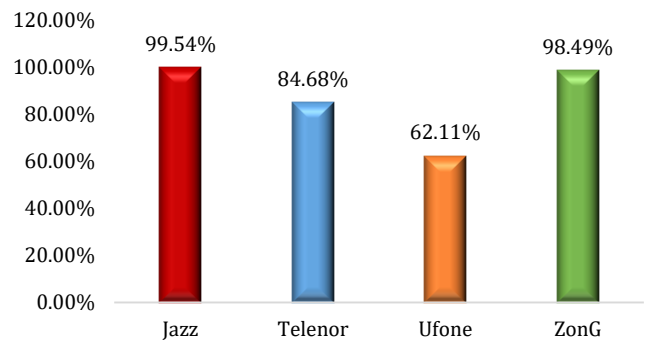
**3G Signal Strength (RSCP) Confidencel Level > 90%**



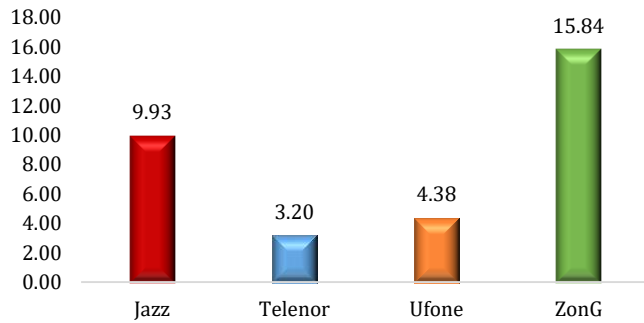
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



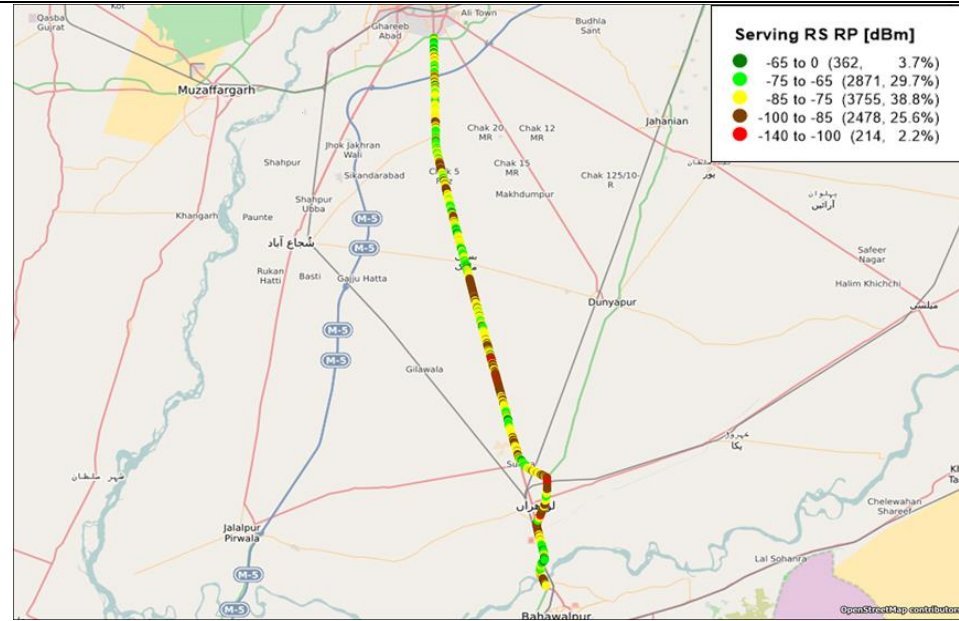
**User Data Throughput (4G) > 2Mbps**



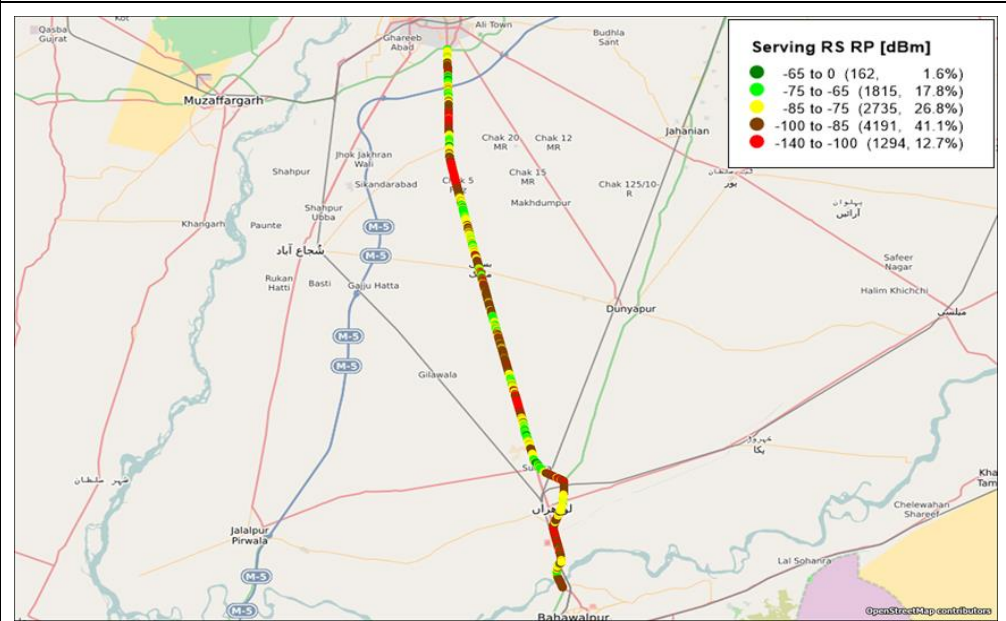


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

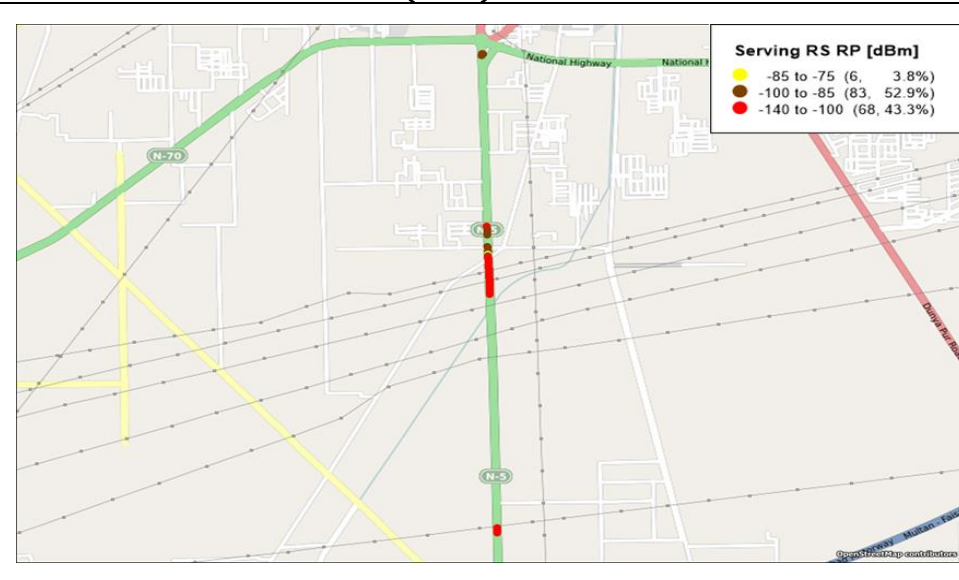
## JAZZ 4G COVERAGE (RSRP) - MULTAN TO BAHAWALPUR



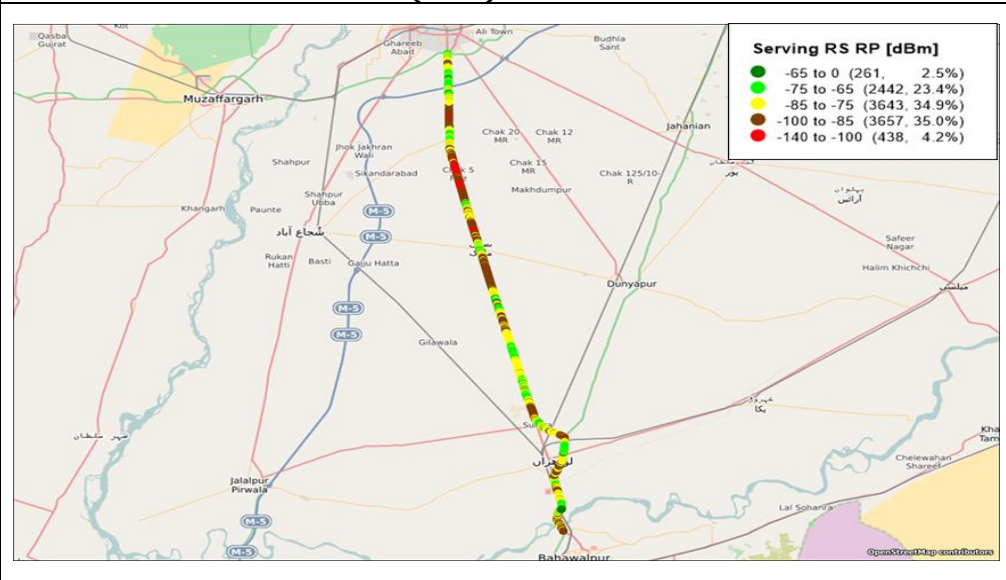
## TELENOR 4G COVERAGE (RSRP) - MULTAN TO BAHAWALPUR



## UFONE 4G COVERAGE (RSRP) - MULTAN TO BAHAWALPUR

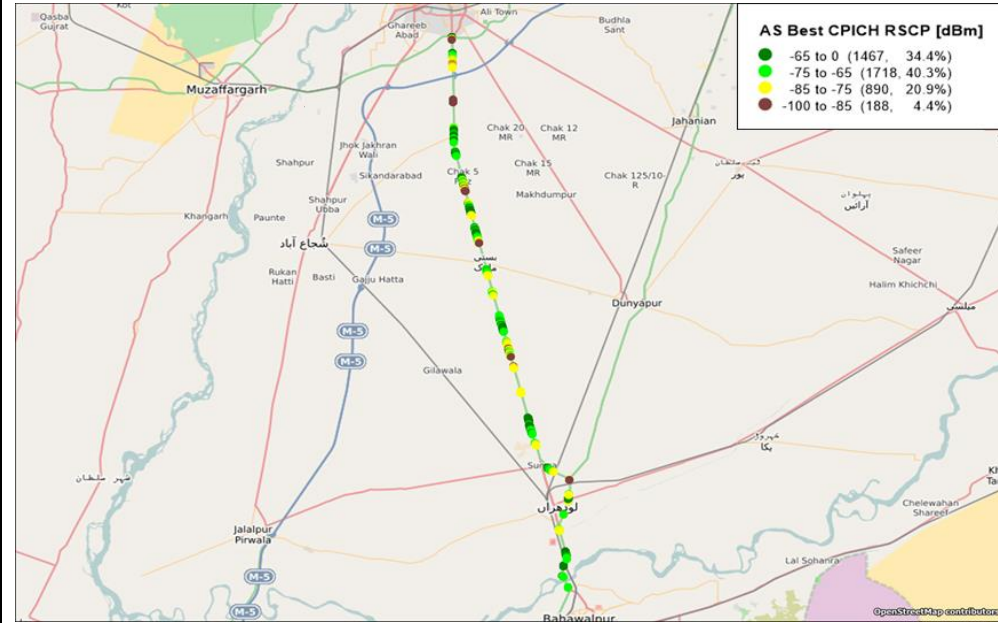


## ZONG 4G COVERAGE (RSRP) - MULTAN TO BAHAWALPUR

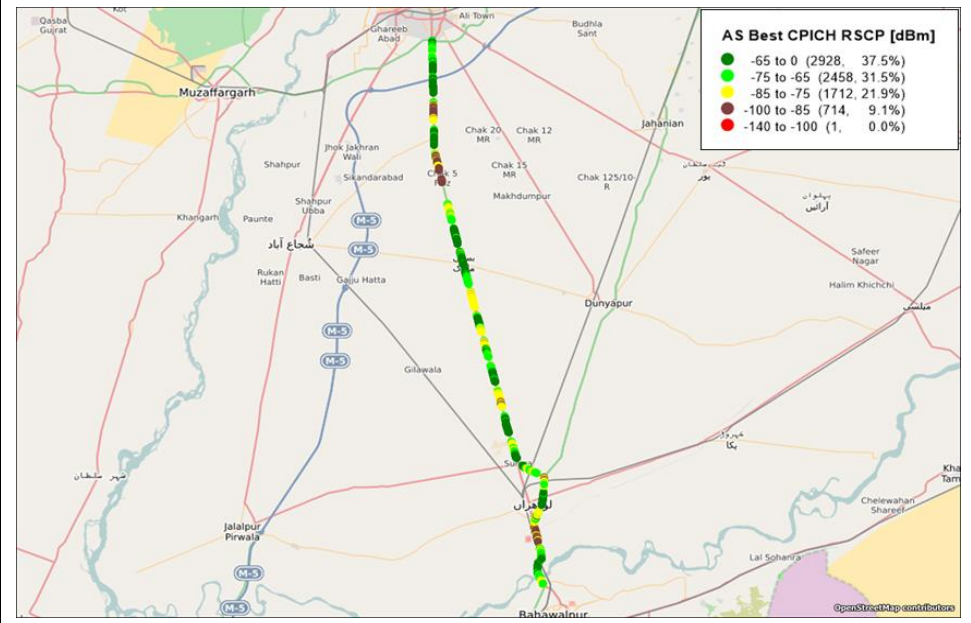


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

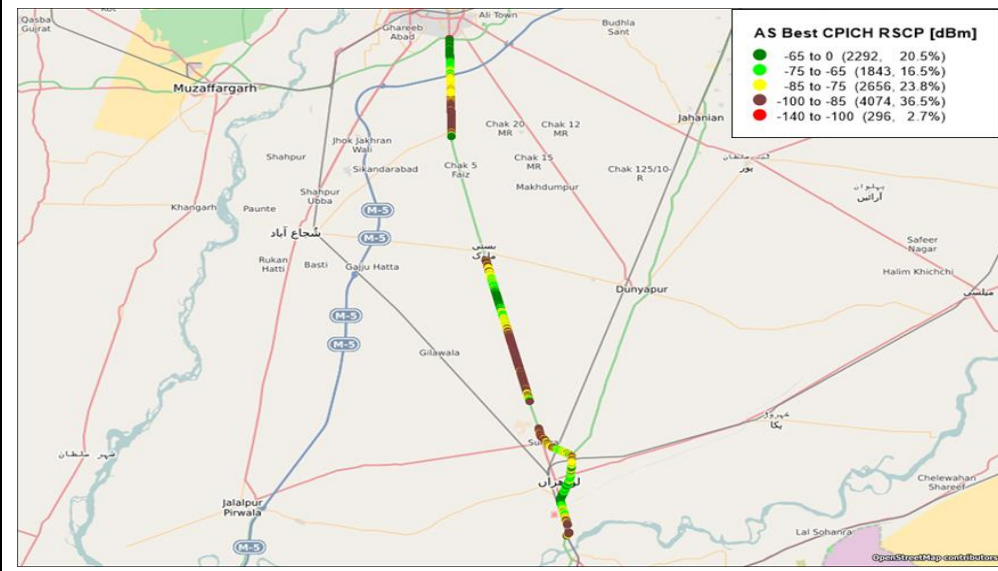
## JAZZ 3G COVERAGE (RSCP) - MULTAN TO BAHAWALPUR



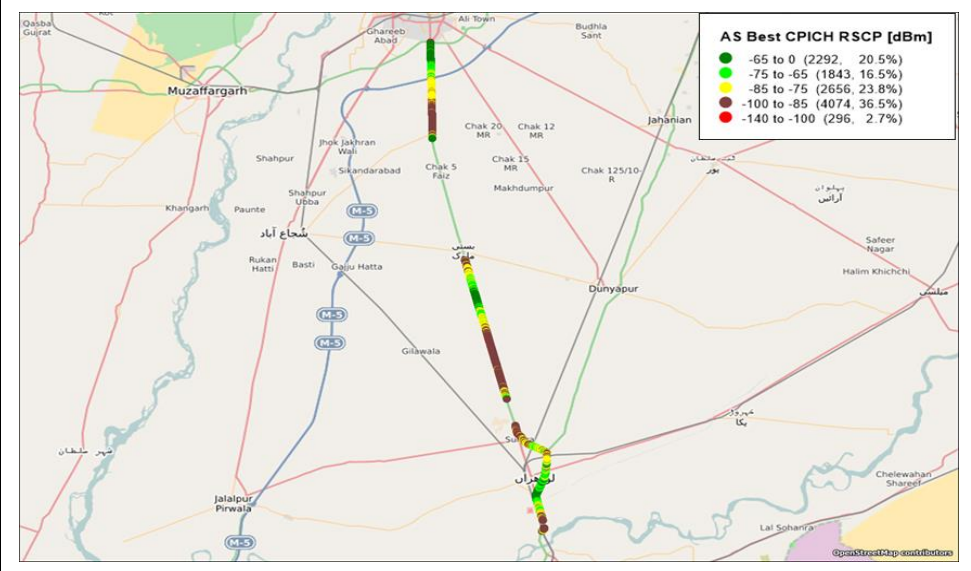
## TELENOR 3G COVERAGE (RSCP) - MULTAN TO BAHAWALPUR



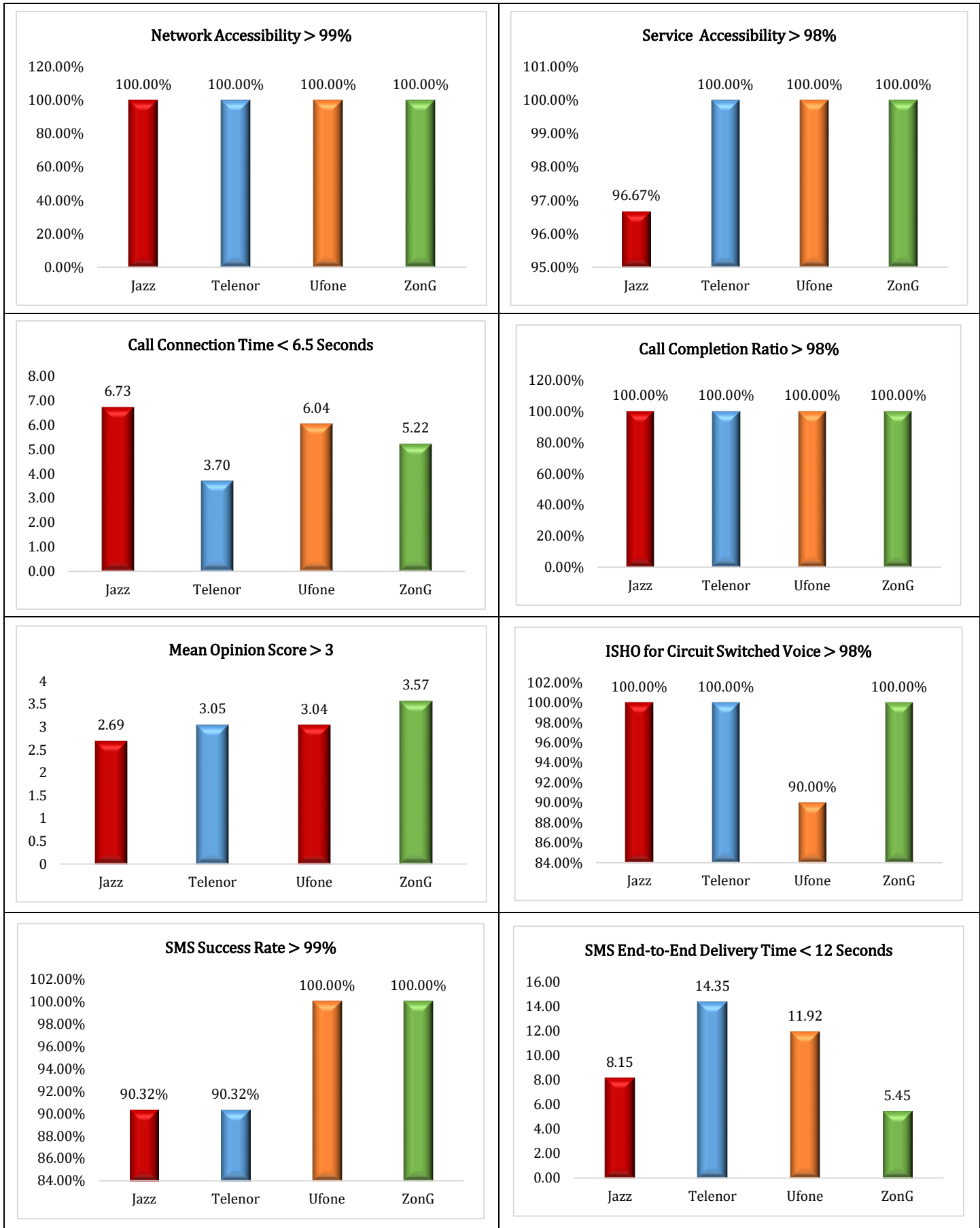
## UFONE 3G COVERAGE (RSCP) - MULTAN TO BAHAWALPUR



## ZONG 3G COVERAGE (RSCP) - MULTAN TO BAHAWALPUR

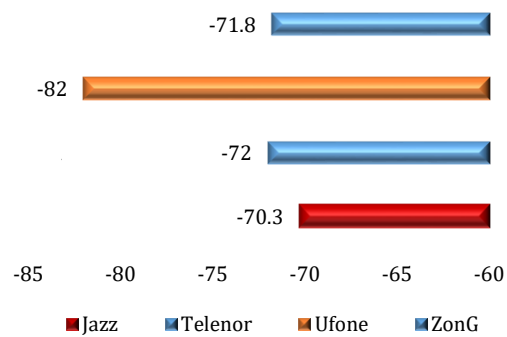


# QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO BAHAWALPUR

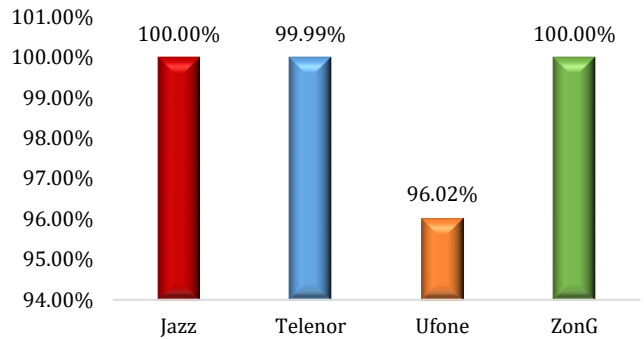


# QUALITY OF SERVICE SURVEY RESULTS – MULTAN TO BAHAWALPUR

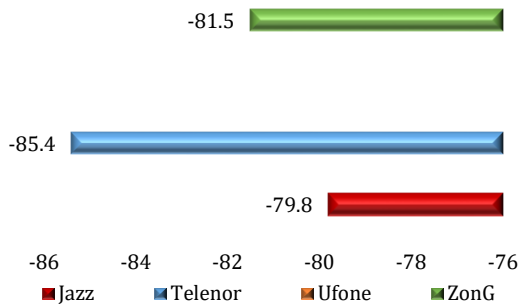
**3G Signal Strength (RSCP) > -100dBm**



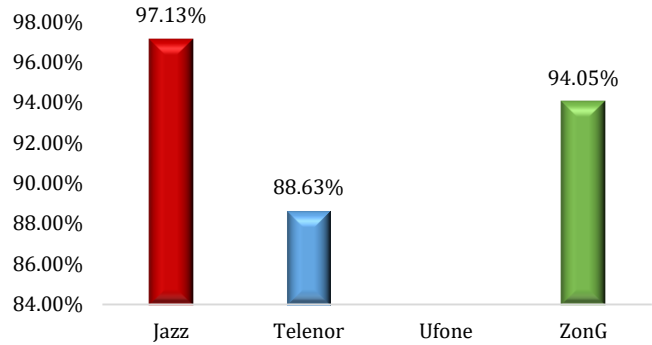
**3G Signal Strength (RSCP) Confidencel Level > 90%**



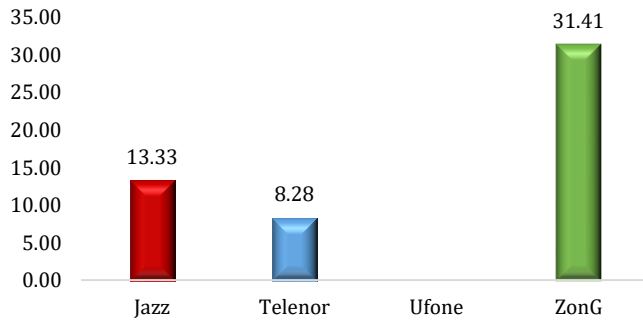
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

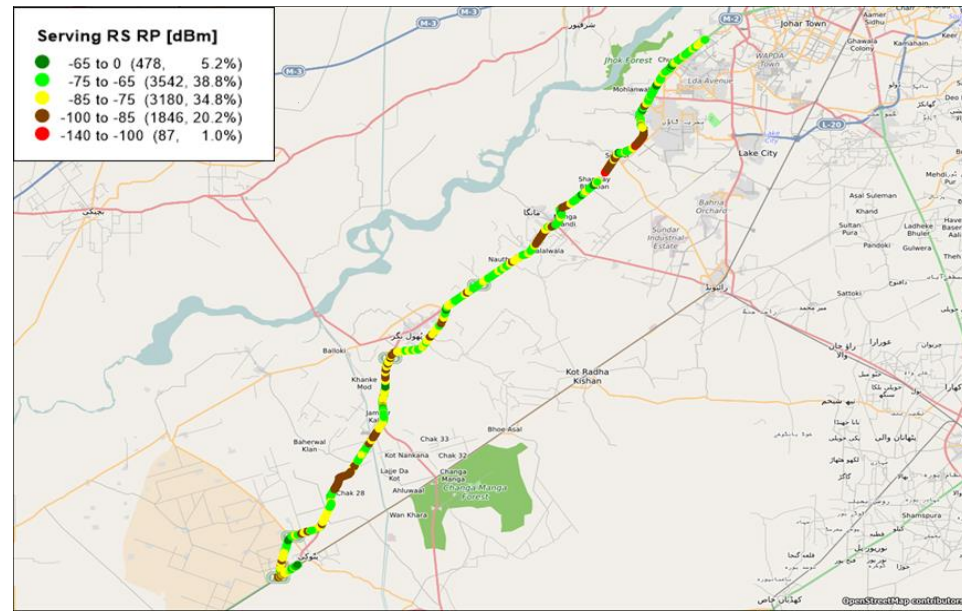


**User Data Throughput (4G) > 2Mbps**

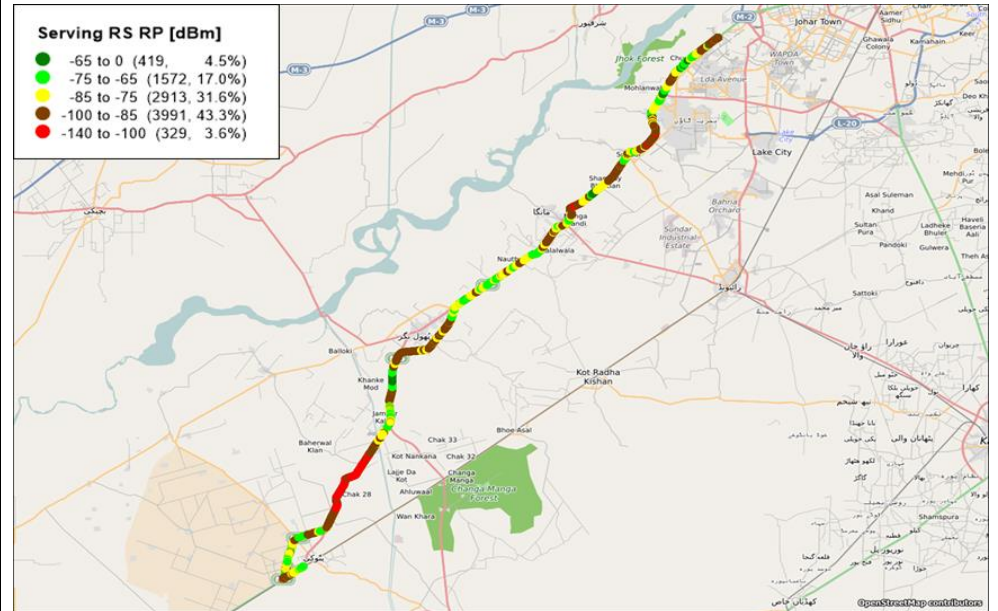


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

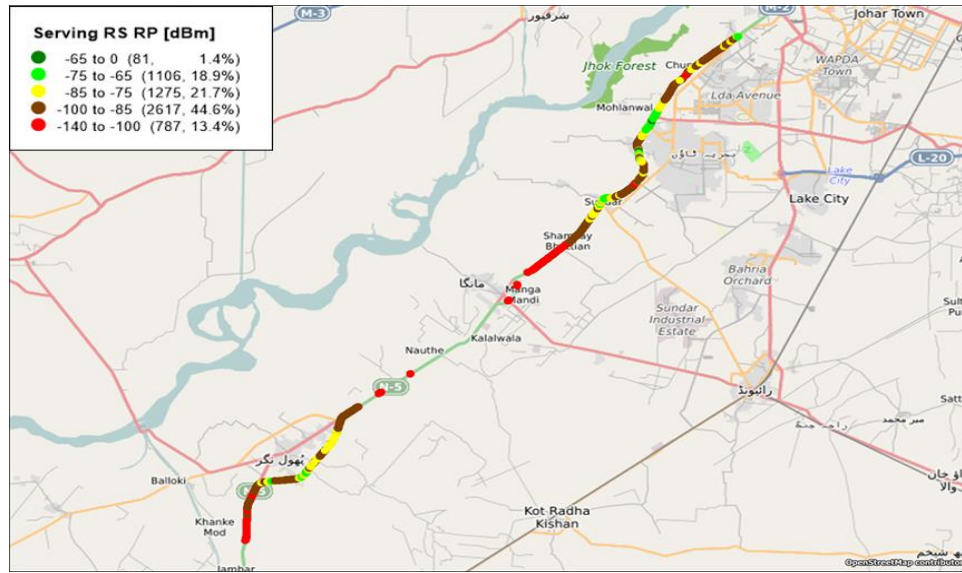
## JAZZ 4G COVERAGE (RSRP) - LAHORE TO PATTOKI



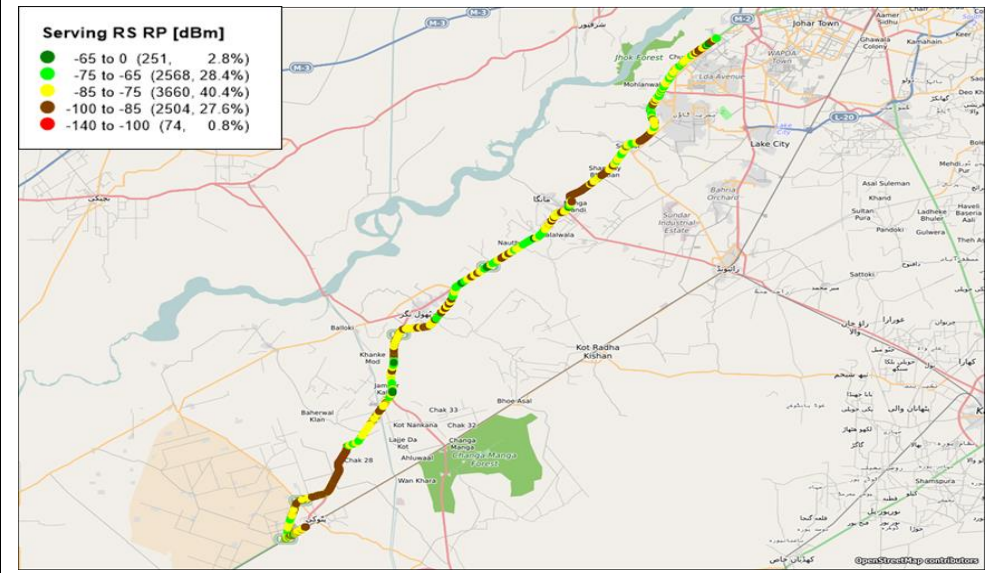
## TELENOR 4G COVERAGE (RSRP) - LAHORE TO PATTOKI



## UFONE 4G COVERAGE (RSRP) - LAHORE TO PATTOKI

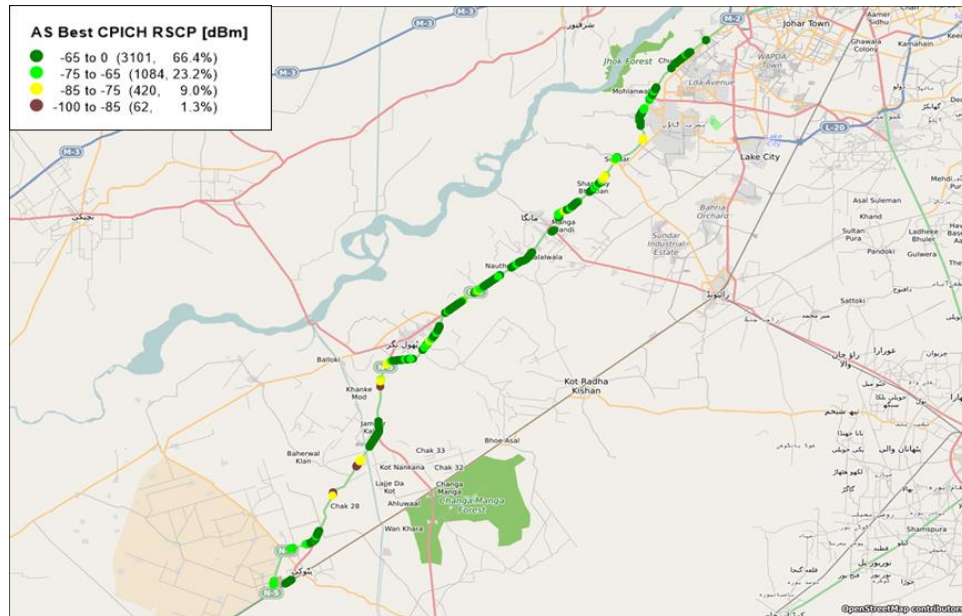


## ZONG 4G COVERAGE (RSRP) - LAHORE TO PATTOKI

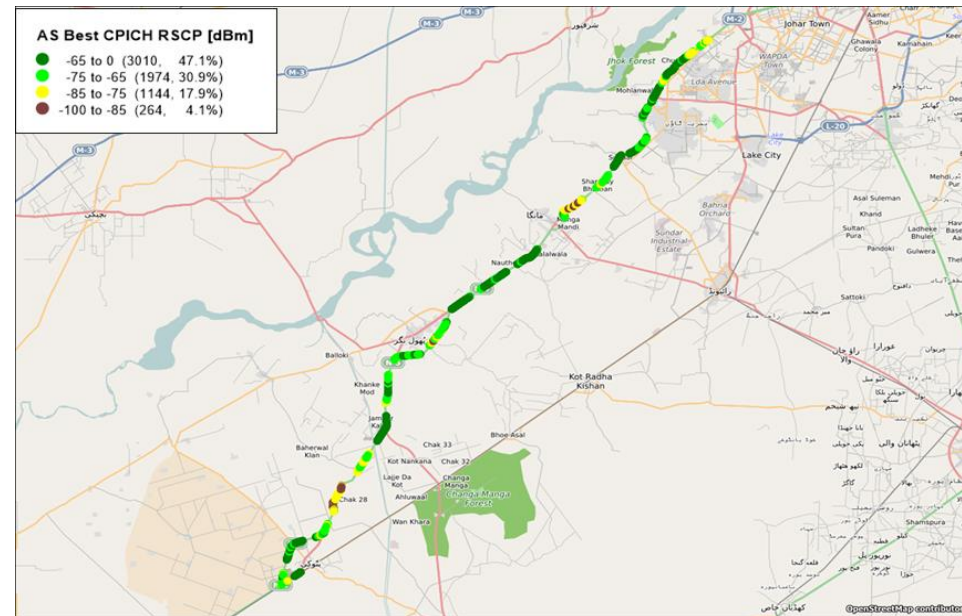


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

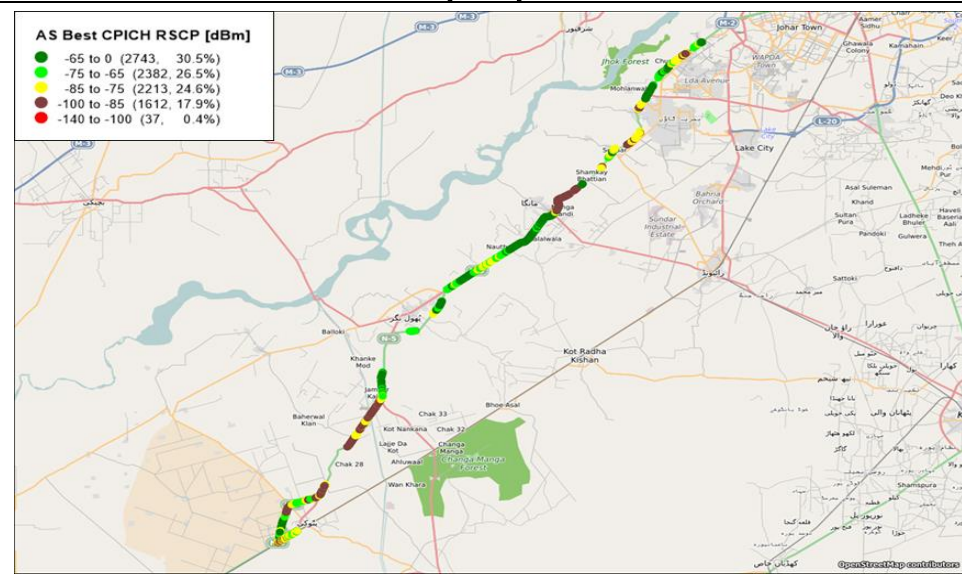
## JAZZ 3G COVERAGE (RSCP) - LAHORE TO PATTOKI



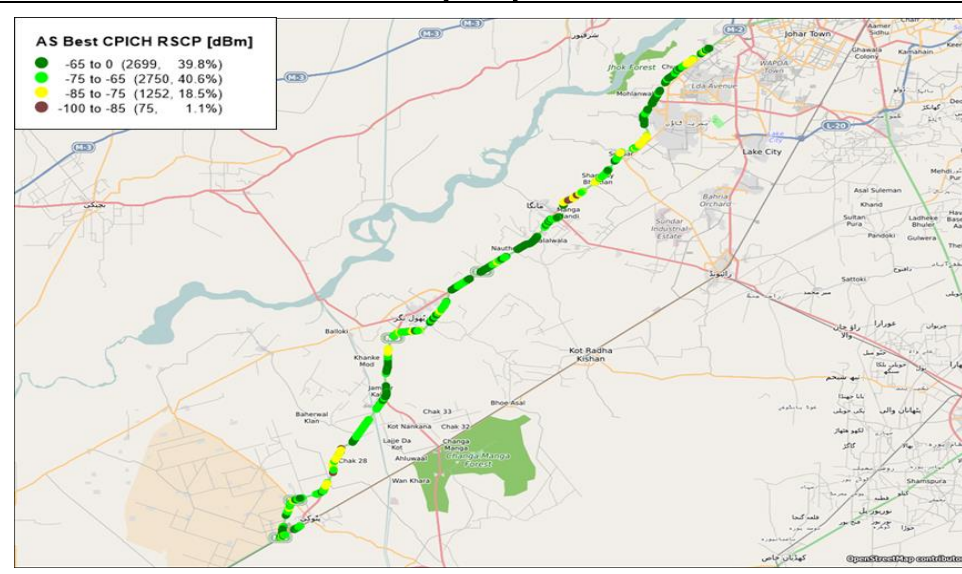
## TELENOR 3G COVERAGE (RSCP) - LAHORE TO PATTOKI



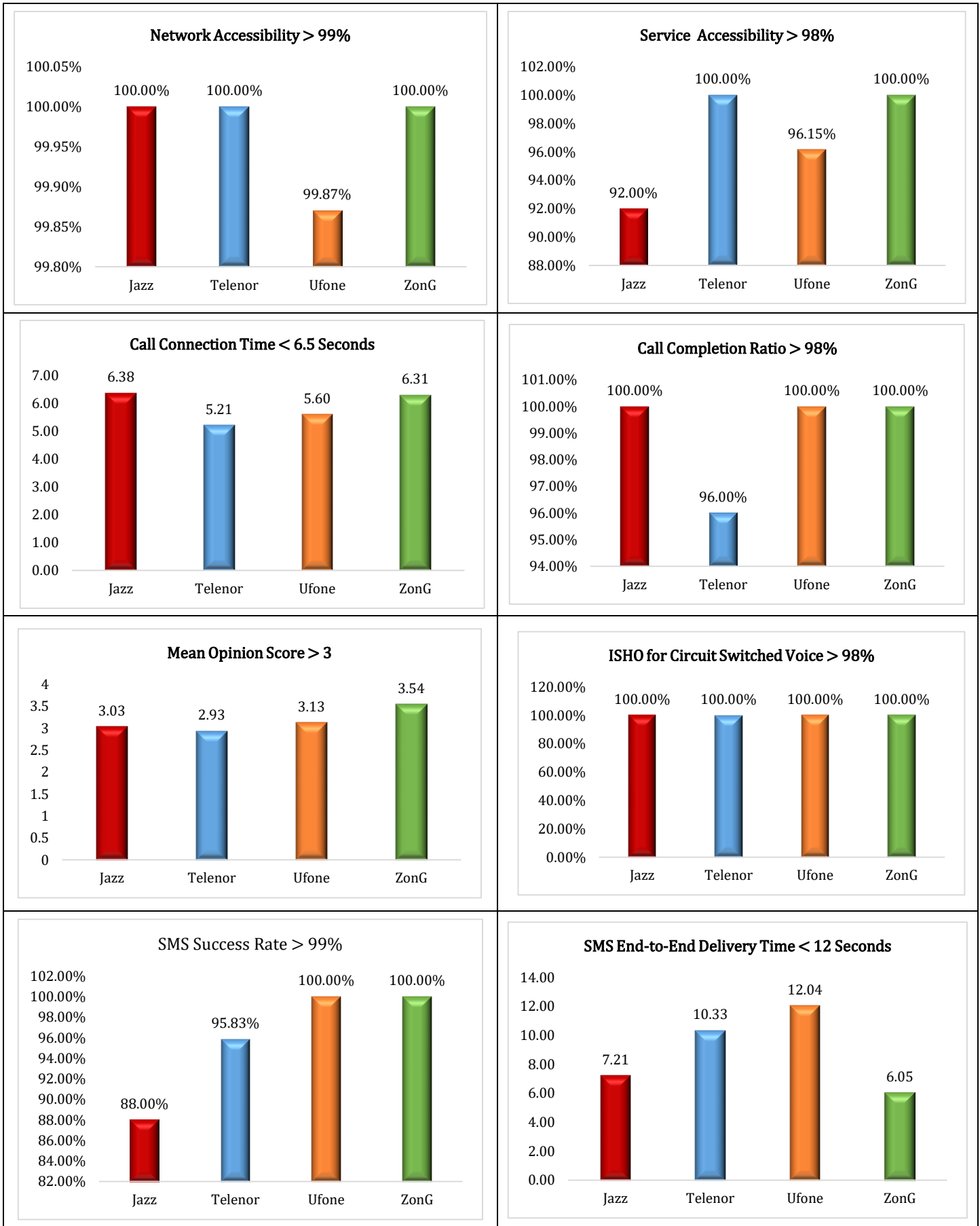
## UFONE 3G COVERAGE (RSCP) - LAHORE TO PATTOKI



## ZONG 3G COVERAGE (RSCP) - LAHORE TO PATTOKI

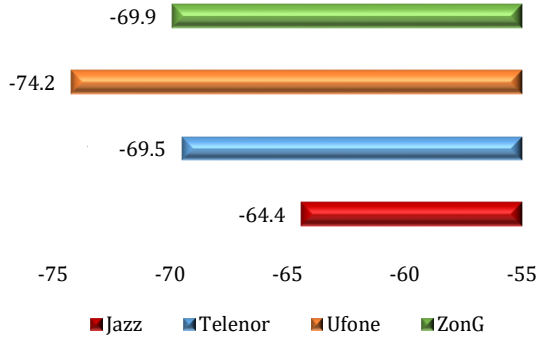


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO PATTOKI

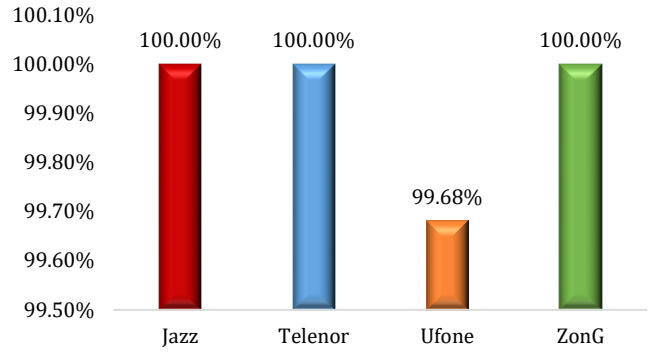


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO PATTOKI

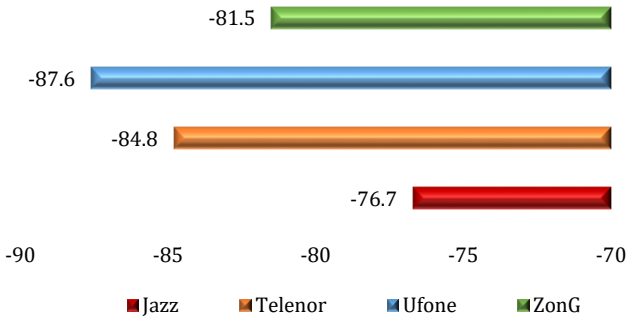
**3G Signal Strength (RSCP) > -100dBm**



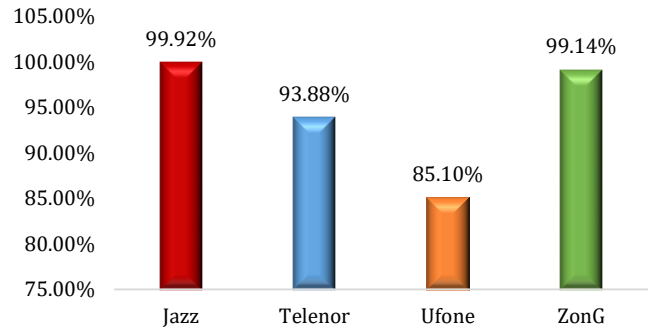
**3G Signal Strength (RSCP) Confidencel Level > 90%**



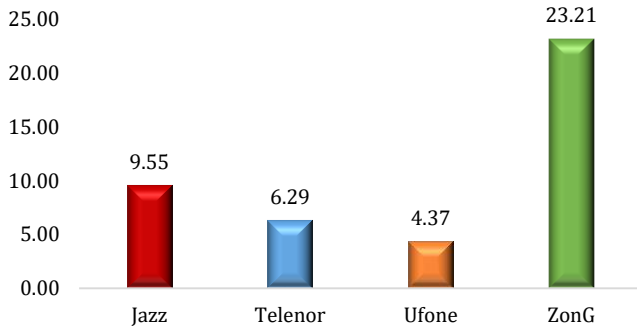
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



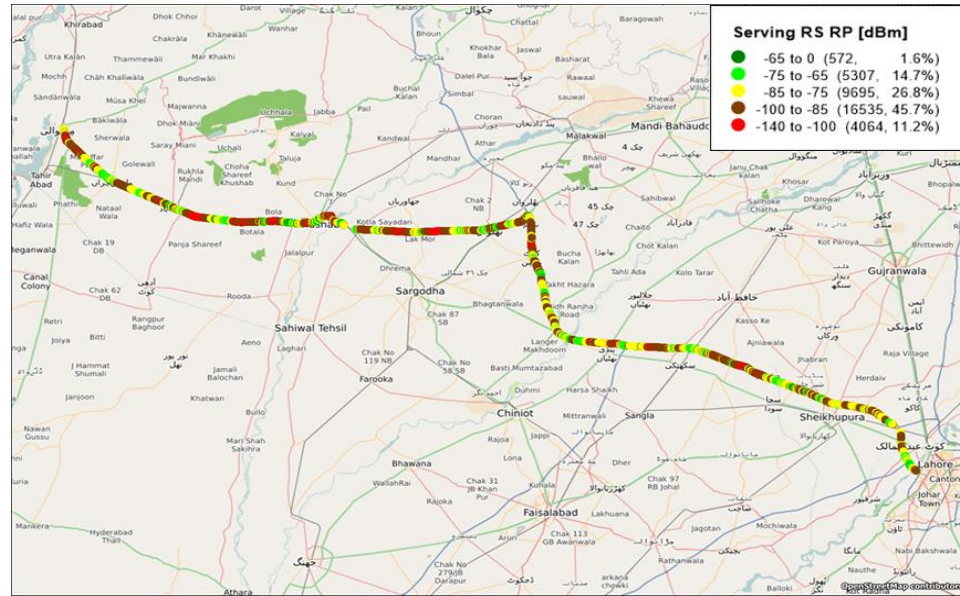
**User Data Throughput (4G) > 2Mbps**



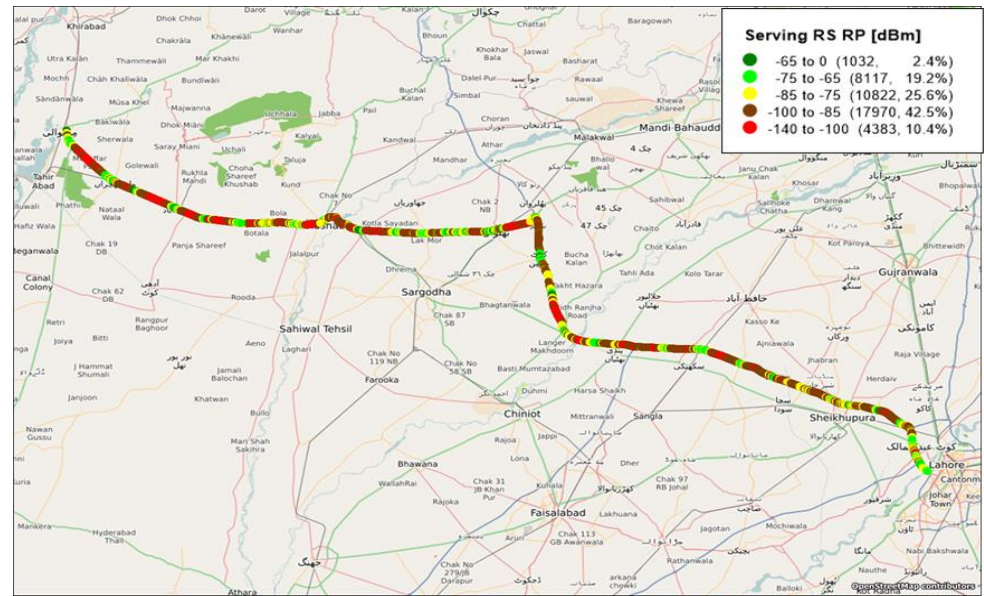


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

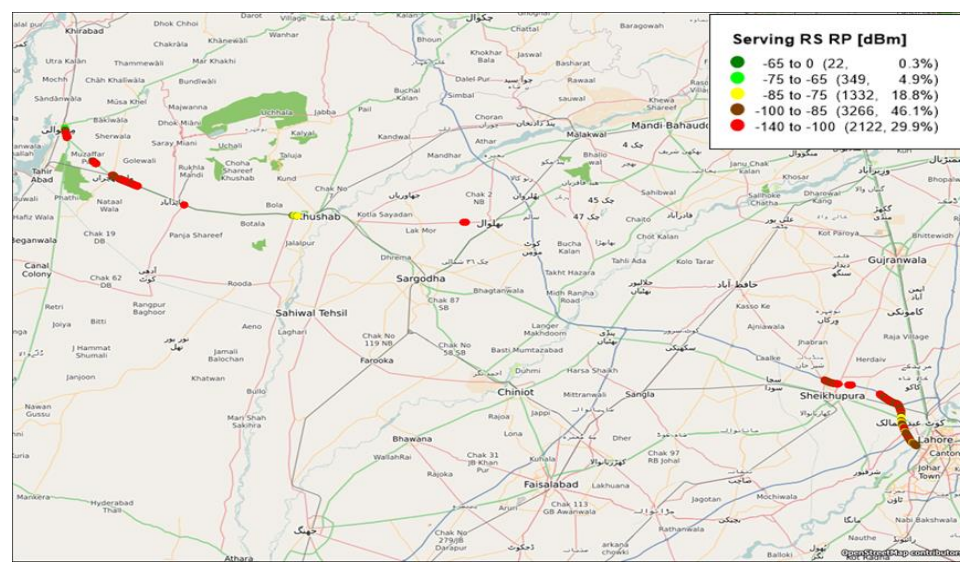
## JAZZ 4G COVERAGE (RSRP) - LAHORE TO MIANWALI



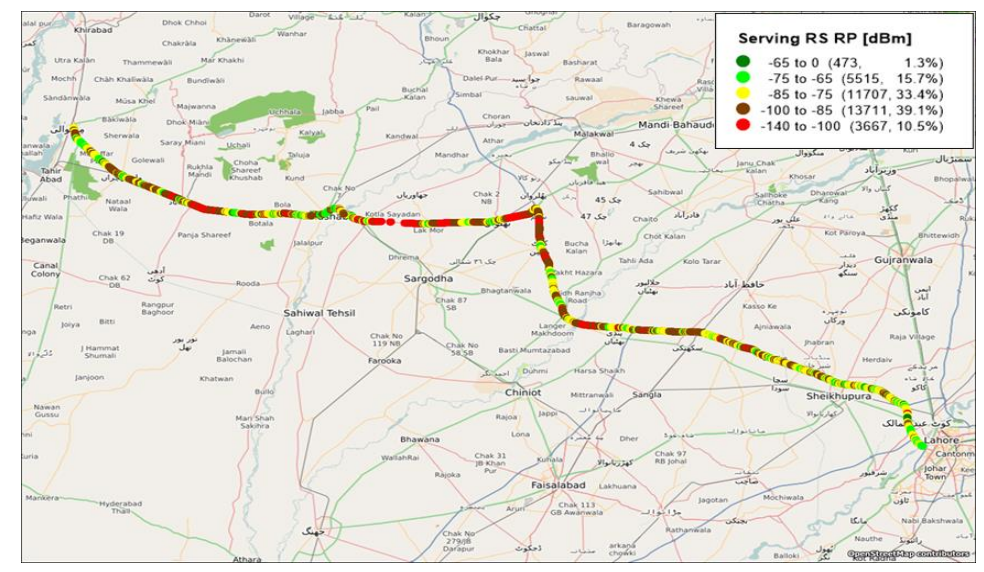
## TELENOR 4G COVERAGE (RSRP) - LAHORE TO MIANWALI



## UFONE 4G COVERAGE (RSRP) - LAHORE TO MIANWALI

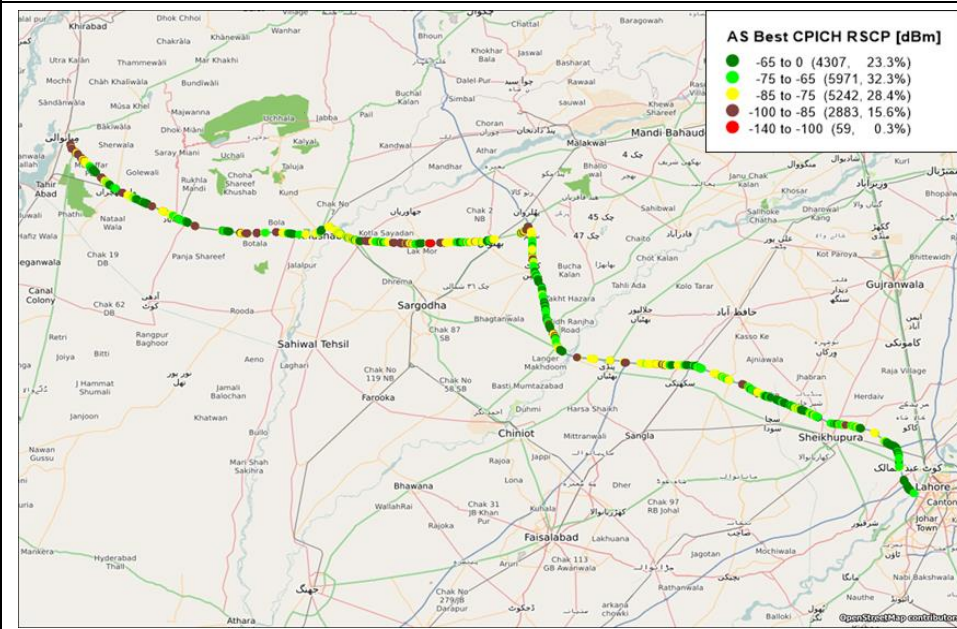


## ZONG 4G COVERAGE (RSRP) - LAHORE TO MIANWALI

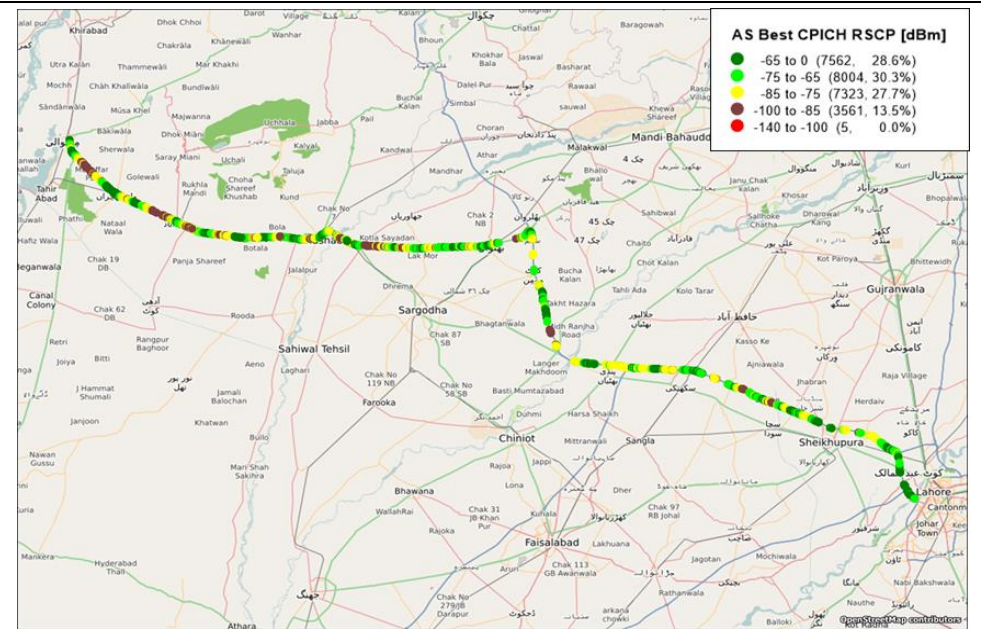


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

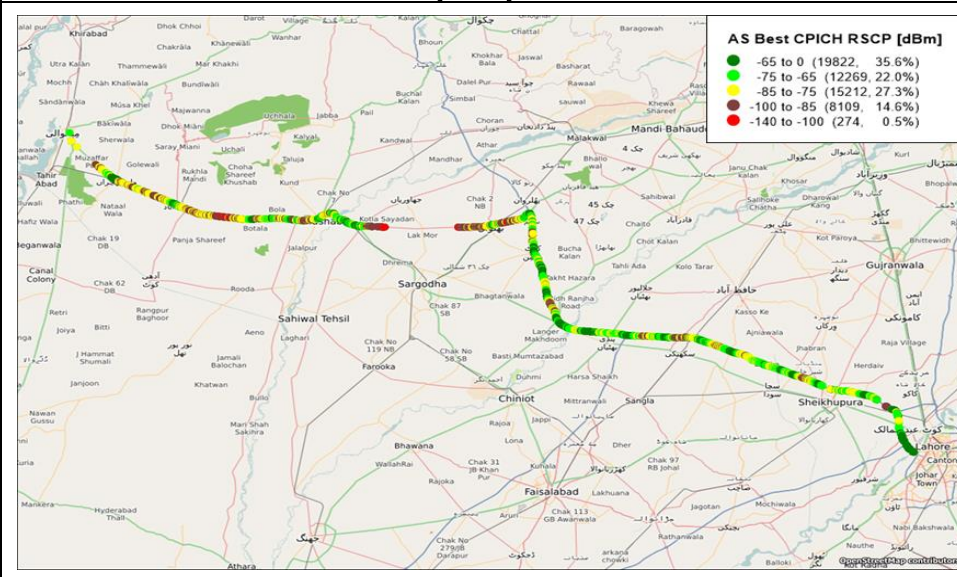
## JAZZ 3G COVERAGE (RSCP) - LAHORE TO MIANWALI



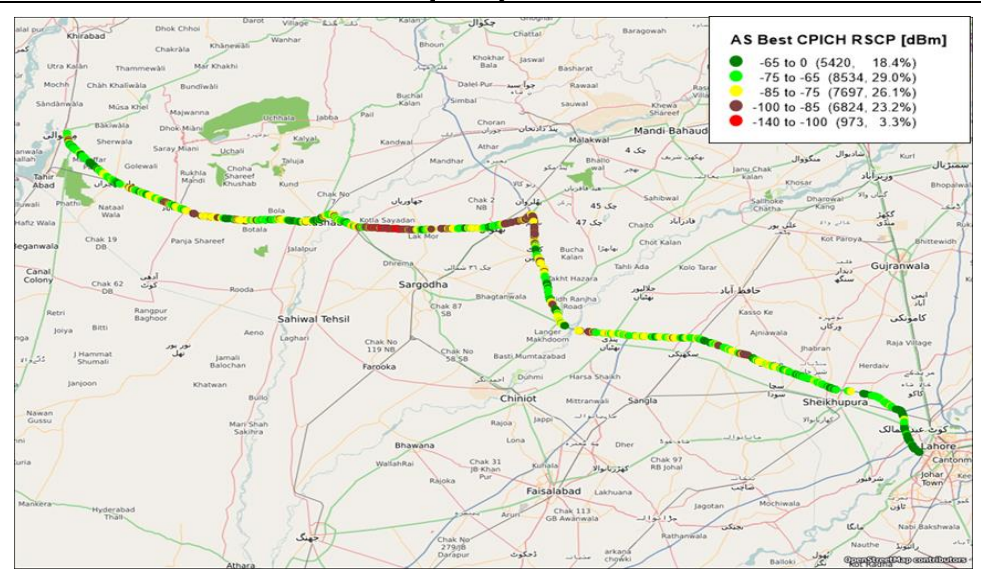
## TELEOR 3G COVERAGE (RSCP) - LAHORE TO MIANWALI



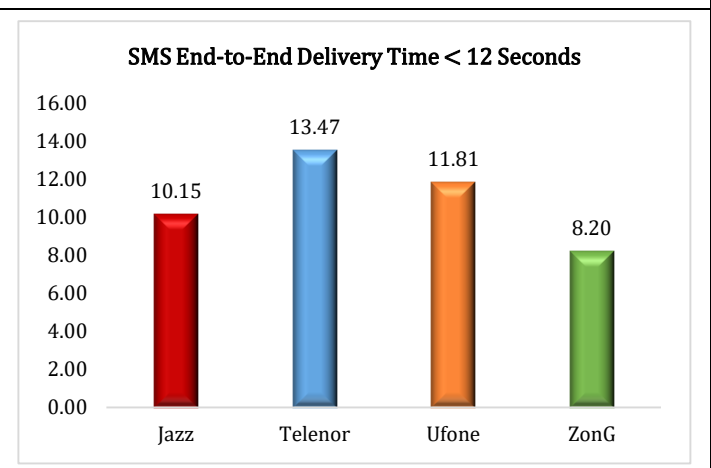
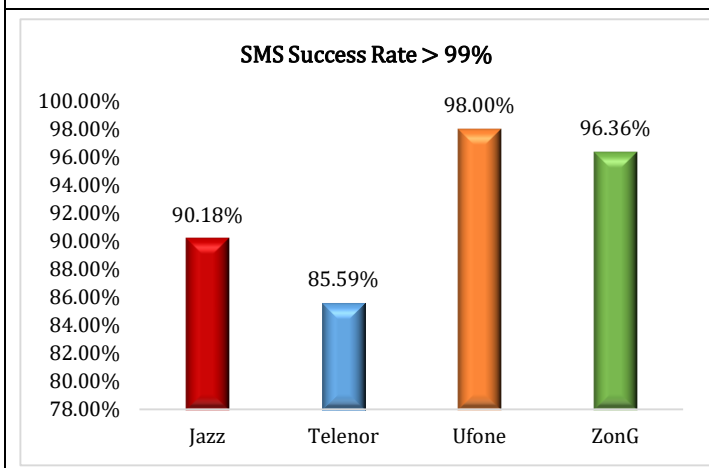
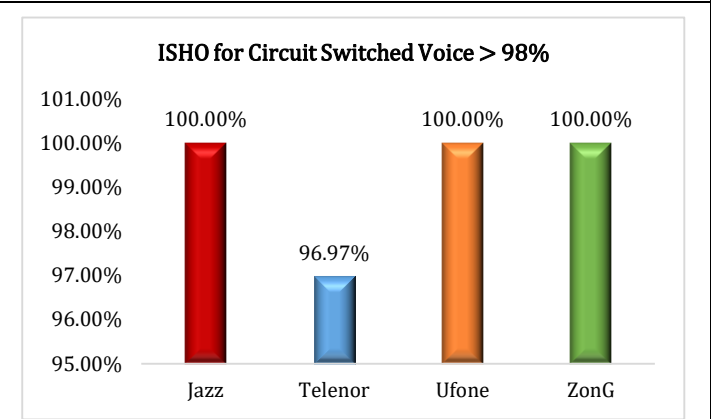
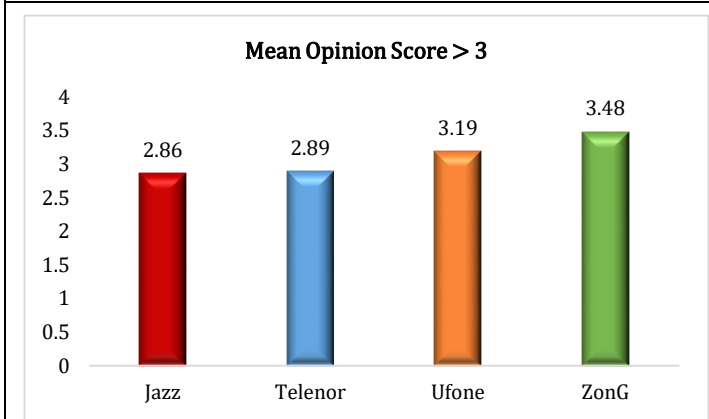
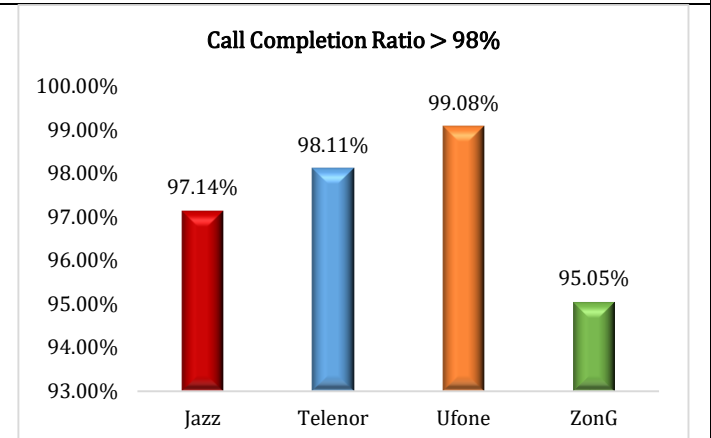
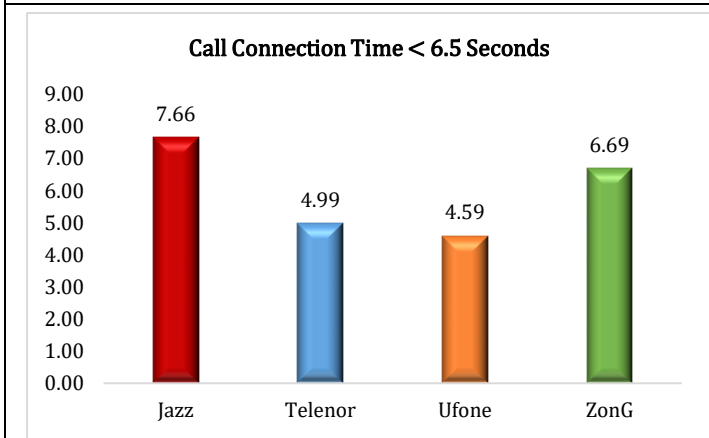
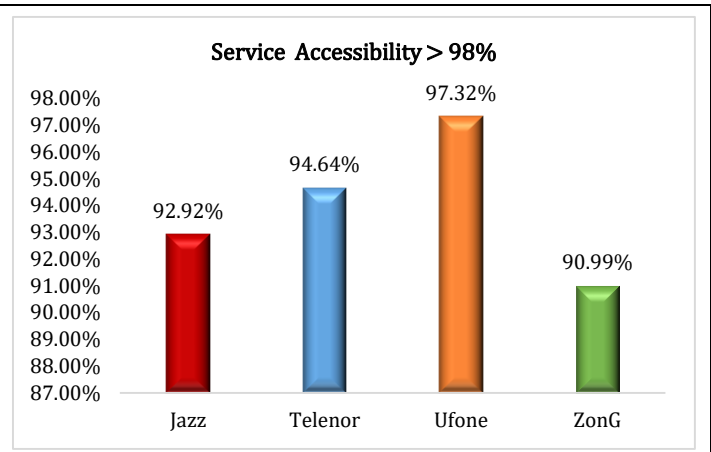
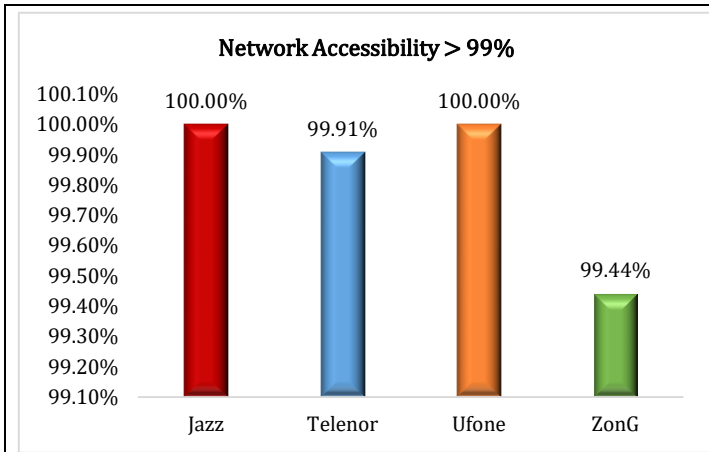
## UFONE 3G COVERAGE (RSCP) - LAHORE TO MIANWALI



## ZONG 3G COVERAGE (RSCP) - LAHORE TO MIANWALI

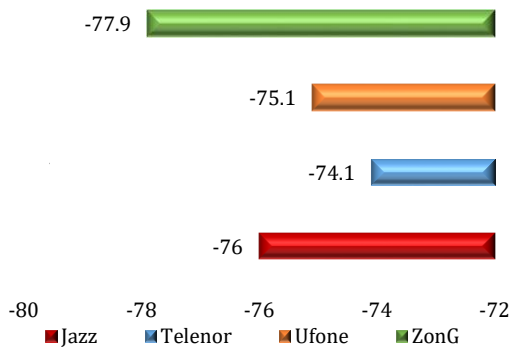


# QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO MIANWALI

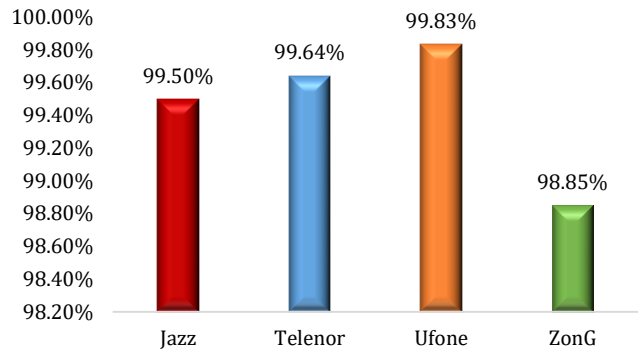


# QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO MIANWALI

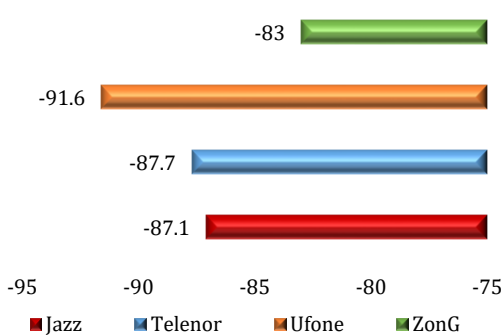
**3G Signal Strength (RSCP) > -100dBm**



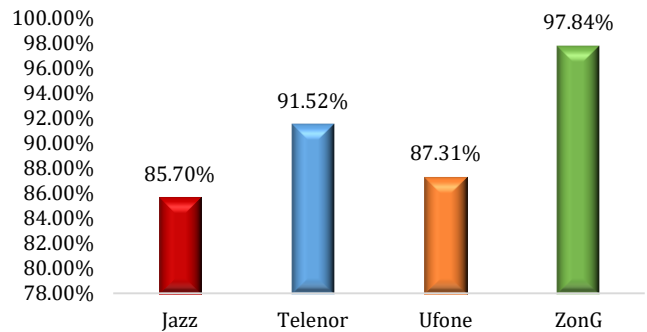
**3G Signal Strength (RSCP) Confidencel Level > 90%**



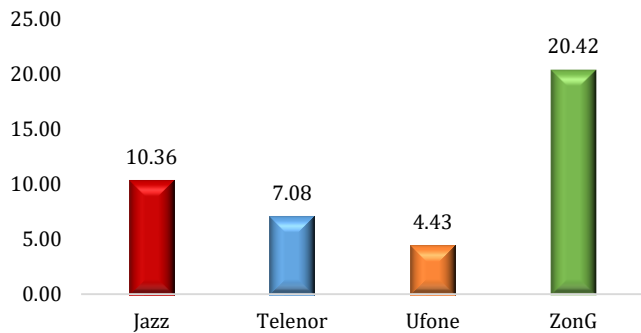
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

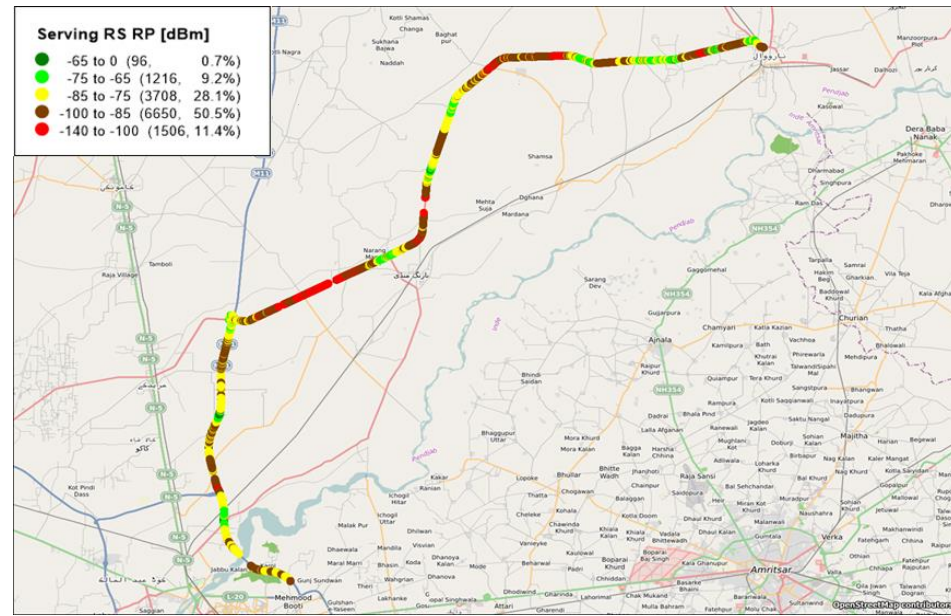


**User Data Throughput (4G) > 2Mbps**

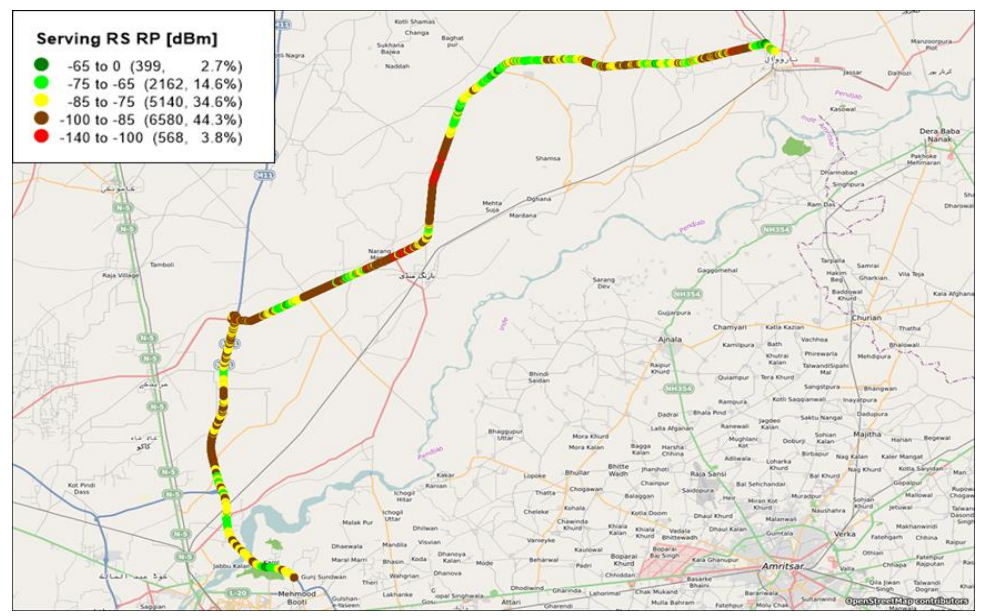


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

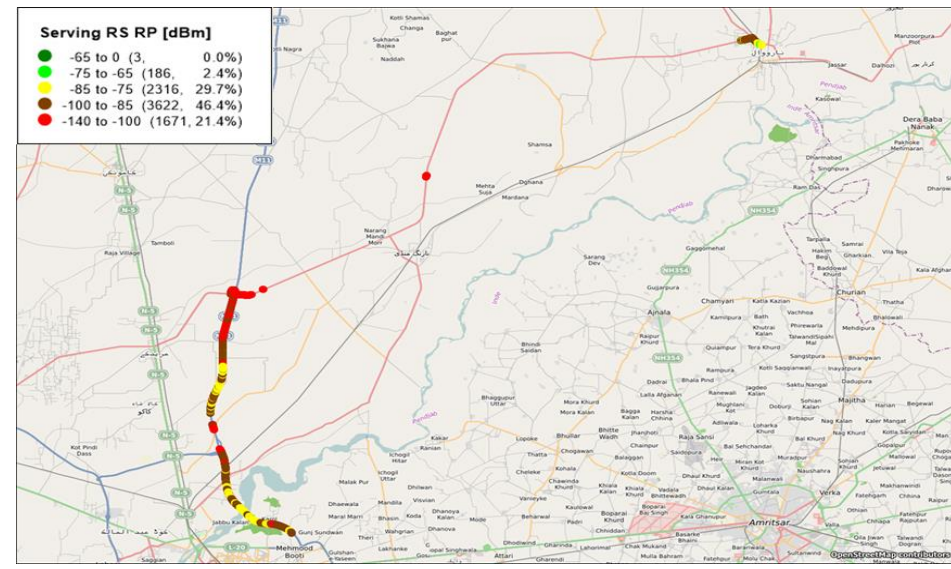
## JAZZ 4G COVERAGE (RSRP) - LAHORE TO NARROWAL



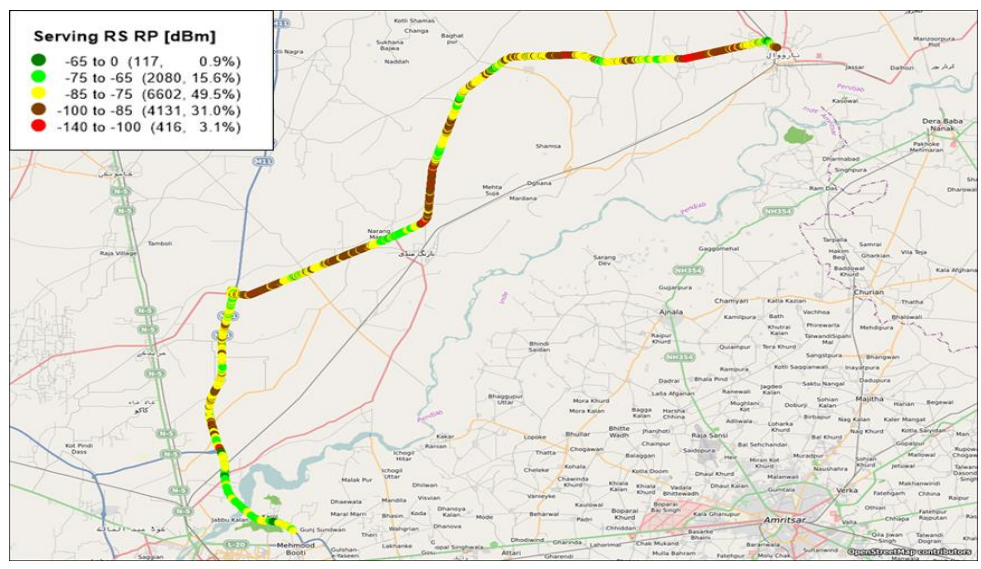
## TELEOR 4G COVERAGE (RSRP) - LAHORE TO NARROWAL



## UFONE 4G COVERAGE (RSRP) - LAHORE TO NARROWAL

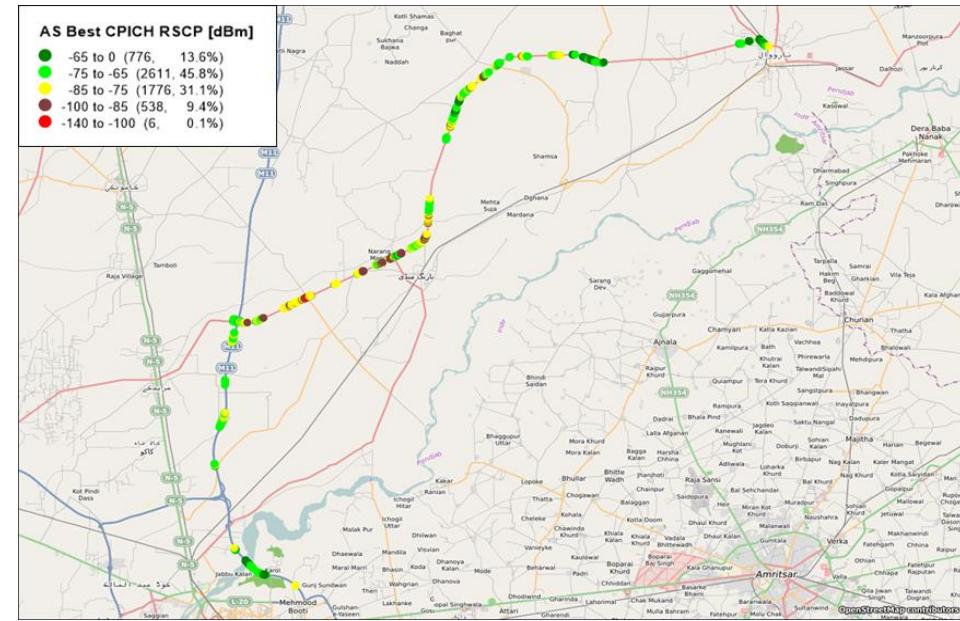


## ZONG 4G COVERAGE (RSRP) - LAHORE TO NARROWAL

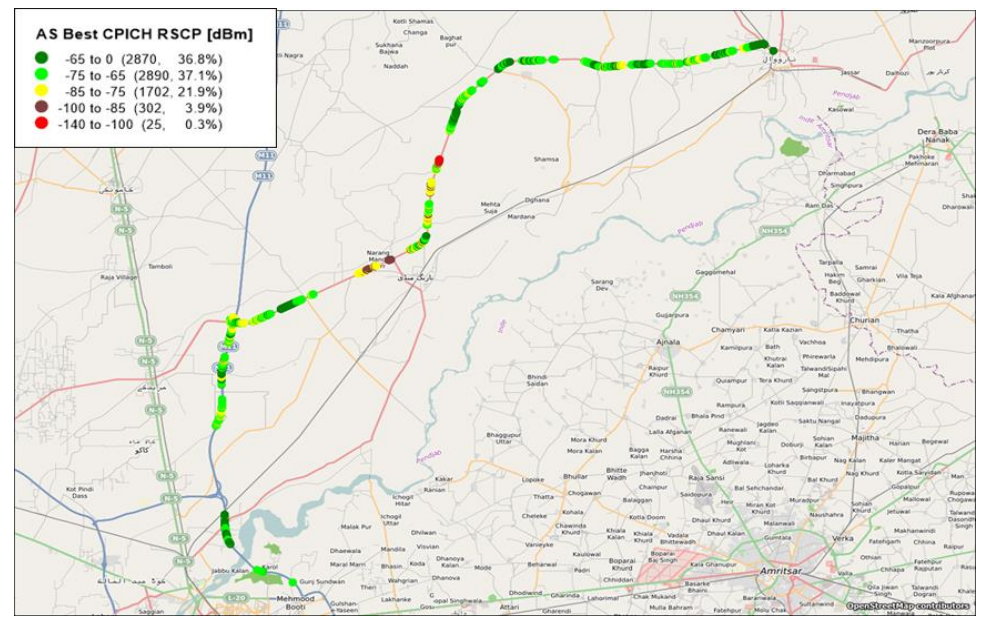


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

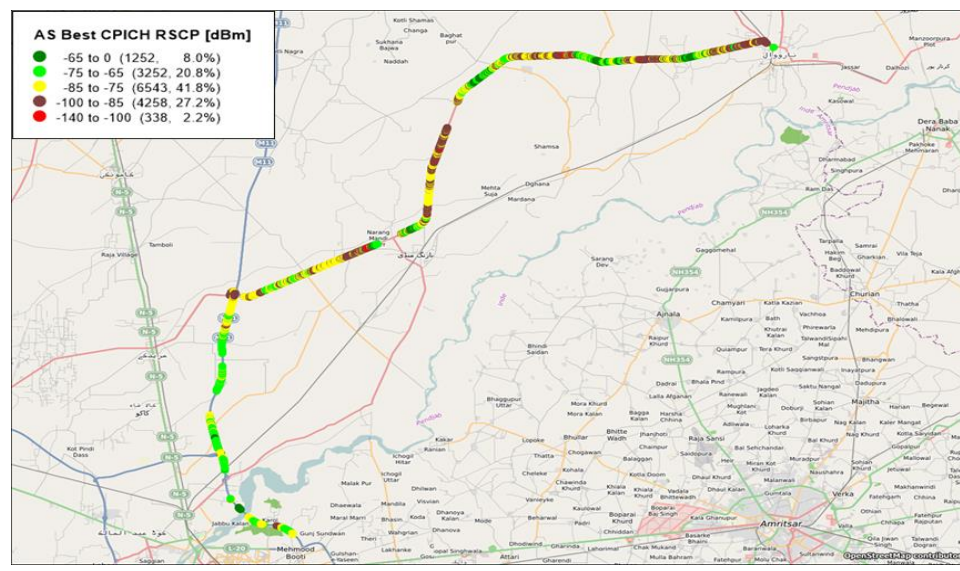
## JAZZ 3G COVERAGE (RSCP) - LAHORE TO NARROWAL



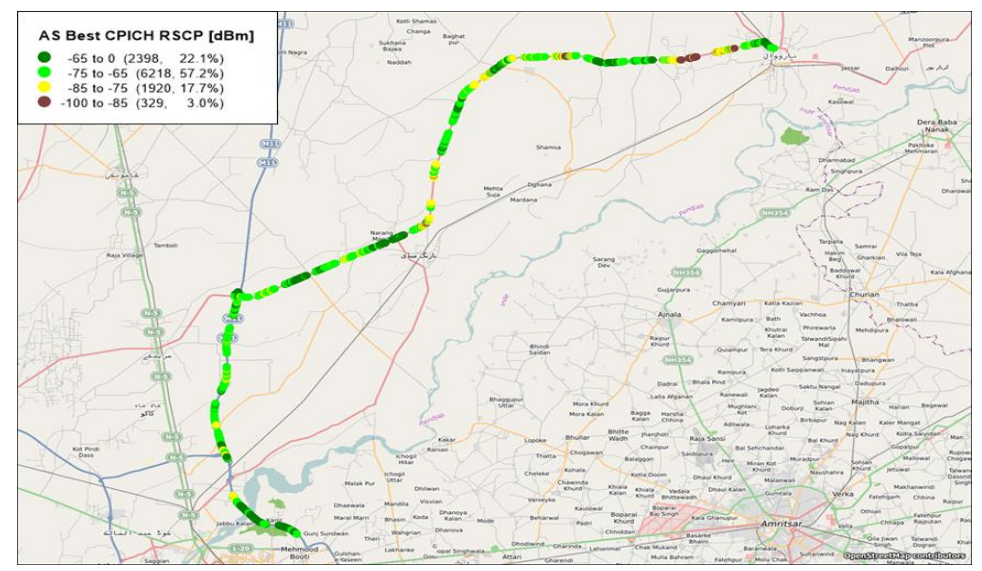
## TELENOR 3G COVERAGE (RSCP) - LAHORE TO NARROWAL



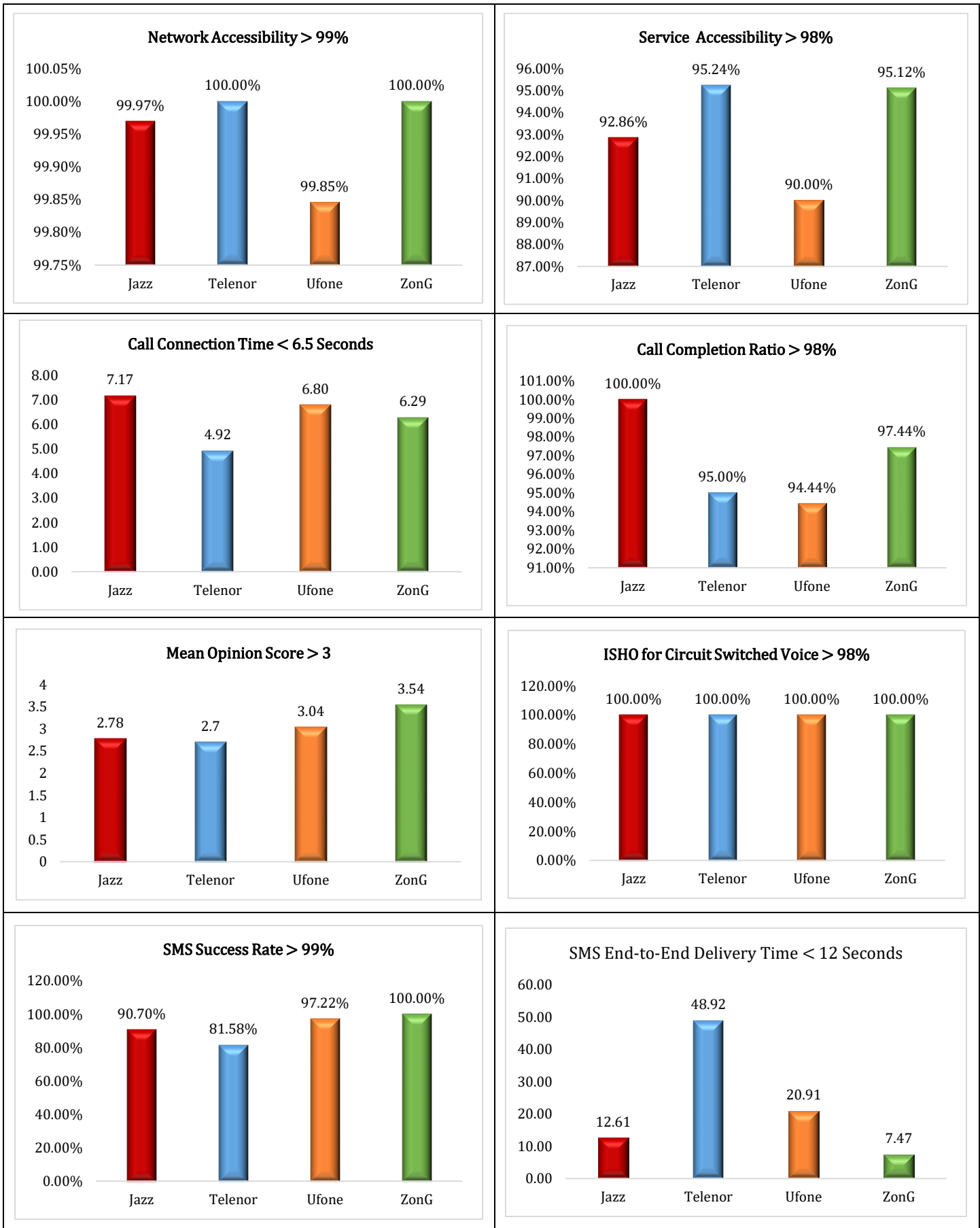
## UFONE 3G COVERAGE (RSCP) - LAHORE TO NARROWAL



## ZONG 3G COVERAGE (RSCP) - LAHORE TO NARROWAL

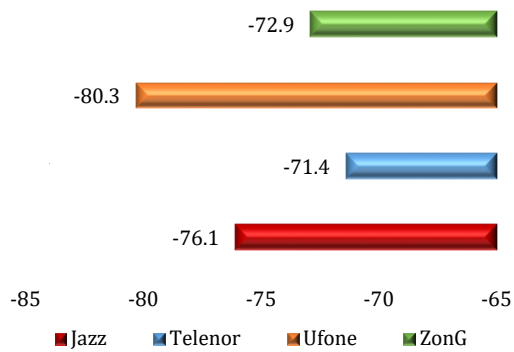


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO NARROWAL

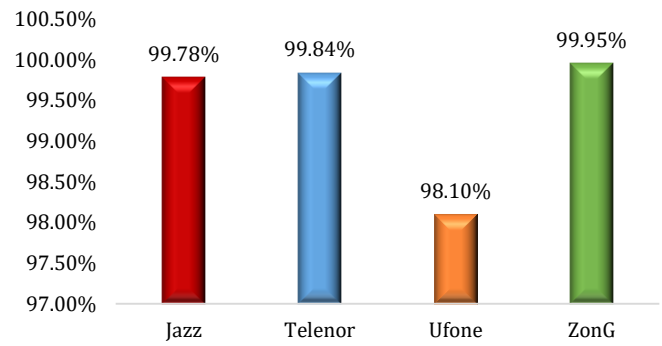


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO NARROWAL

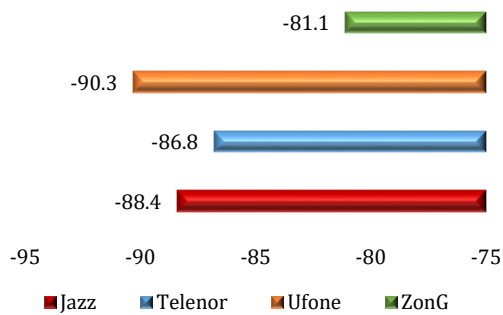
**3G Signal Strength (RSCP) > -100dBm**



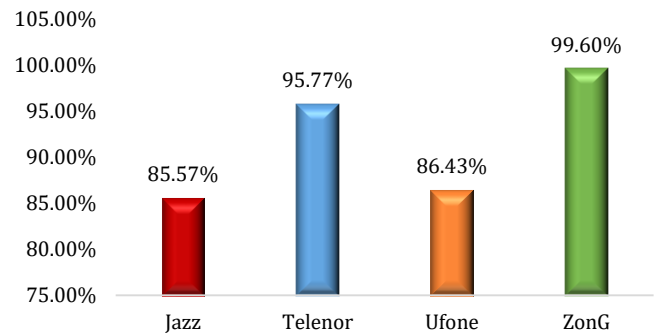
**3G Signal Strength (RSCP) Confidencel Level > 90%**



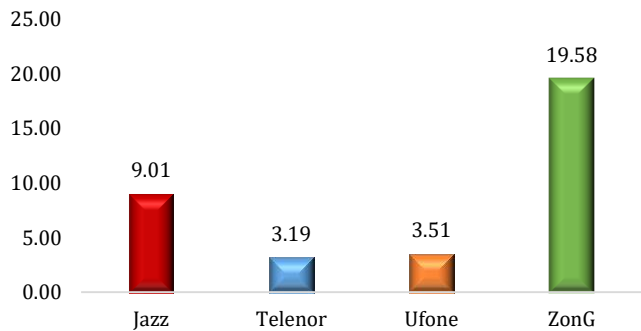
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



**User Data Throughput (4G) > 2Mbps**

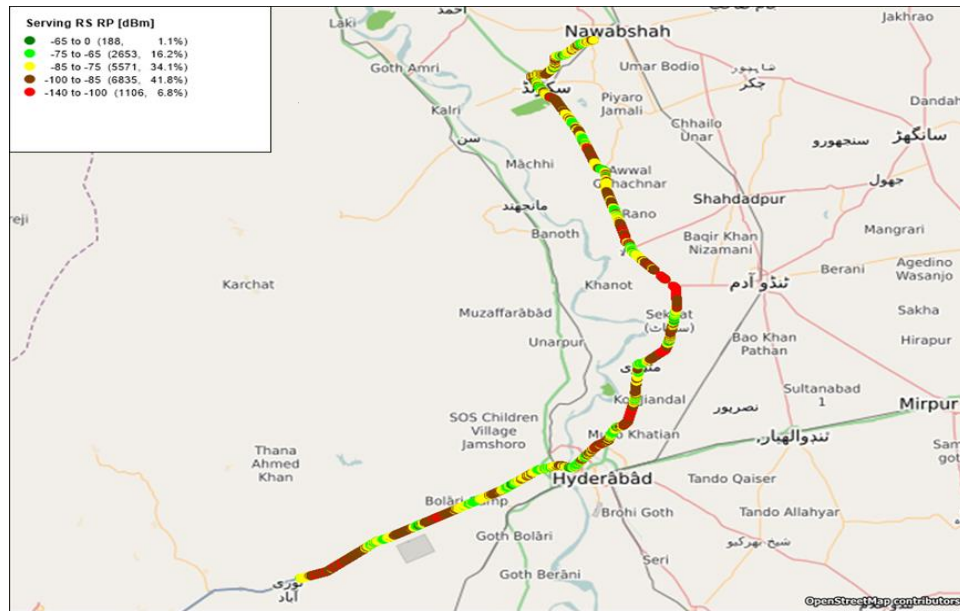




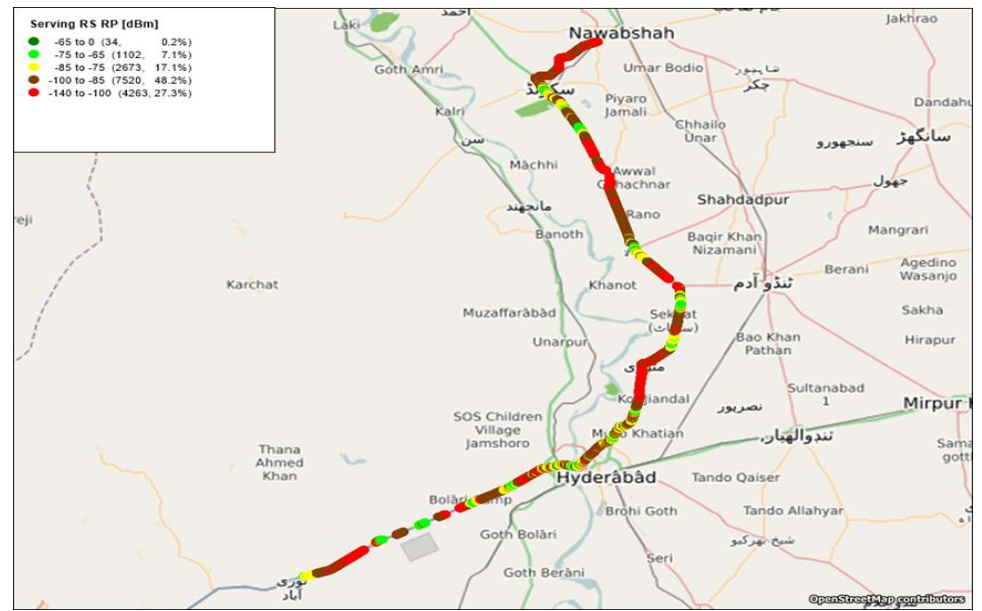
**SINDH**

# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

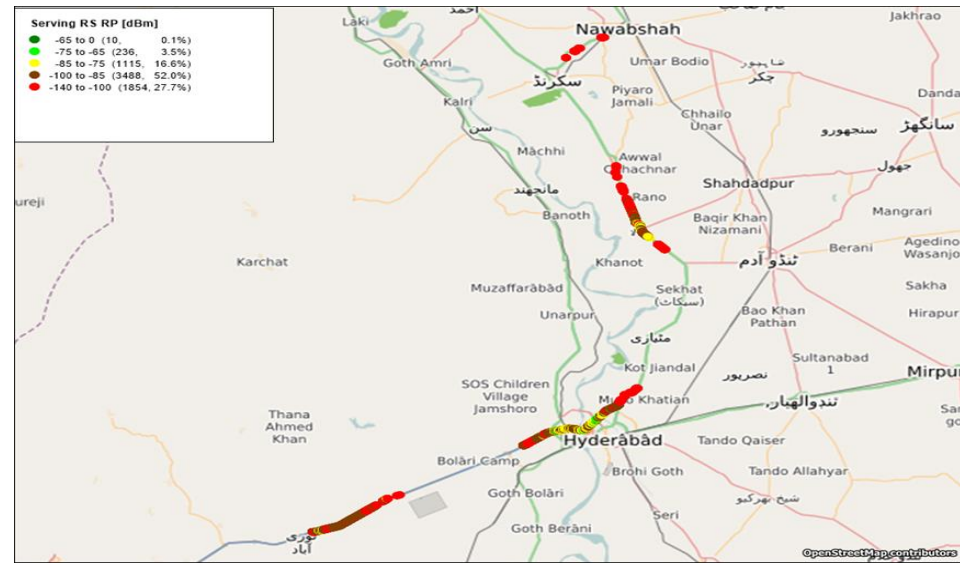
## JAZZ 4G COVERAGE (RSRP) - KARACHI TO NAWABSHAH



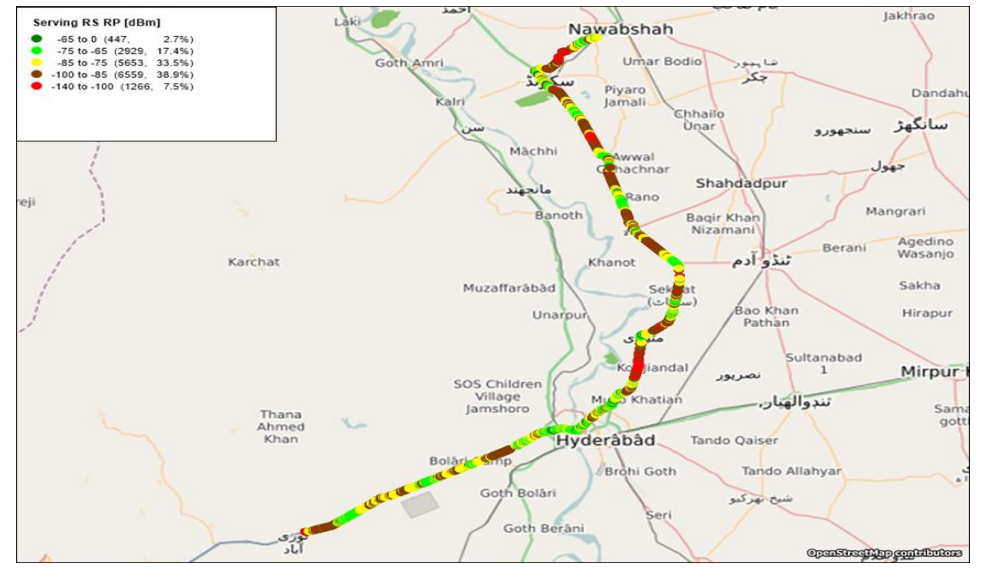
## TELENOR 4G COVERAGE (RSRP) - KARACHI TO NAWABSHAH



## UFONE 4G COVERAGE (RSRP) - KARACHI TO NAWABSHAH

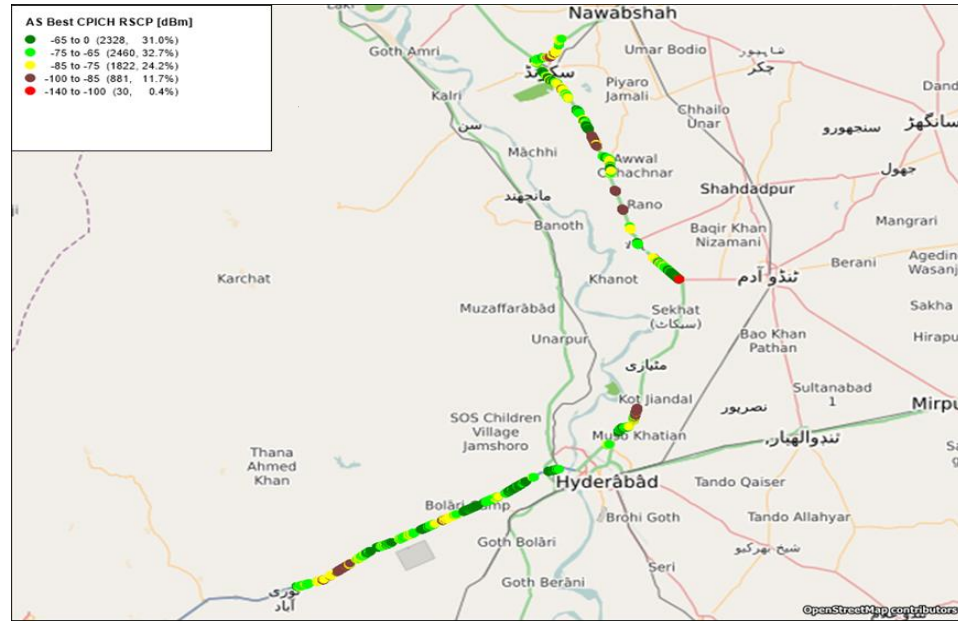


## ZONG 4G COVERAGE (RSRP) - KARACHI TO NAWABSHAH

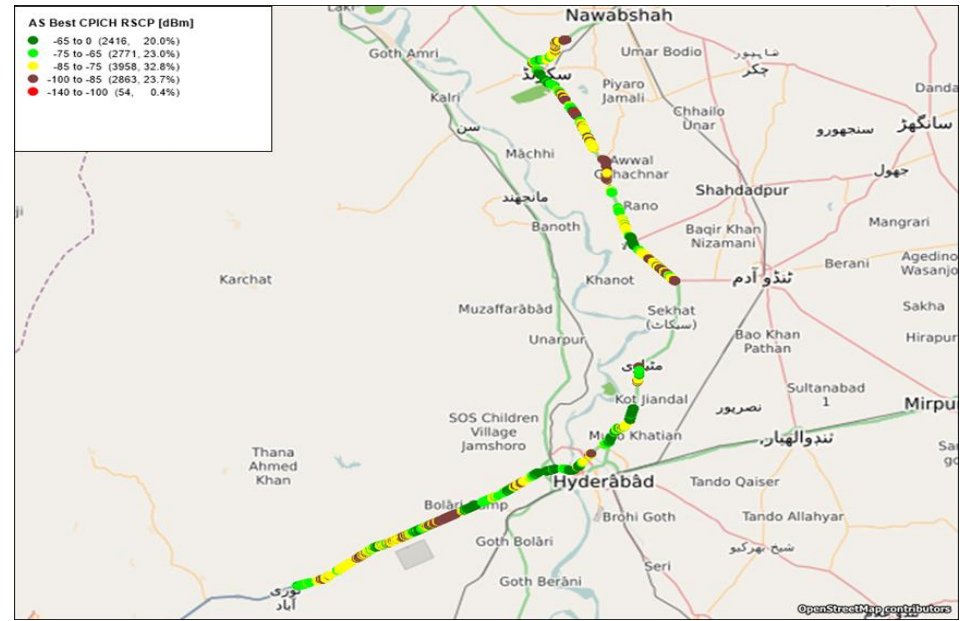


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

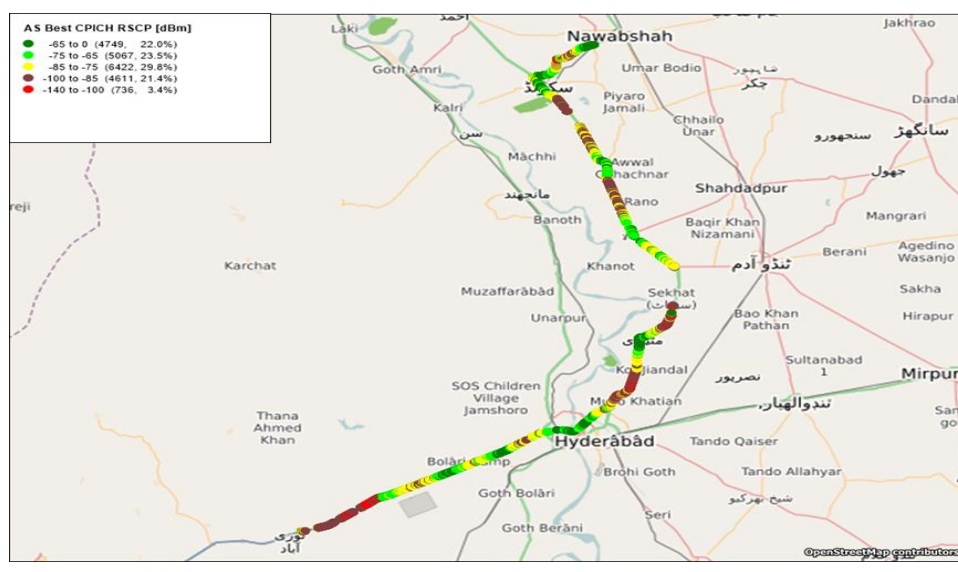
## JAZZ 3G COVERAGE (RSCP) - KARACHI TO NAWABSHAH



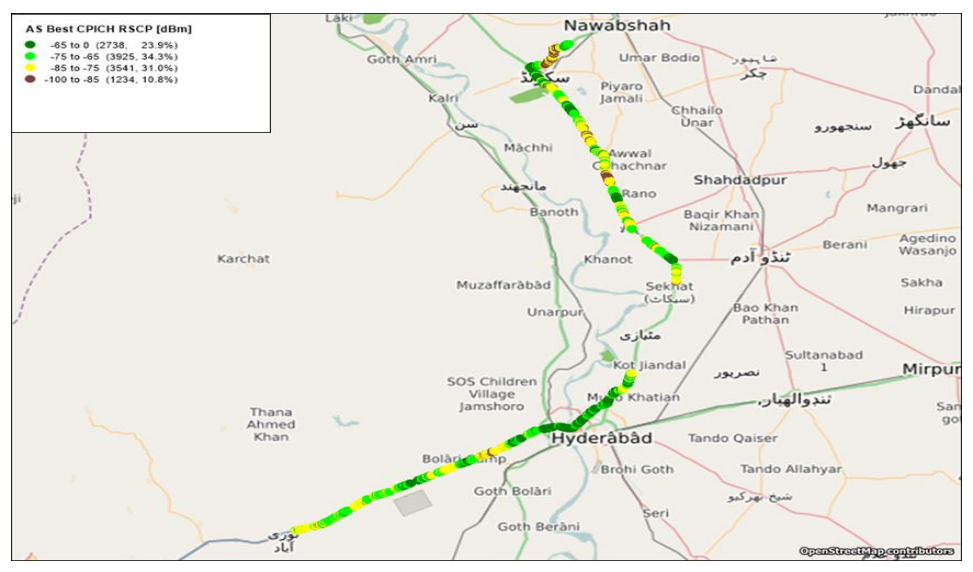
## TELENOR 3G COVERAGE (RSCP) - KARACHI TO NAWABSHAH



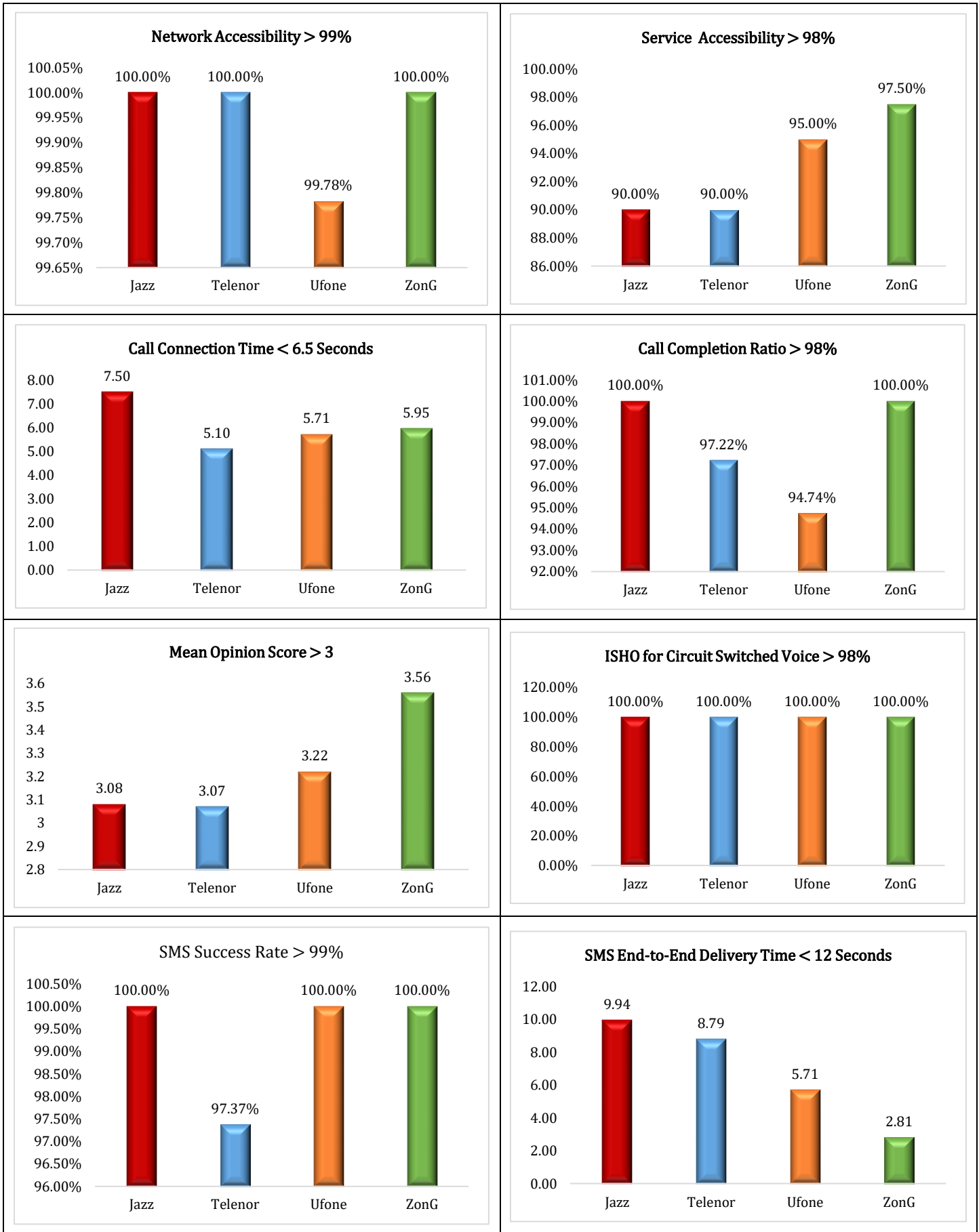
## UFONE 3G COVERAGE (RSCP) - KARACHI TO NAWABSHAH



## ZONG 3G COVERAGE (RSCP) - KARACHI TO NAWABSHAH

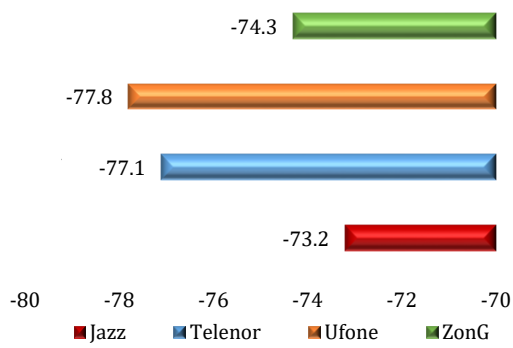


## QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO NAWABSHAH

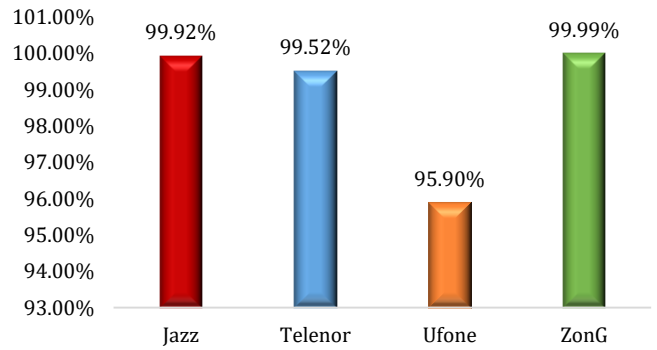


## QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO NAWABSHAH

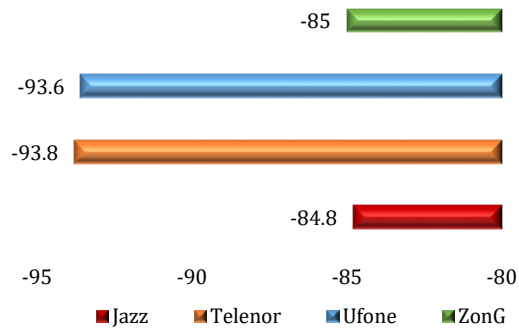
**3G Signal Strength (RSCP) > -100dBm**



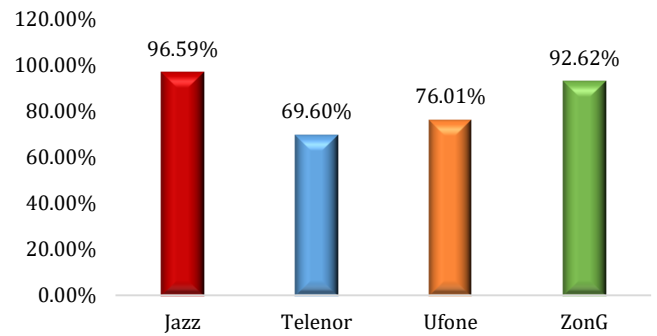
**3G Signal Strength (RSCP) Confidencel Level > 90%**



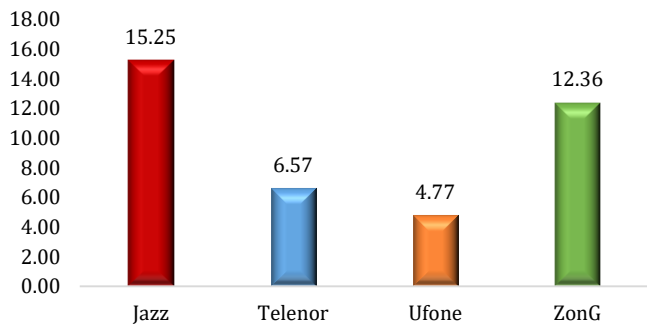
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



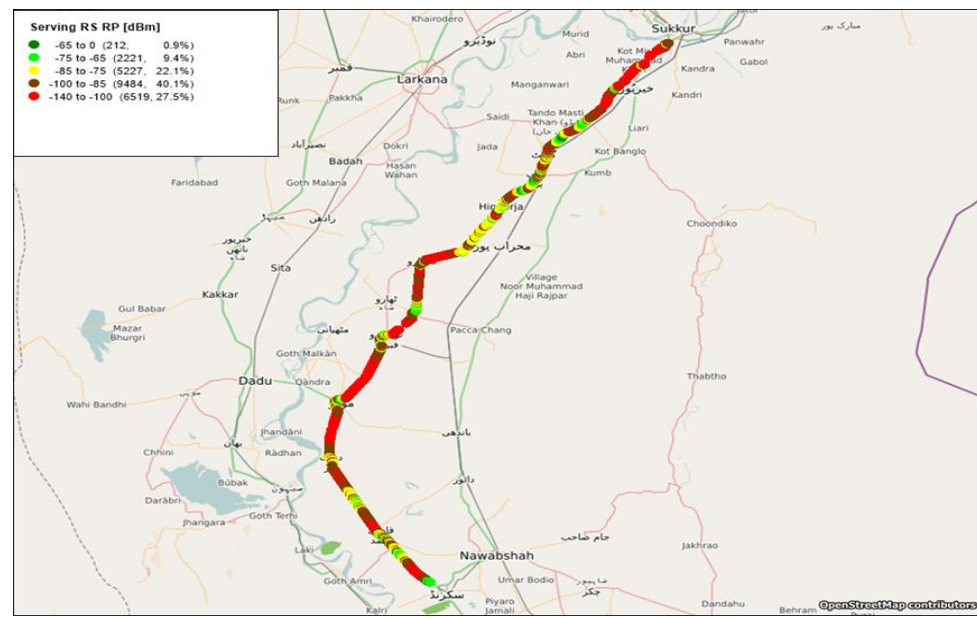
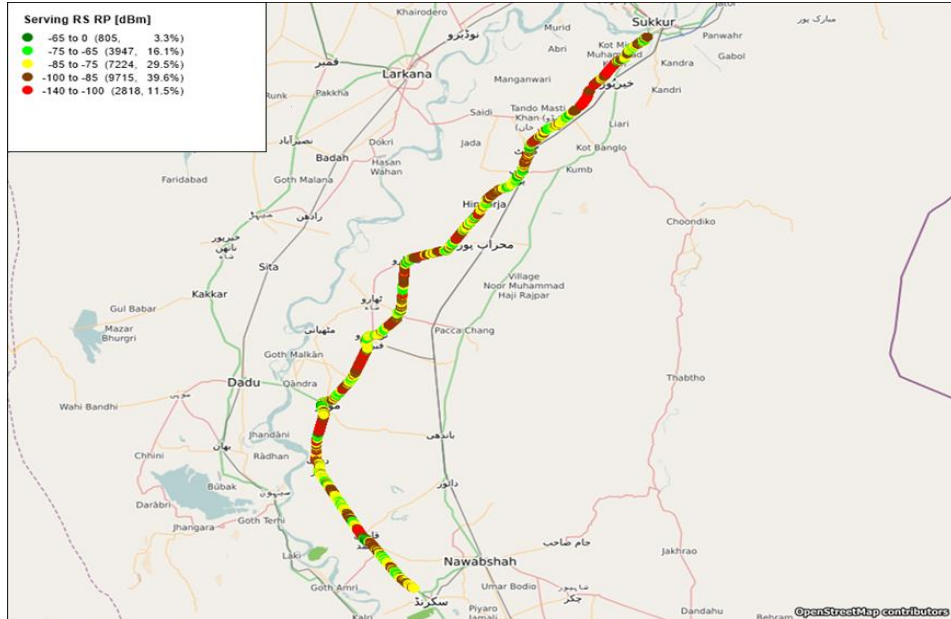
**User Data Throughput (4G) > 2Mbps**



# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

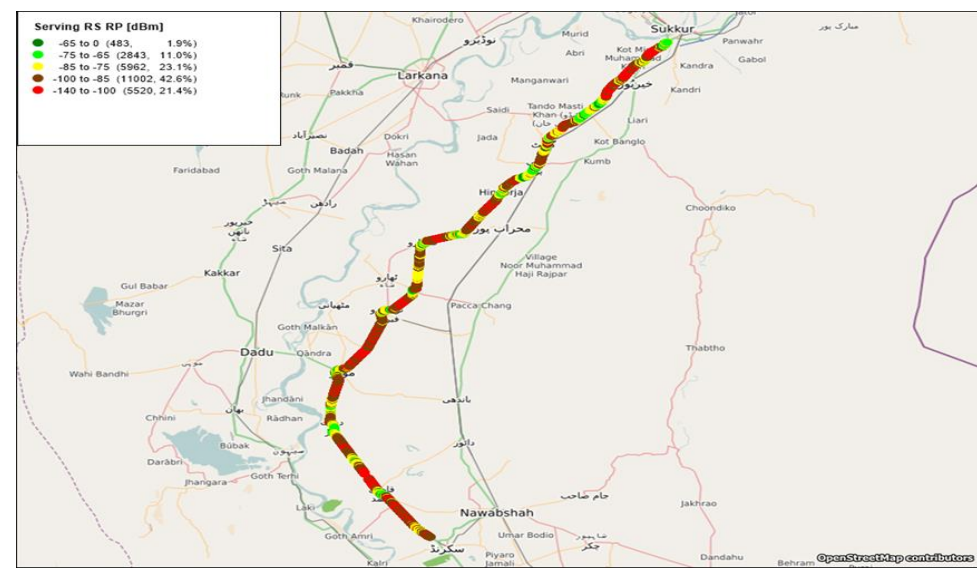
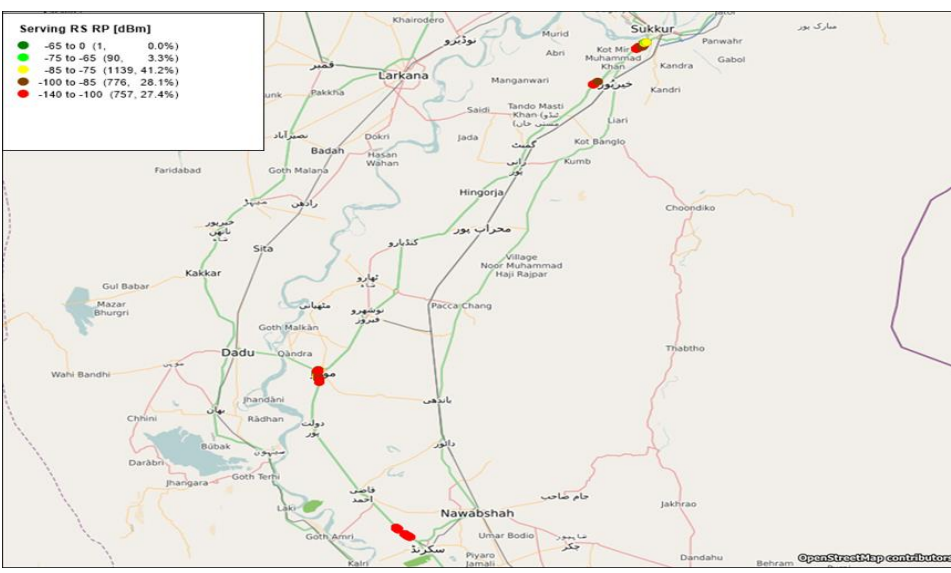
## JAZZ 4G COVERAGE (RSRP) – SUKKUR TO NAWABSHAH

## TELENOR 4G COVERAGE (RSRP) - SUKKUR TO NAWABSHAH



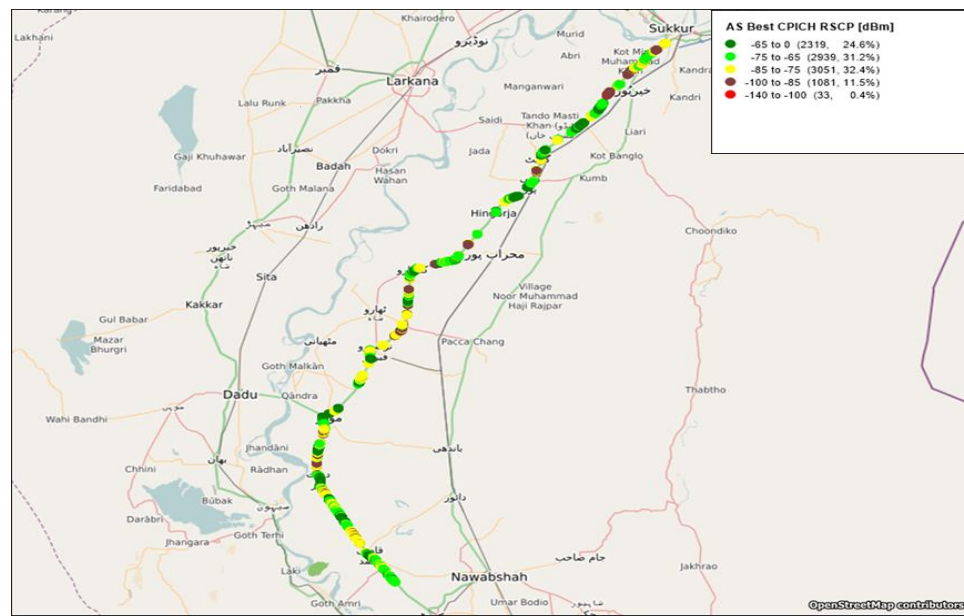
## UFONE 4G COVERAGE (RSRP) – SUKKUR TO NAWABSHAH

## ZONG 4G COVERAGE (RSRP) - SUKKUR TO NAWABSHAH

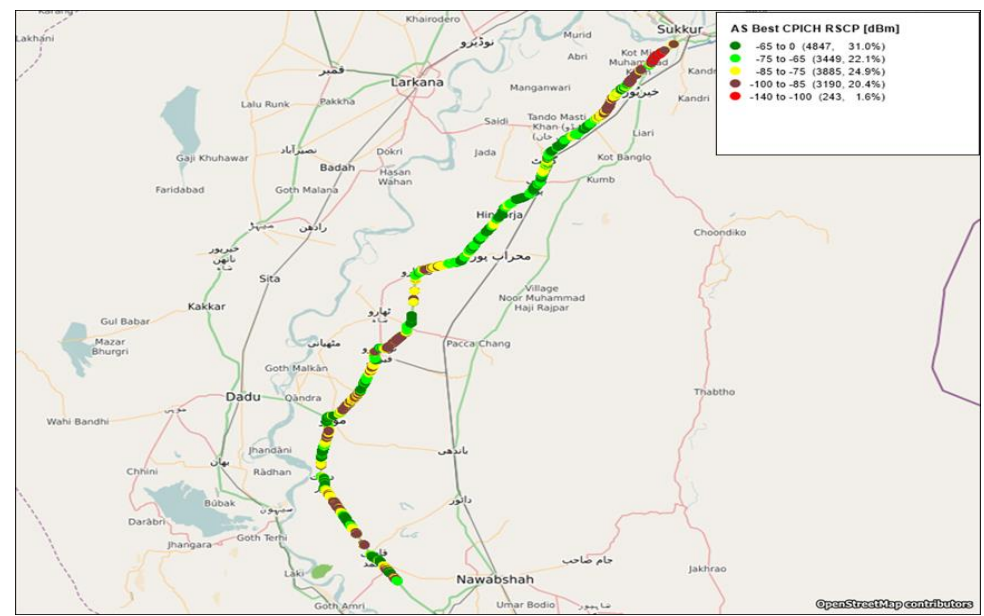


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

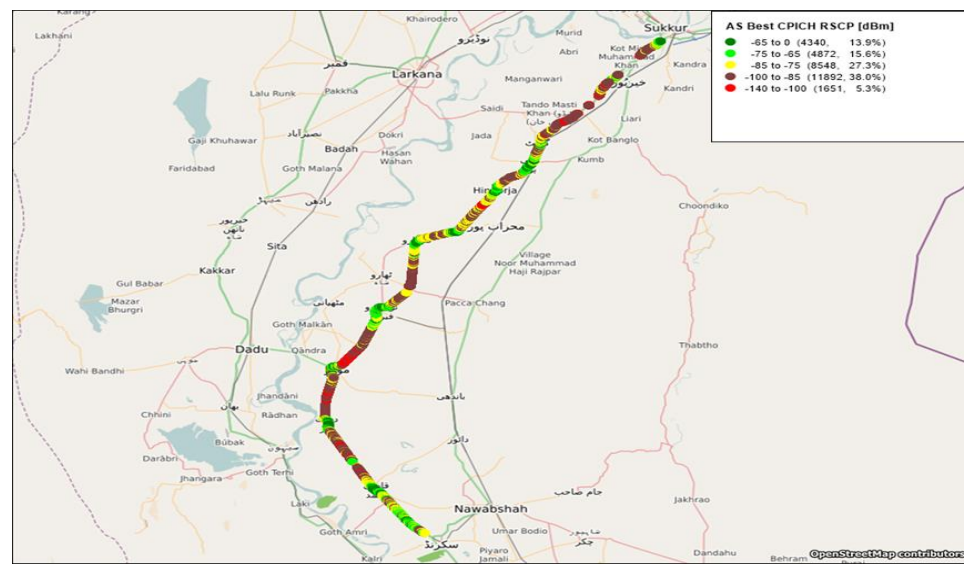
## JAZZ 3G COVERAGE (RSCP) – SUKKUR TO NAWABSHAH



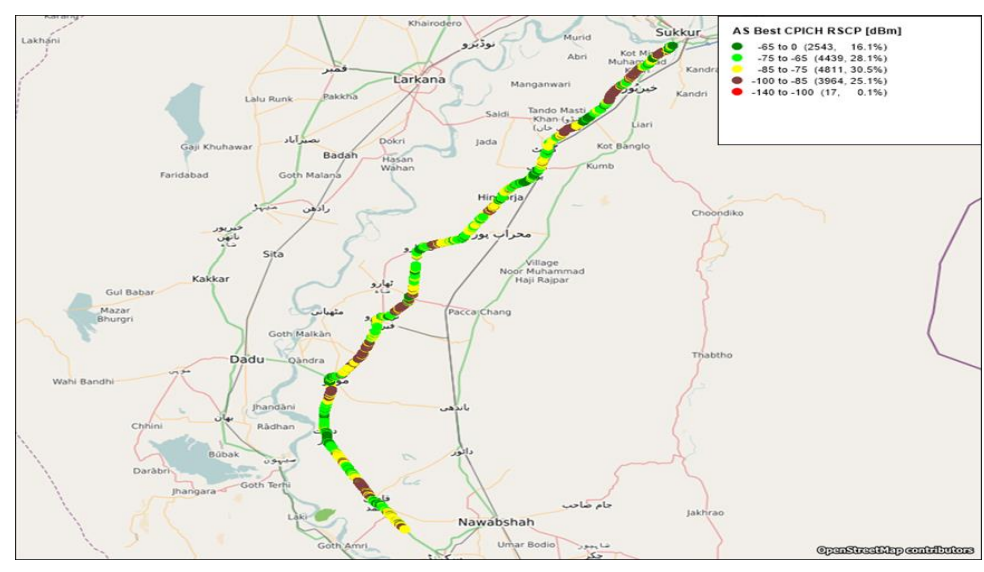
## TELEOR 3G COVERAGE (RSCP) - SUKKUR TO NAWABSHAH



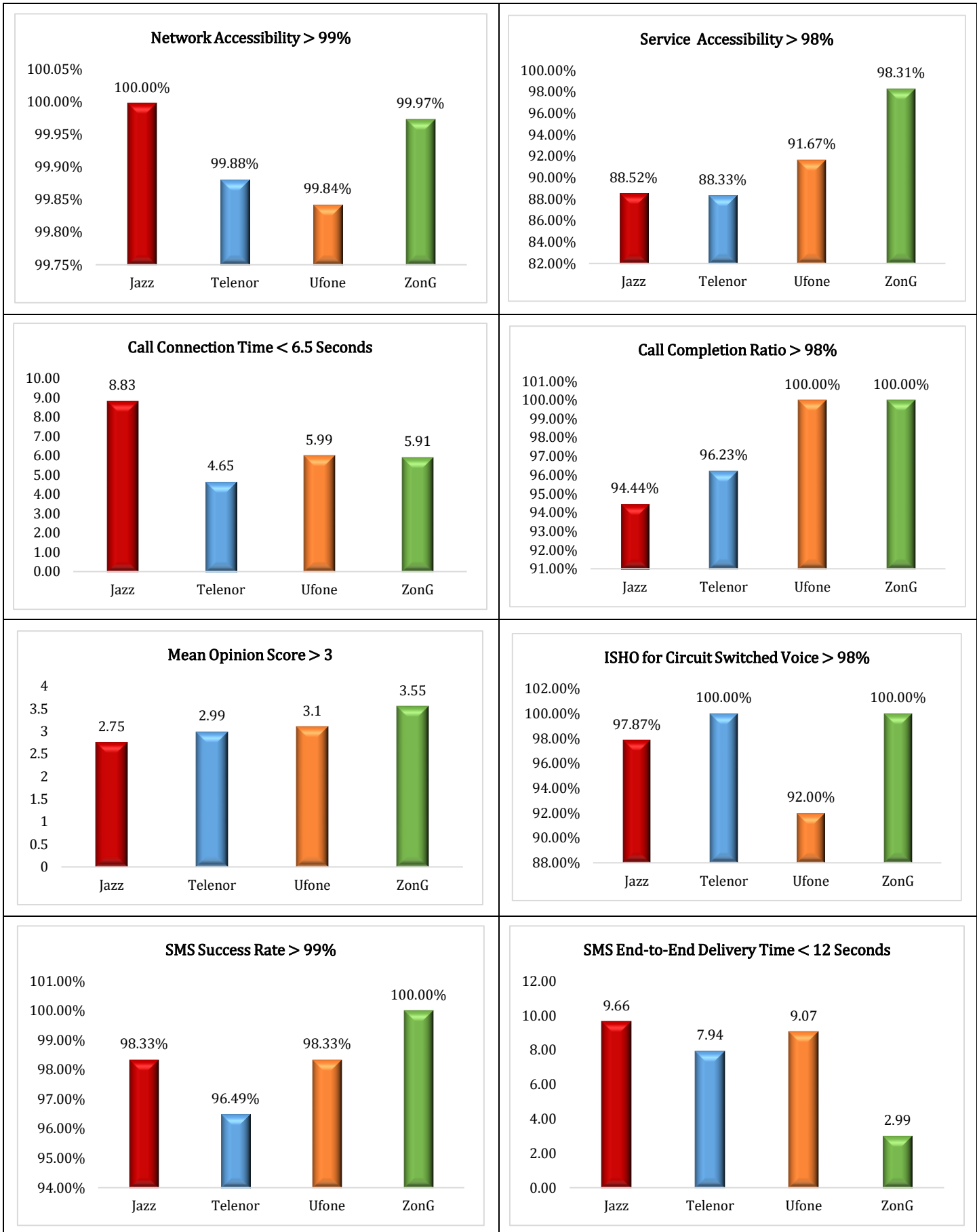
## UFONE 3G COVERAGE (RSCP) – SUKKUR TO NAWABSHAH



## ZONG 3G COVERAGE (RSCP) - SUKKUR TO NAWABSHAH



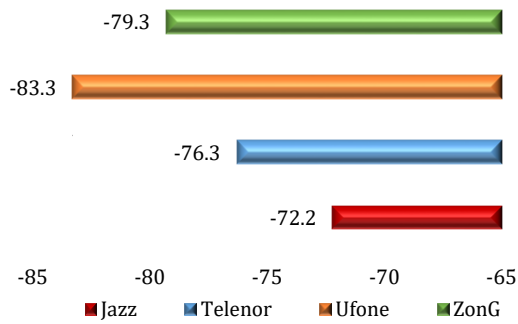
## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO NAWABSHAH



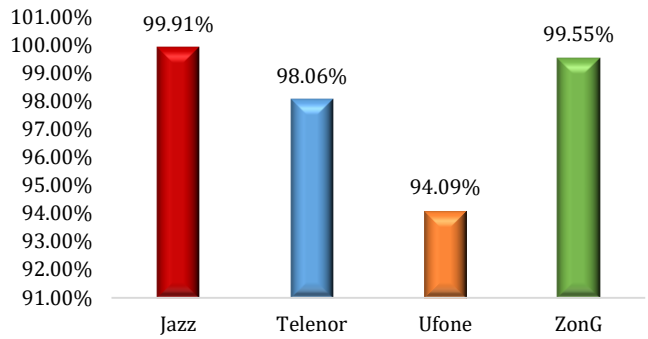


## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO NAWABSHAH

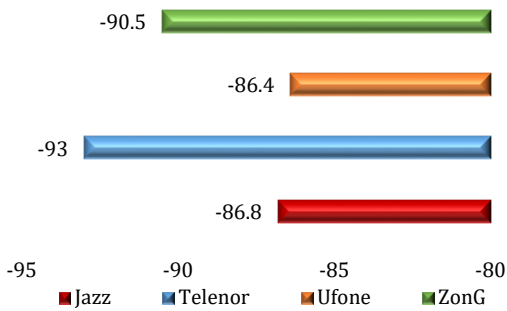
**3G Signal Strength (RSCP) > -100dBm**



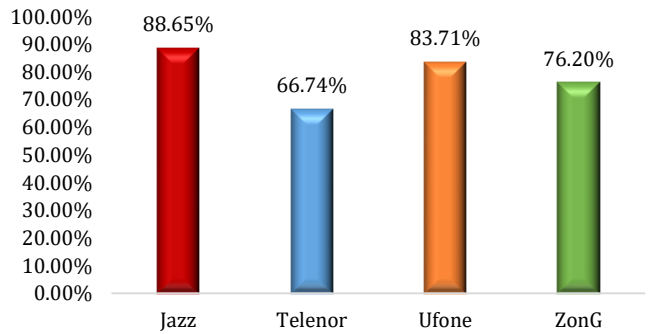
**3G Signal Strength (RSCP) Confidencel Level > 90%**



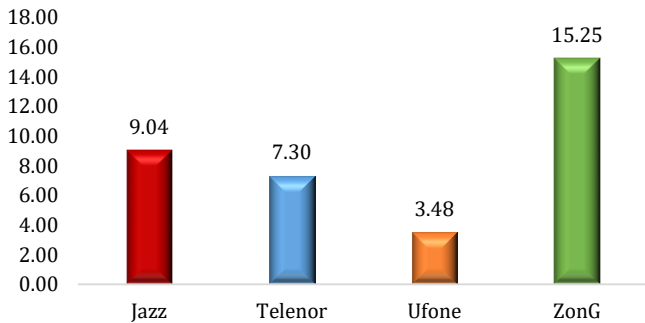
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

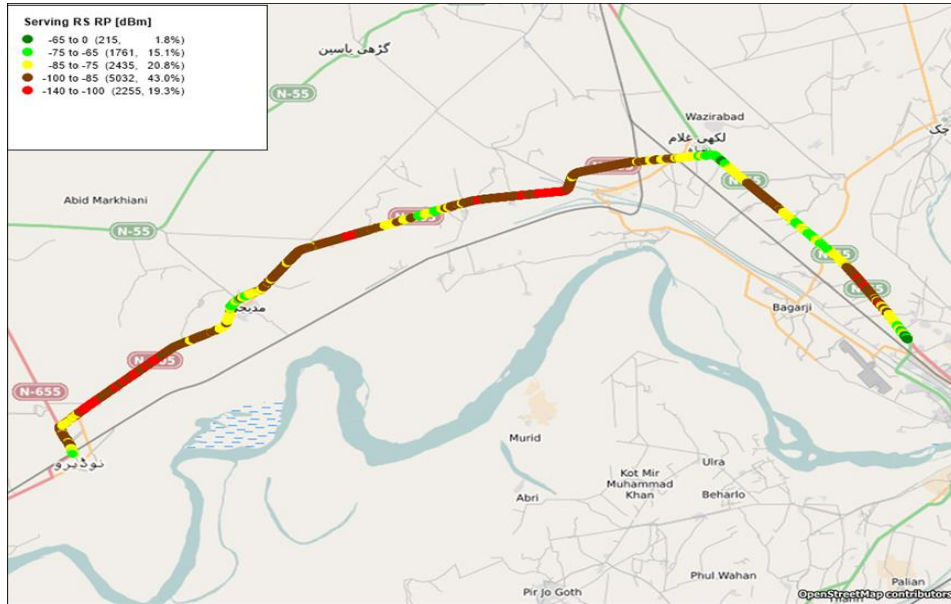


**User Data Throughput (4G) > 2Mbps**



# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

## JAZZ 4G COVERAGE (RSRP) - SUKKUR TO LARKANA



## TELENOR 4G COVERAGE (RSRP) - SUKKUR TO LARKANA



## UFONE 4G COVERAGE (RSRP) - SUKKUR TO LARKANA



## ZONG 4G COVERAGE (RSRP) - SUKKUR TO LARKANA

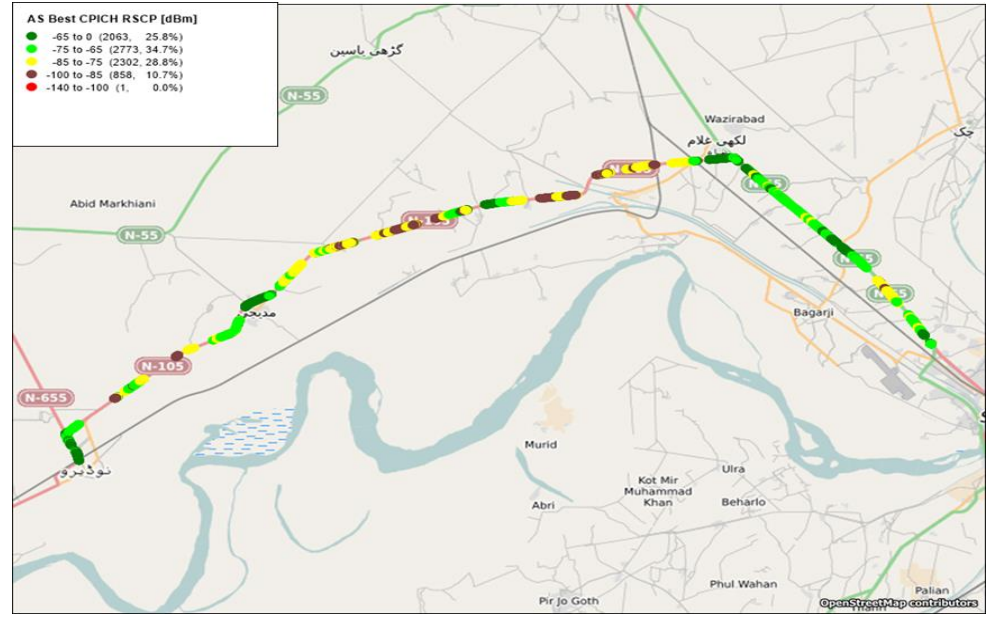


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

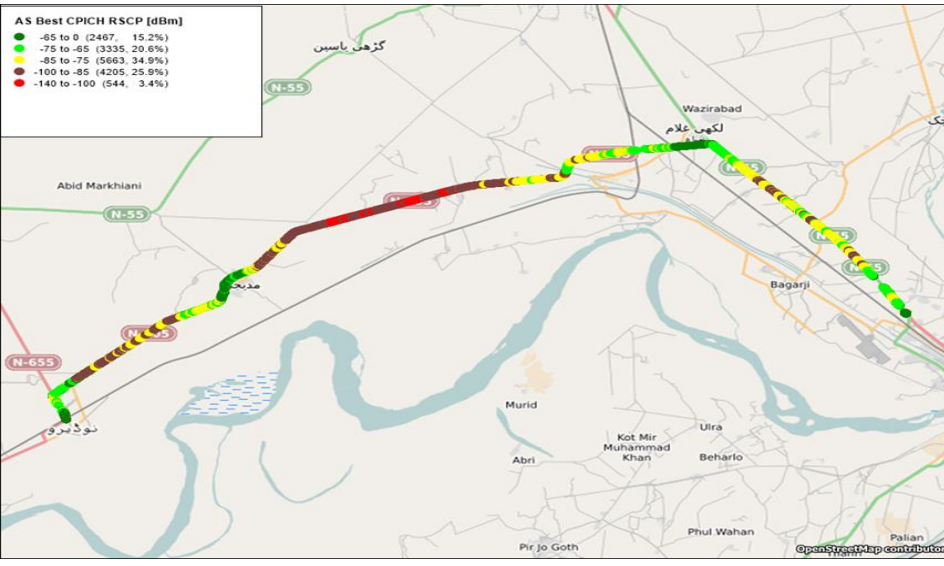
## JAZZ 3G COVERAGE (RSCP) - SUKKUR TO LARKANA



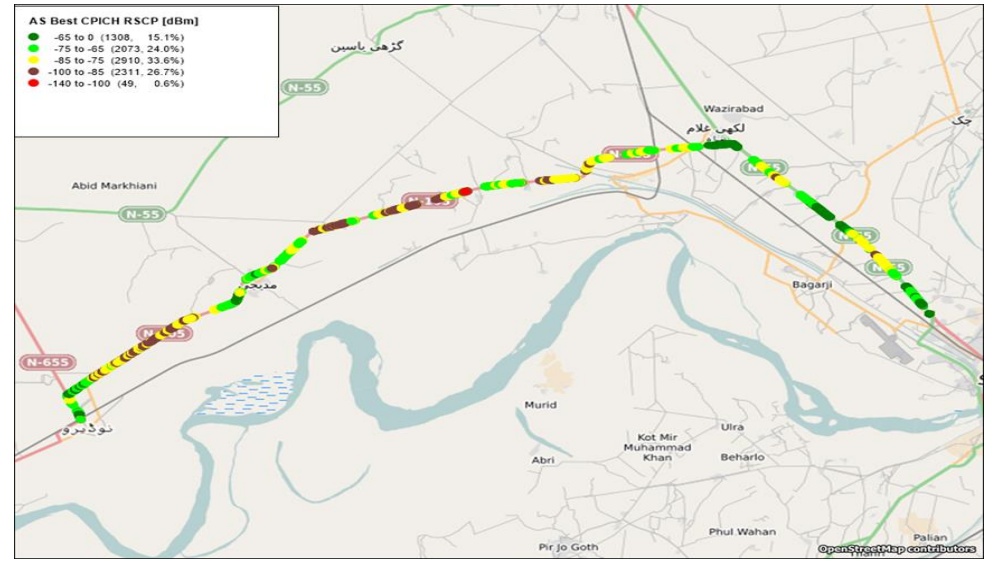
## TELENOR 3G COVERAGE (RSCP) - SUKKUR TO LARKANA



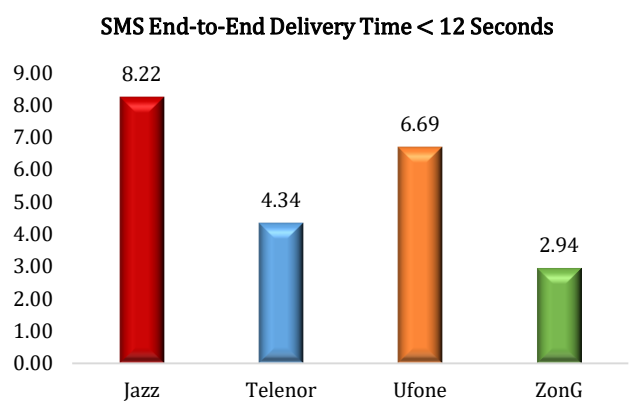
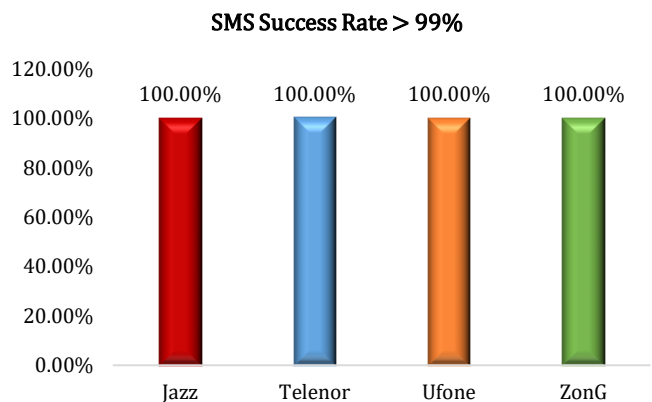
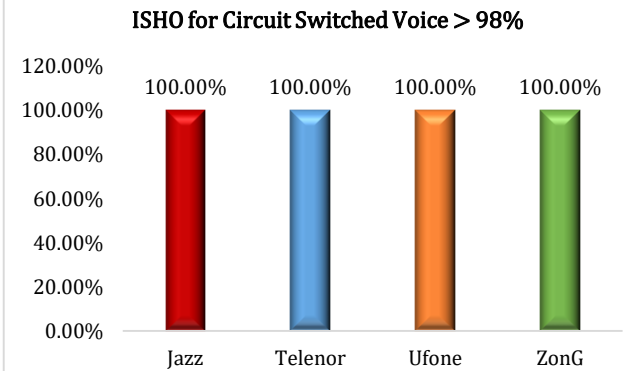
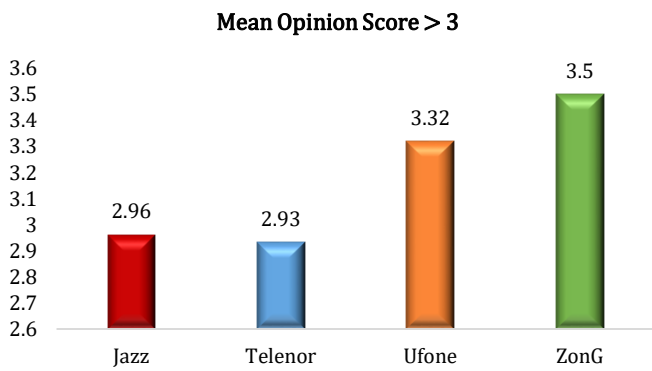
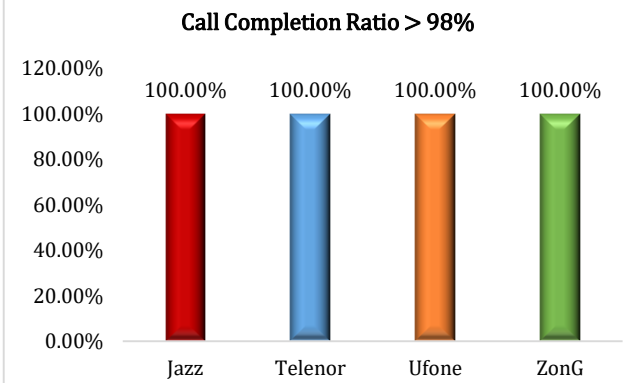
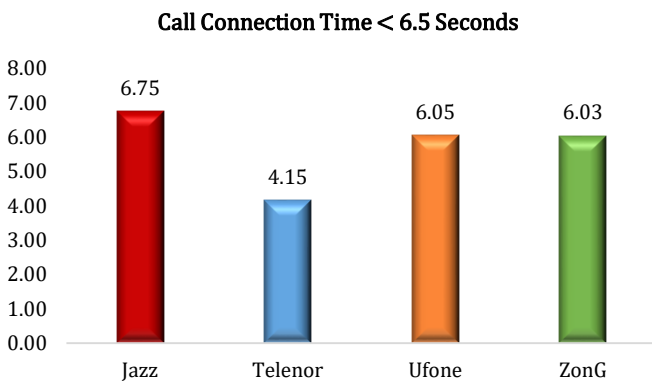
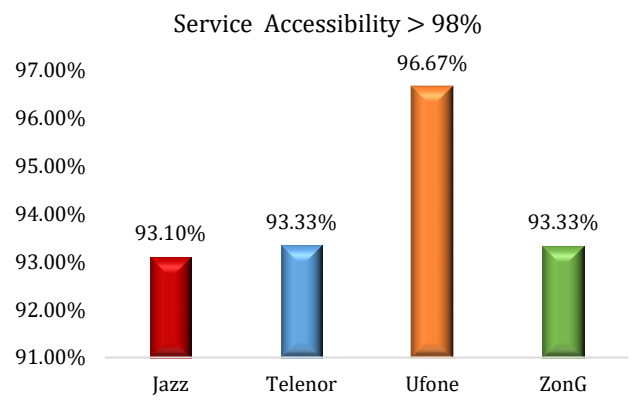
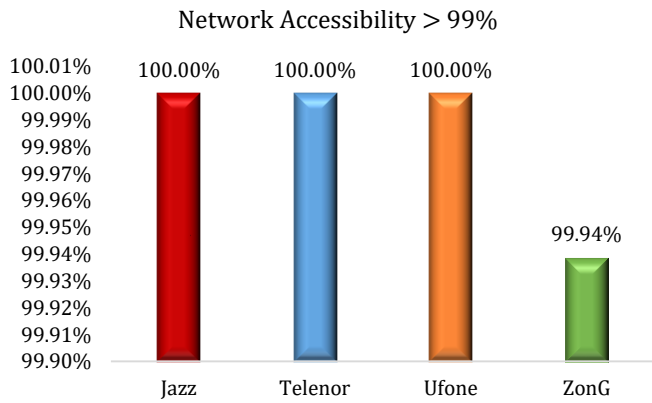
## UFONE 3G COVERAGE (RSCP) - SUKKUR TO LARKANA



## ZONG 3G COVERAGE (RSCP) - SUKKUR TO LARKANA

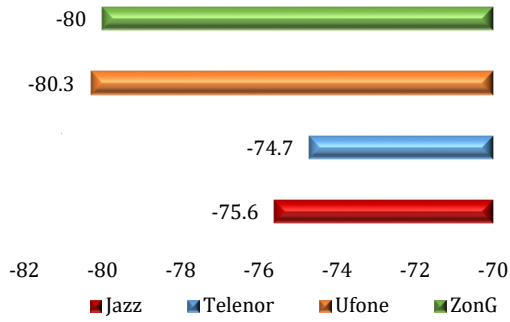


## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO LARKANA

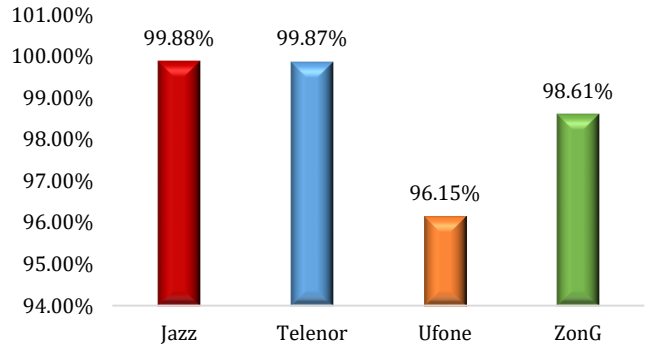


## QUALITY OF SERVICE SURVEY RESULTS – SUKKUR TO LARKANA

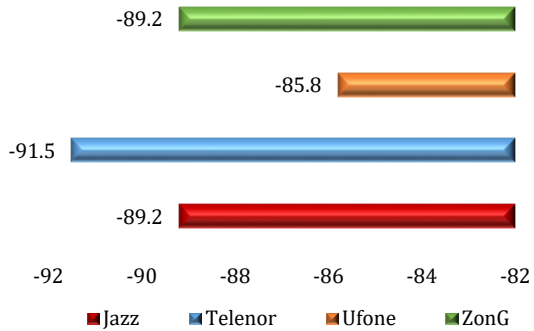
**3G Signal Strength (RSCP) > -100dBm**



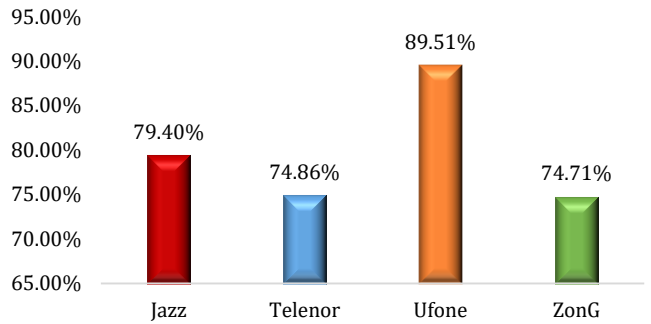
**3G Signal Strength (RSCP) Confidencel Level > 90%**



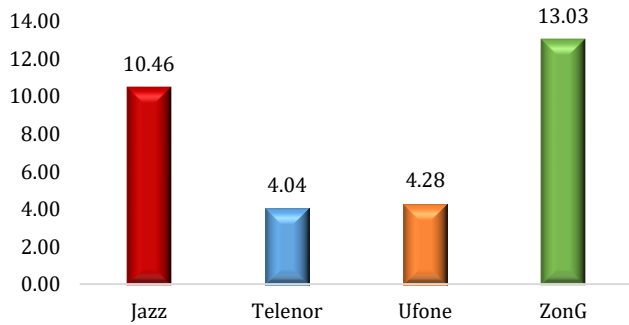
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

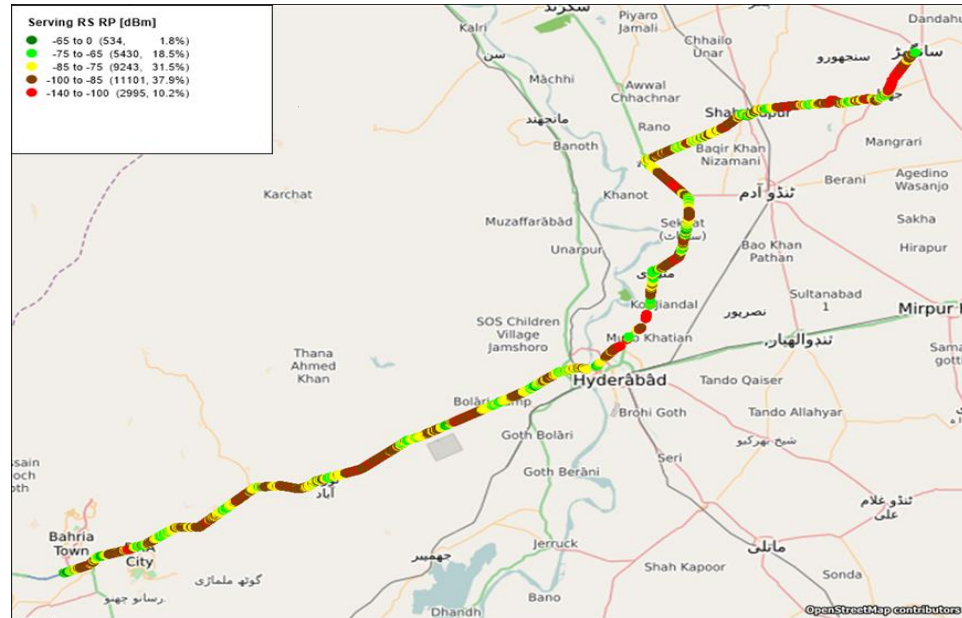


**User Data Throughput (4G) > 2Mbps**

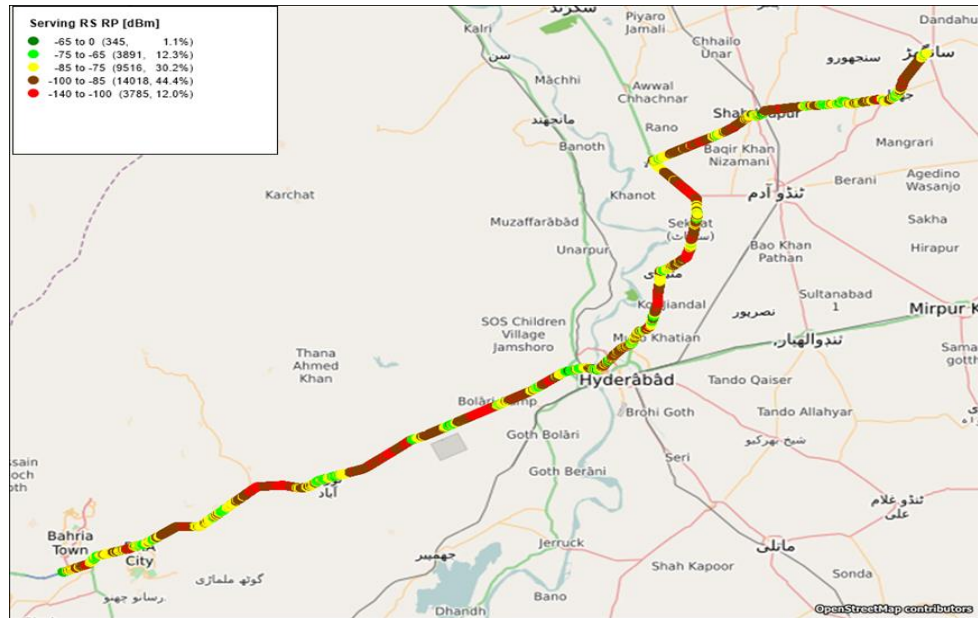


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

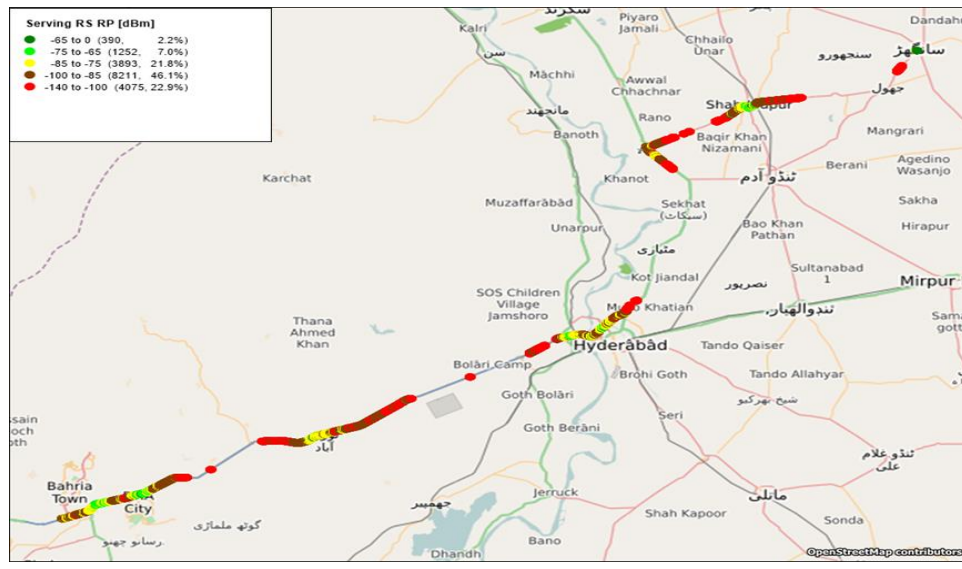
## JAZZ 4G COVERAGE (RSRP) - KARACHI TO SANGHAR



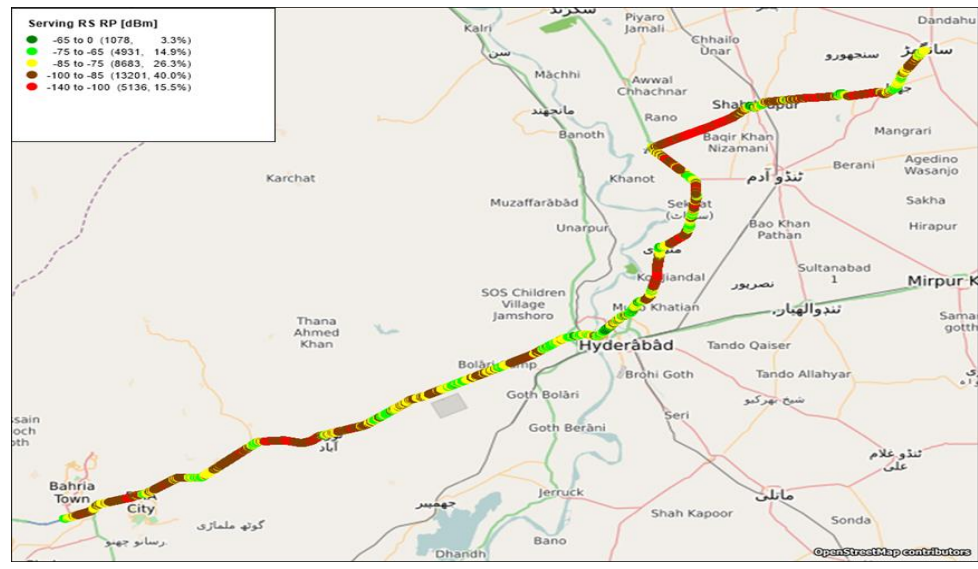
## TELENOR 4G COVERAGE (RSRP) - KARACHI TO SANGHAR



## UFONE 4G COVERAGE (RSRP) - KARACHI TO SANGHAR

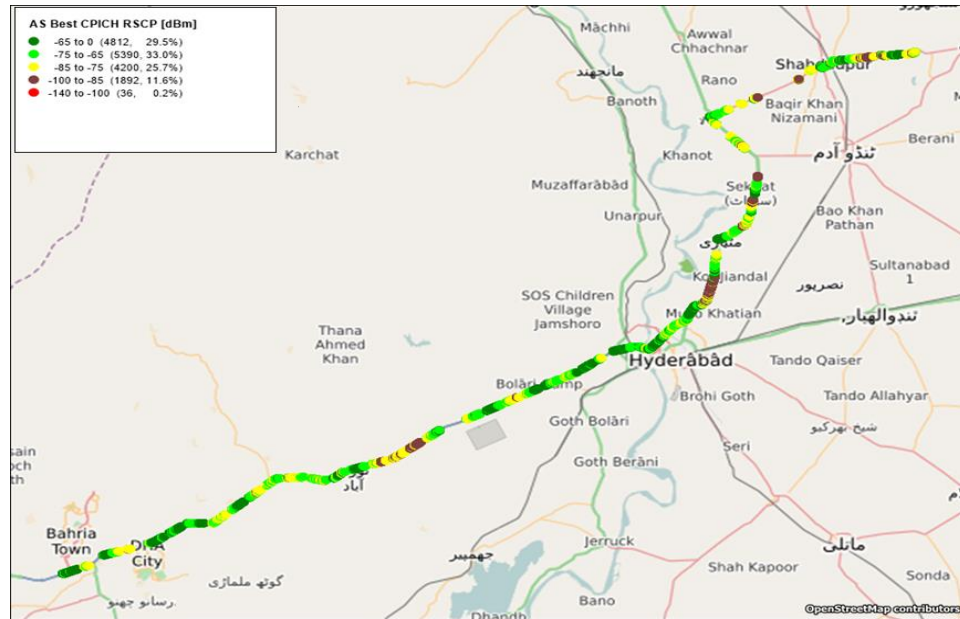


## ZONG 4G COVERAGE (RSRP) - KARACHI TO SANGHAR

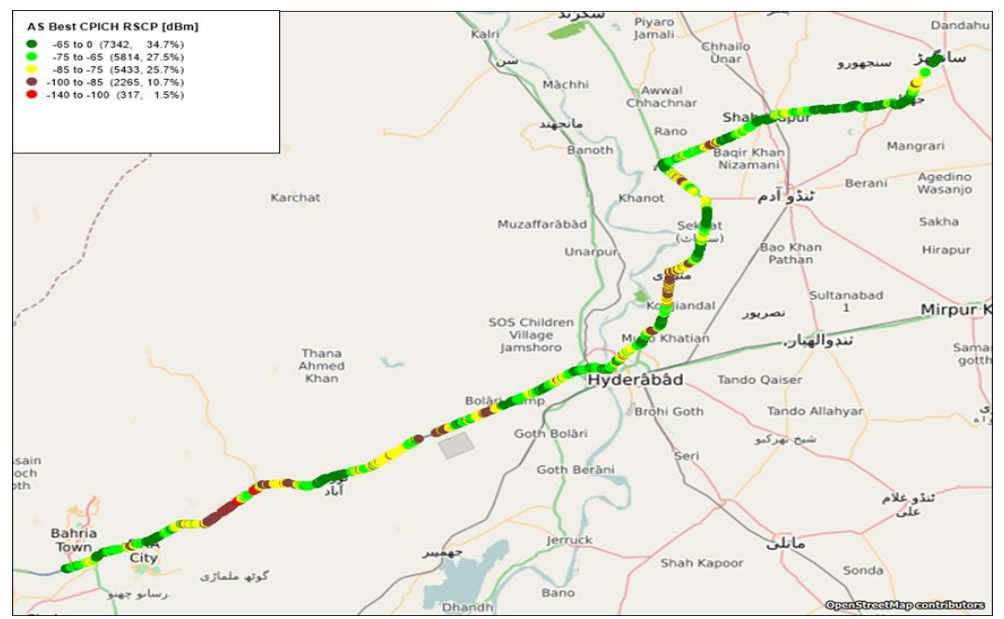


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

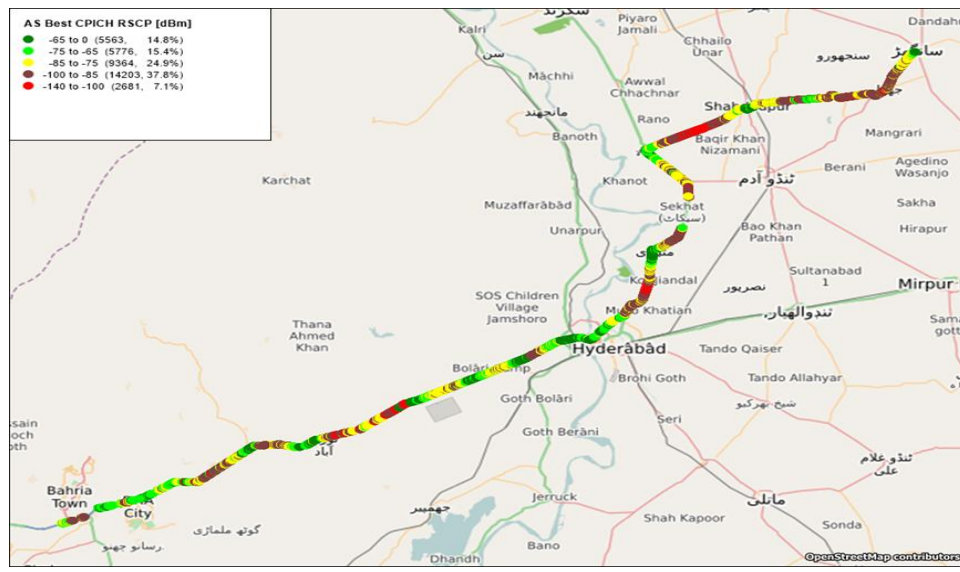
## JAZZ 3G COVERAGE (RSCP) - KARACHI TO SANGHAR



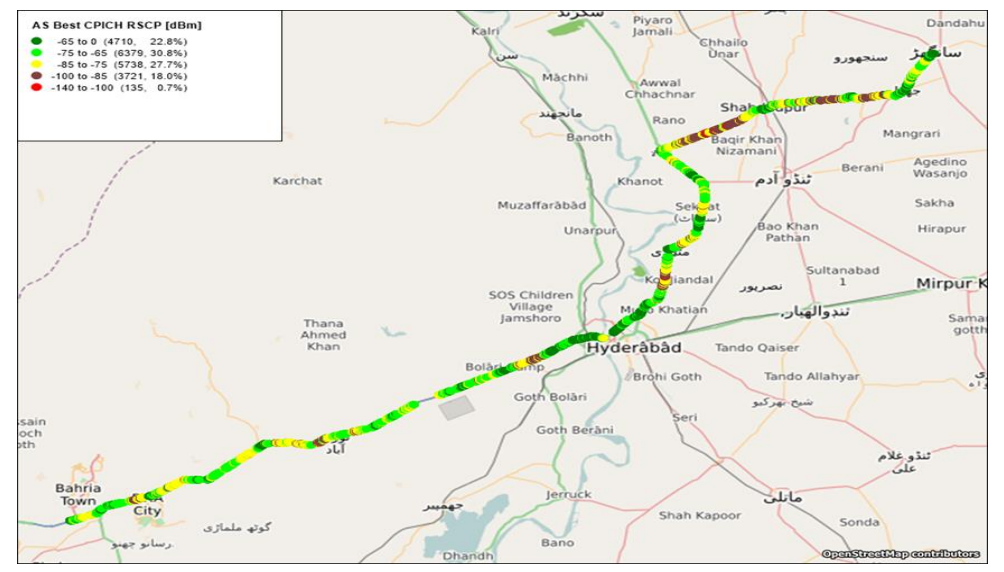
## TELENOR 3G COVERAGE (RSCP) - KARACHI TO SANGHAR



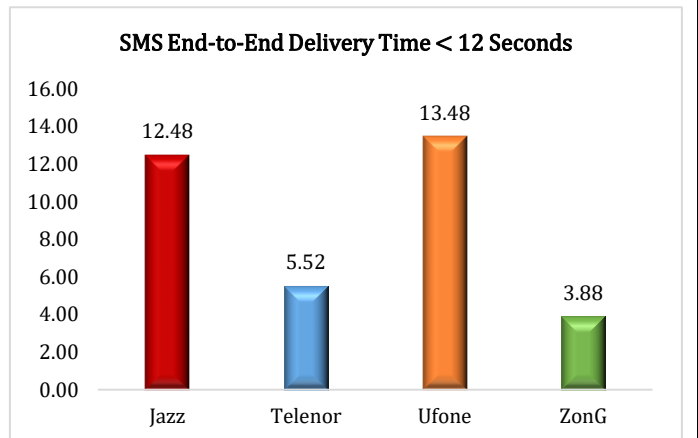
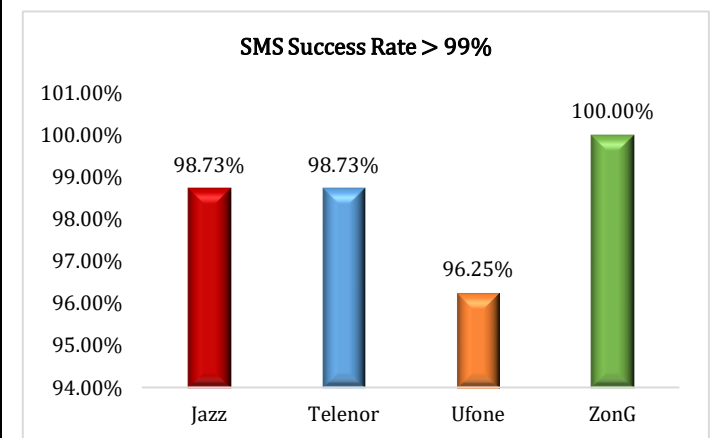
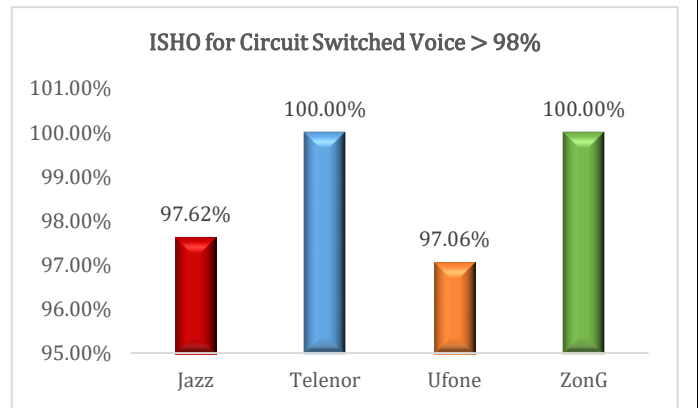
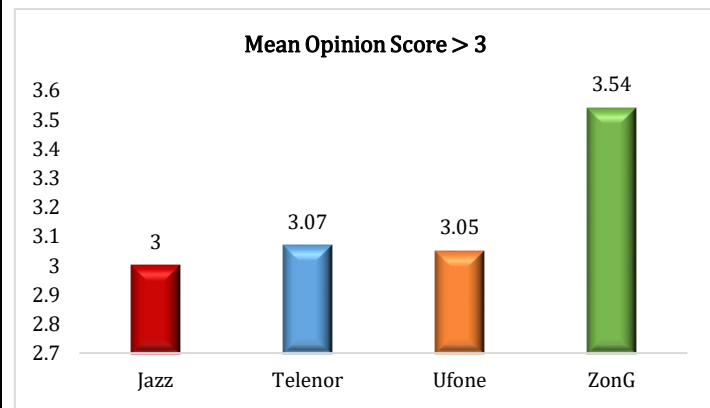
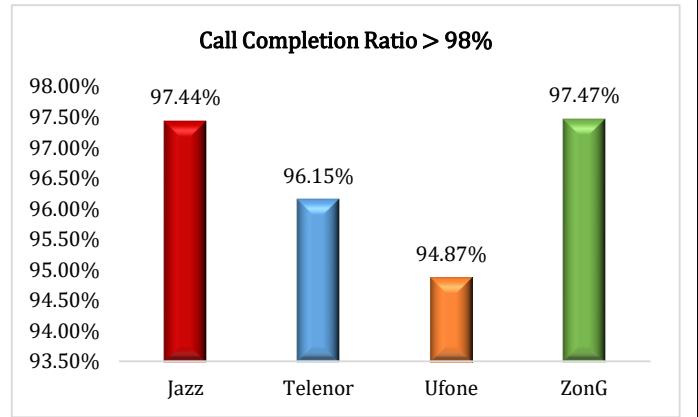
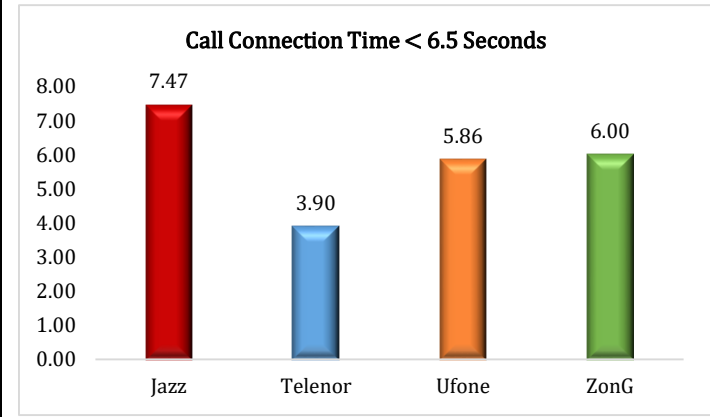
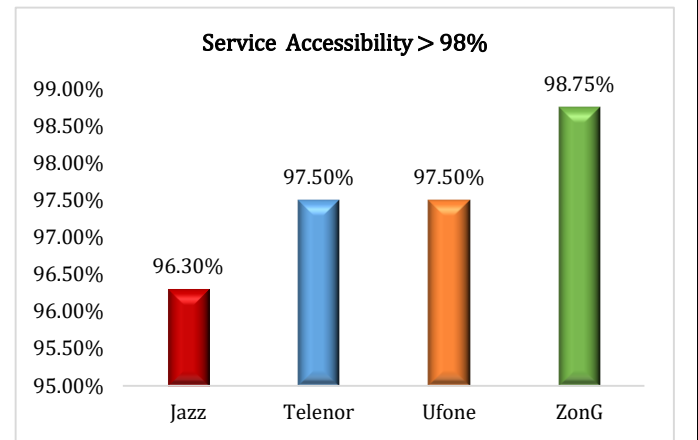
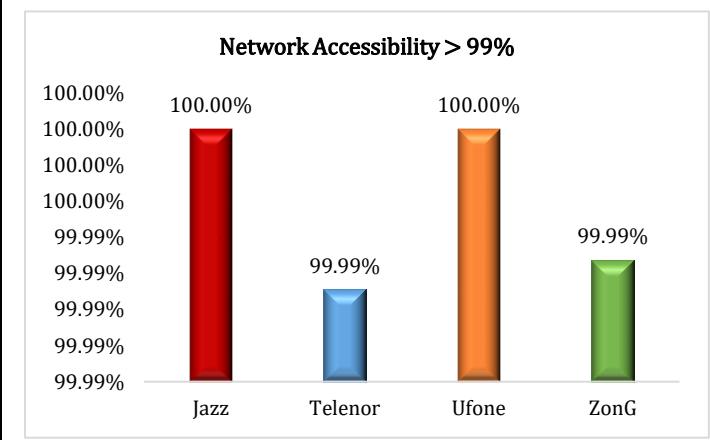
## UFONE 3G COVERAGE (RSCP) - KARACHI TO SANGHAR



## ZONG 3G COVERAGE (RSCP) - KARACHI TO SANGHAR



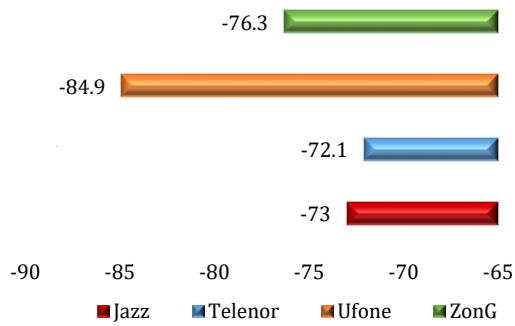
# QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO SANGHAR



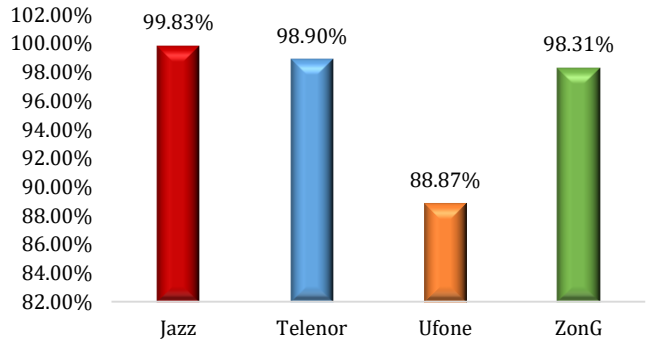


# QUALITY OF SERVICE SURVEY RESULTS – KARACHI TO SANGHAR

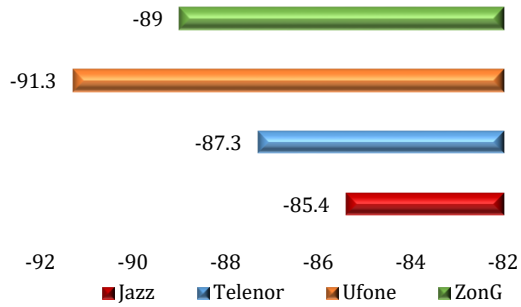
**3G Signal Strength (RSCP) > -100dBm**



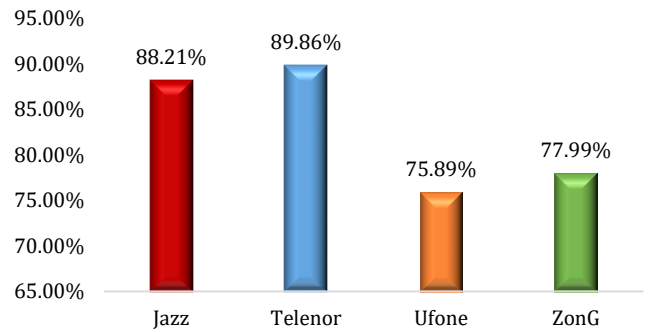
**3G Signal Strength (RSCP) Confidencel Level > 90%**



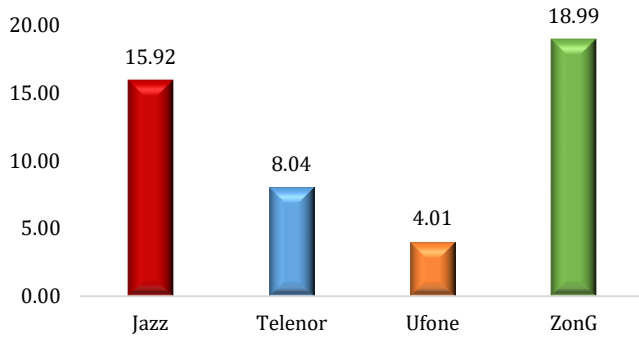
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

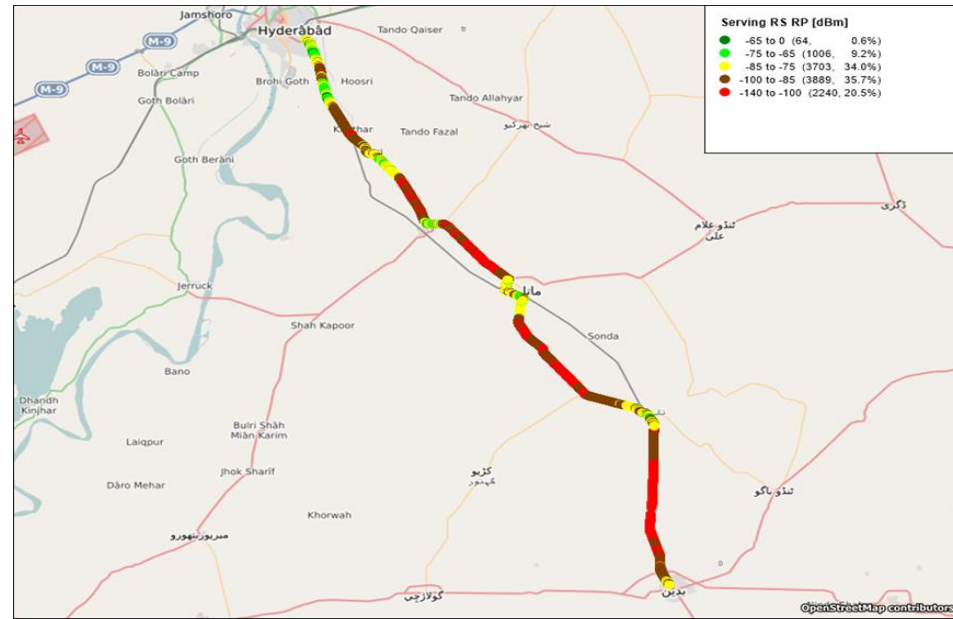


**User Data Throughput (4G) > 2Mbps**

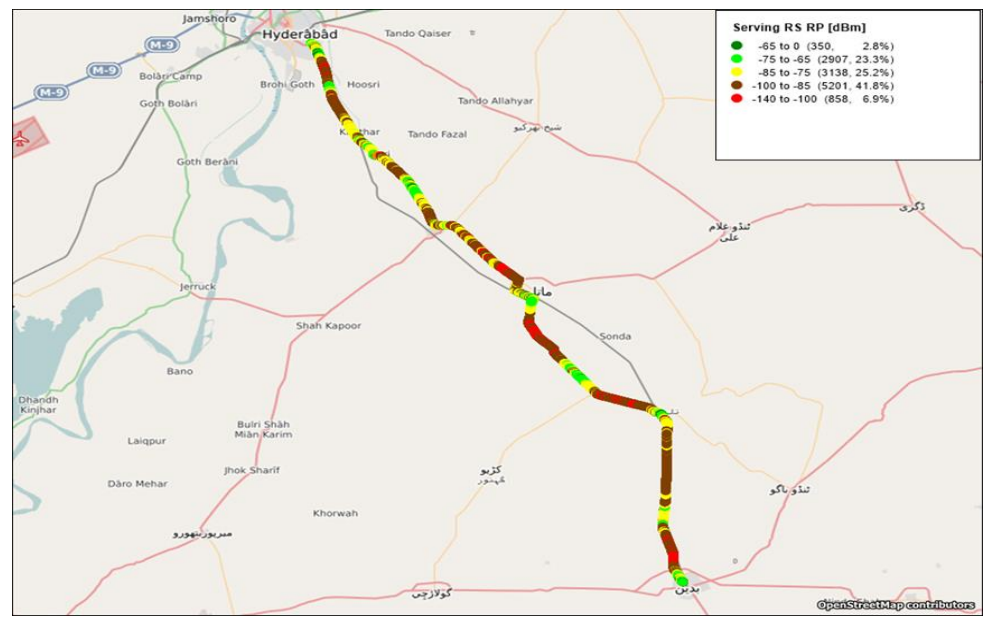


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

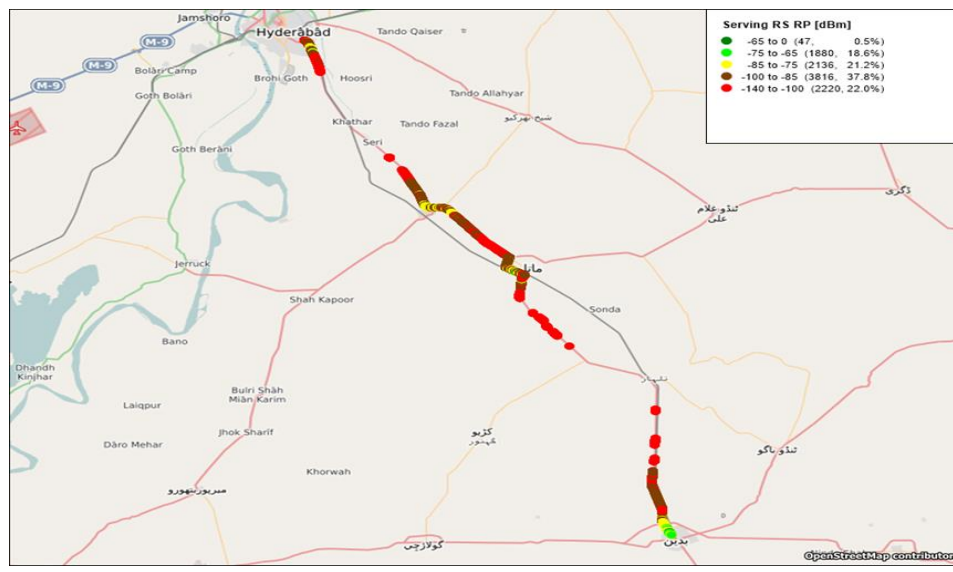
## JAZZ 4G COVERAGE (RSRP) - HYDERABAD TO BADIN



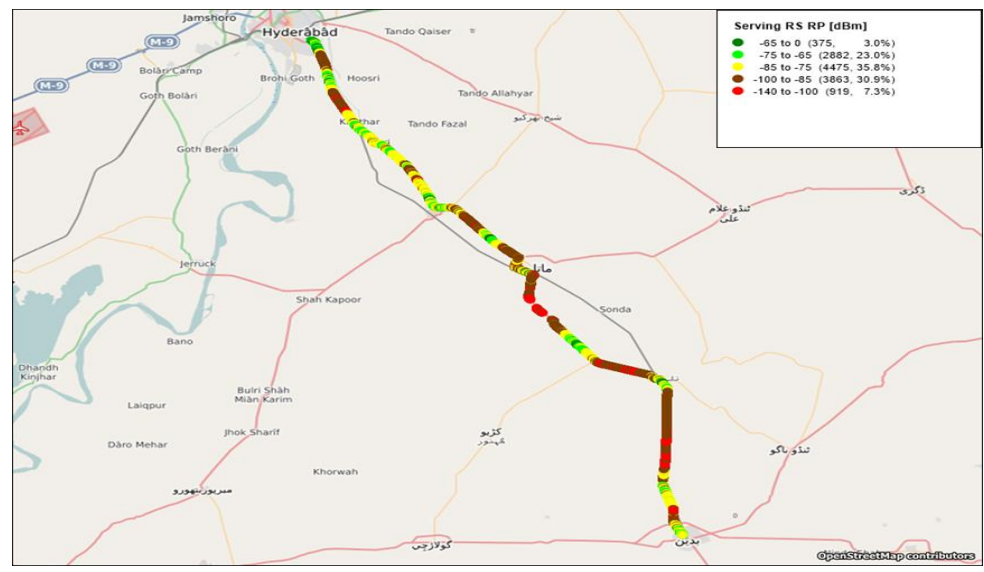
## TELENOR 4G COVERAGE (RSRP) - HYDERABAD TO BADIN



## UFONE 4G COVERAGE (RSRP) - HYDERABAD TO BADIN

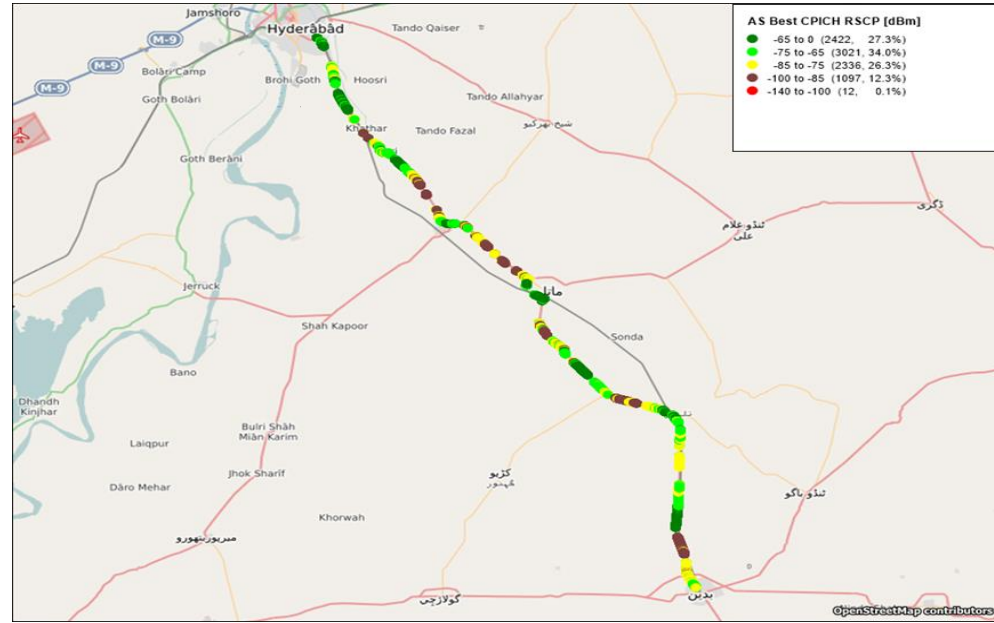


## ZONG 4G COVERAGE (RSRP) - HYDERABAD TO BADIN

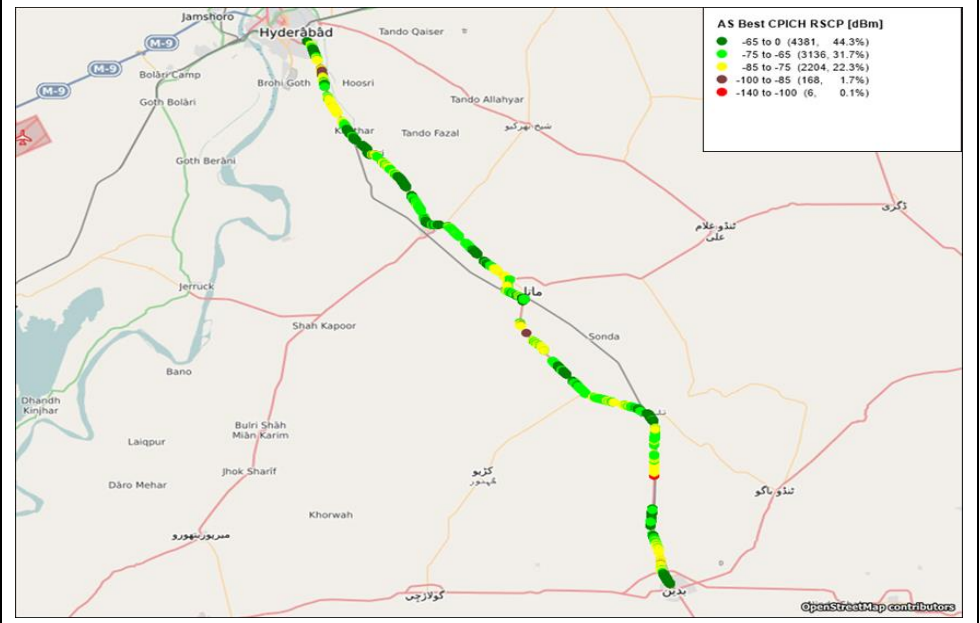


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

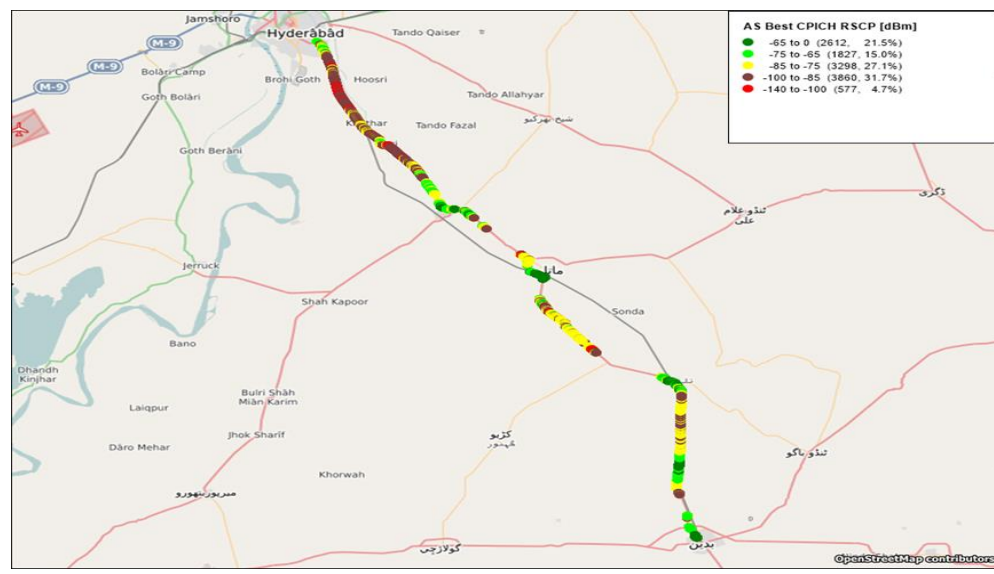
## JAZZ 3G COVERAGE (RSCP) - HYDERABAD TO BADIN



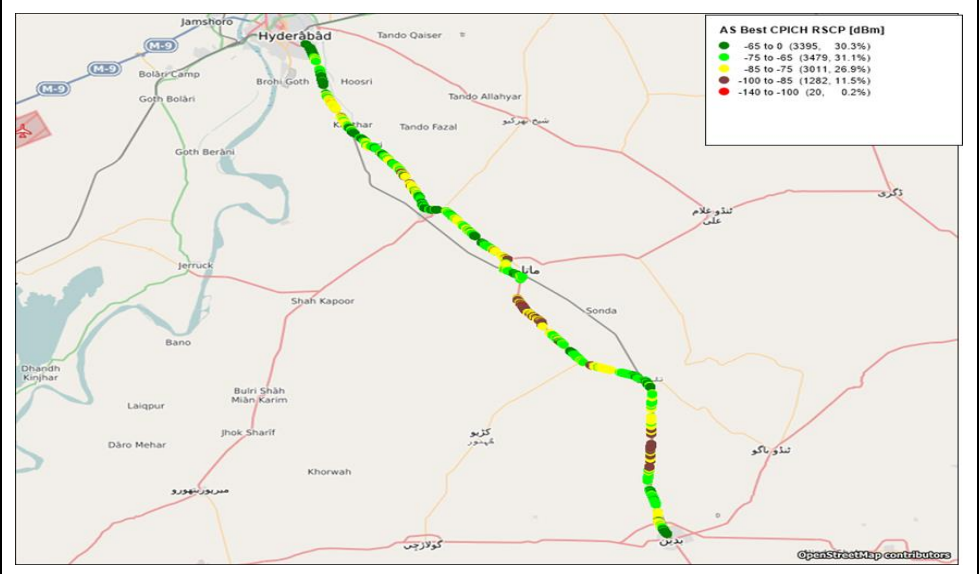
## TELEOR 3G COVERAGE (RSCP) - HYDERABAD TO BADIN



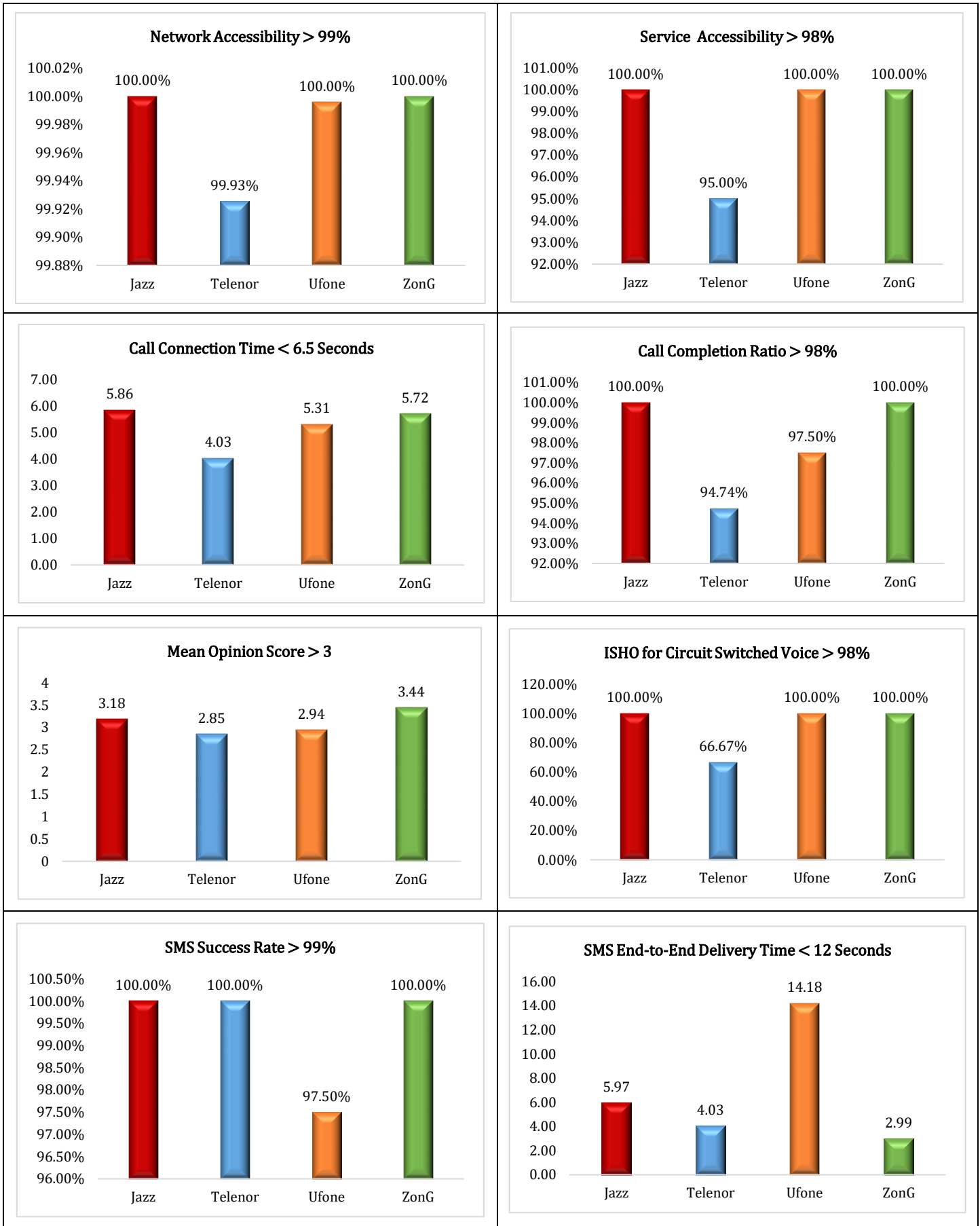
## UFONE 3G COVERAGE (RSCP) - HYDERABAD TO BADIN



## ZONG 3G COVERAGE (RSCP) - HYDERABAD TO BADIN

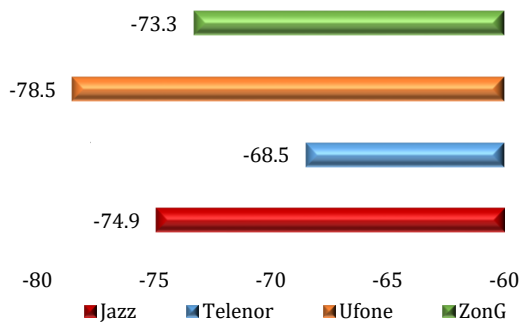


## QUALITY OF SERVICE SURVEY RESULTS – HYDERABAD TO BADIN

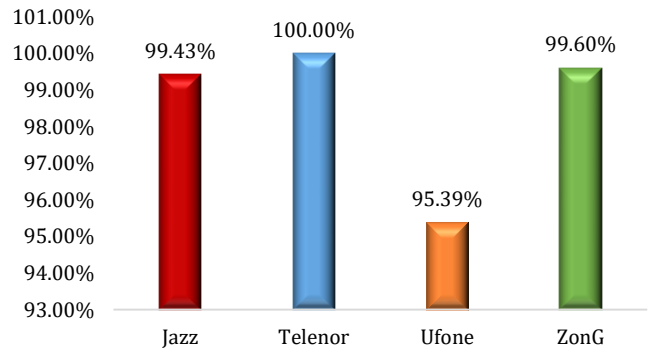


## QUALITY OF SERVICE SURVEY RESULTS – HYDERABAD TO BADIN

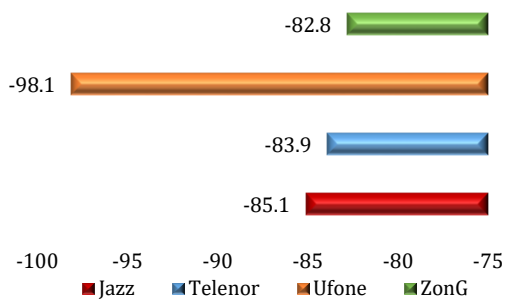
**3G Signal Strength (RSCP) > -100dBm**



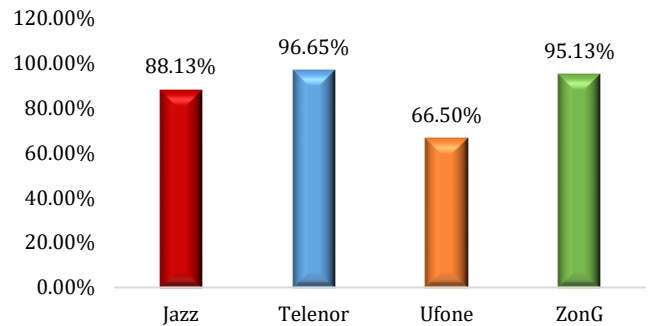
**3G Signal Strength (RSCP) Confidencel Level > 90%**



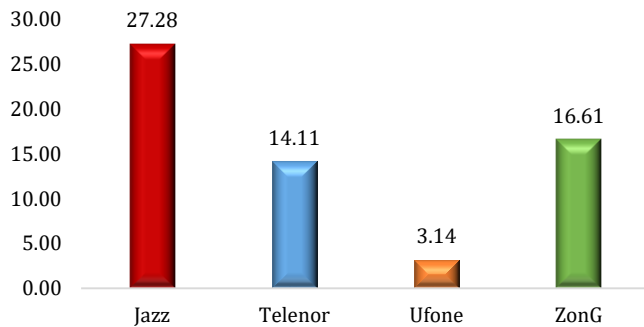
**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**

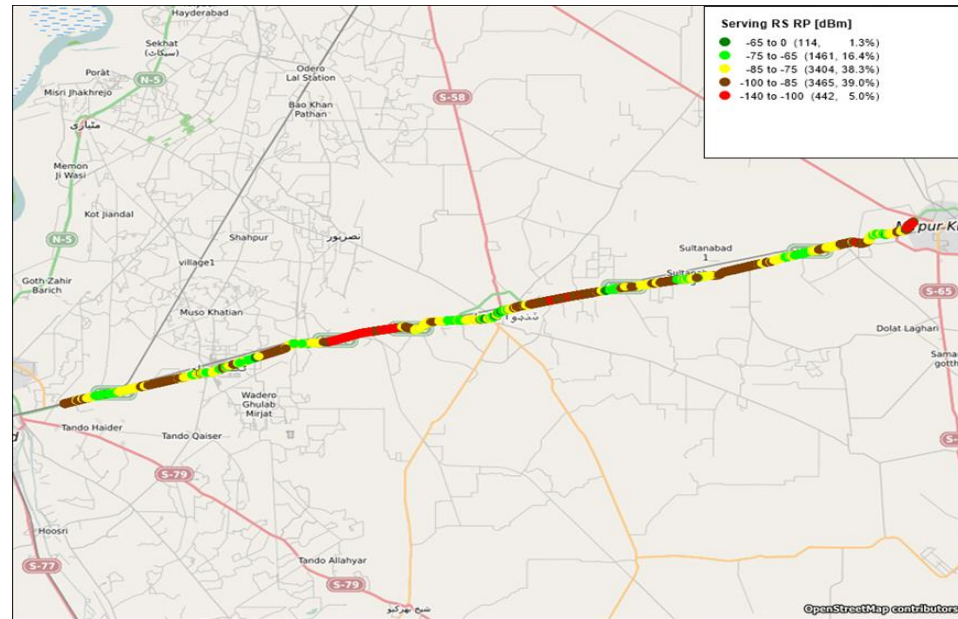


**User Data Throughput (4G) > 2Mbps**

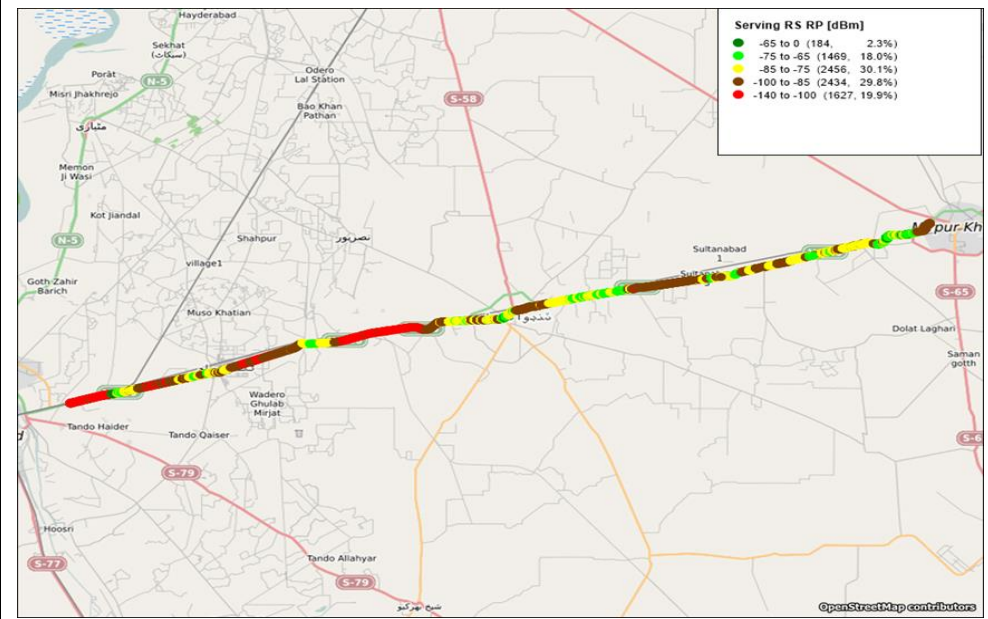


# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

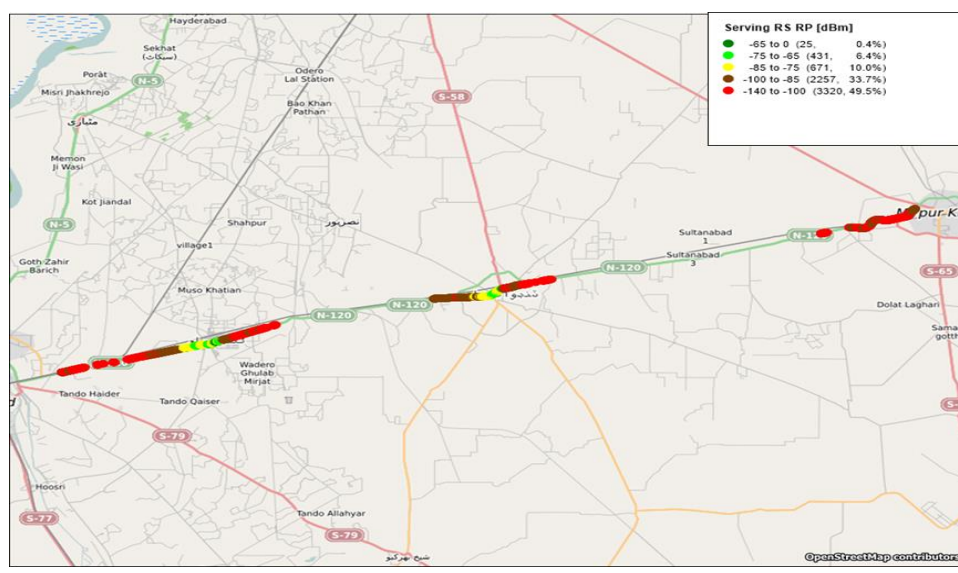
## JAZZ 4G COVERAGE (RSRP) - HYDERABAD TO MIRPUR KHAS



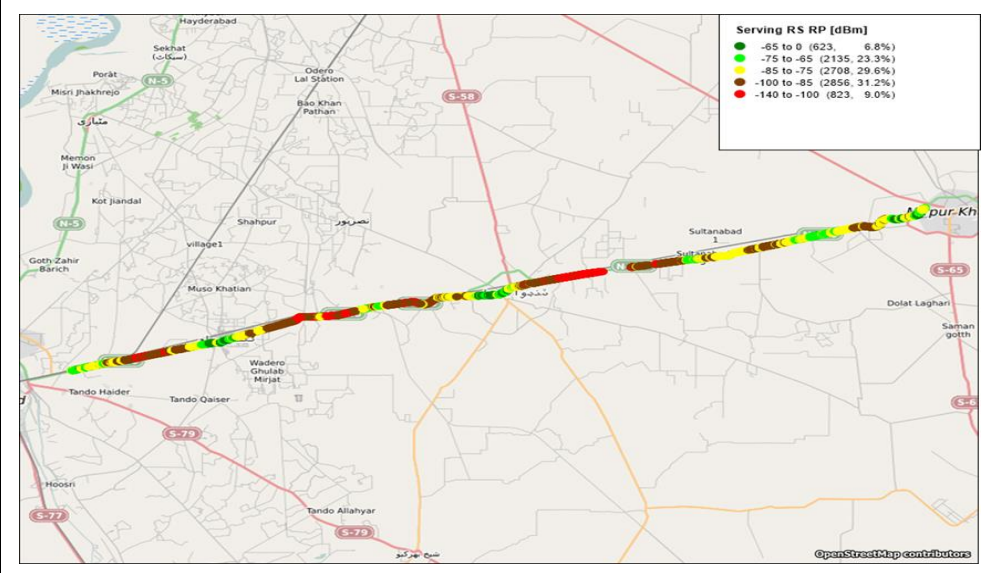
## TELENOR 4G COVERAGE (RSRP) - HYDERABAD TO MIRPUR KHAS



## UFONE 4G COVERAGE (RSRP) - HYDERABAD TO MIRPUR KHAS

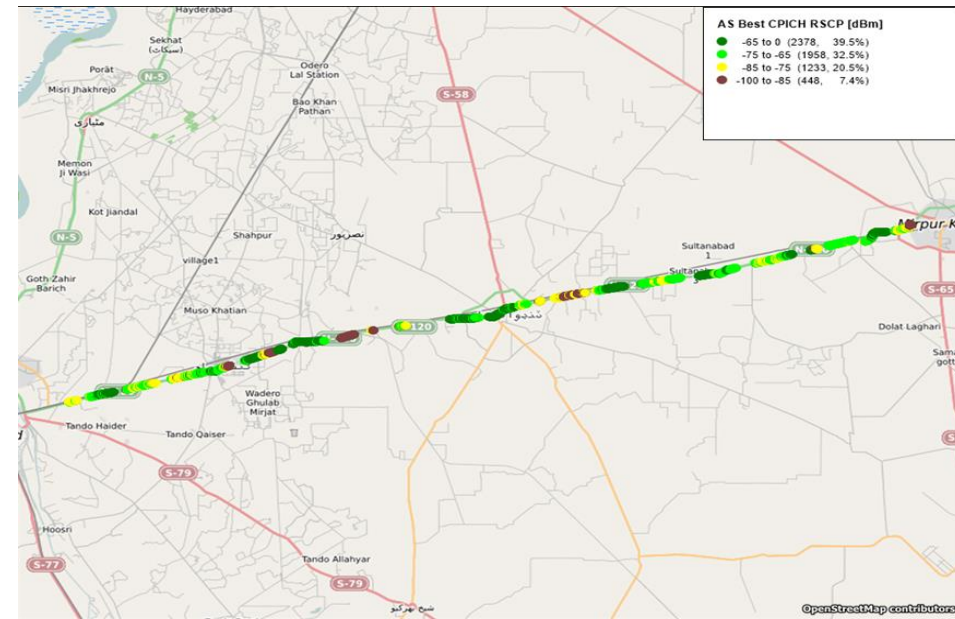


## ZONG 4G COVERAGE (RSRP) - HYDERABAD TO MIRPUR KHAS

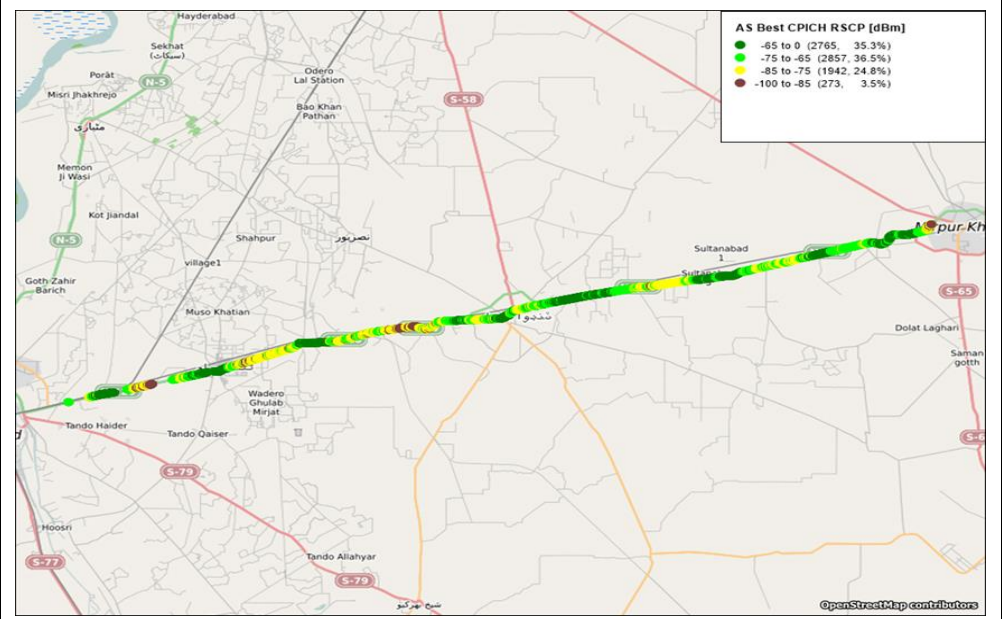


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

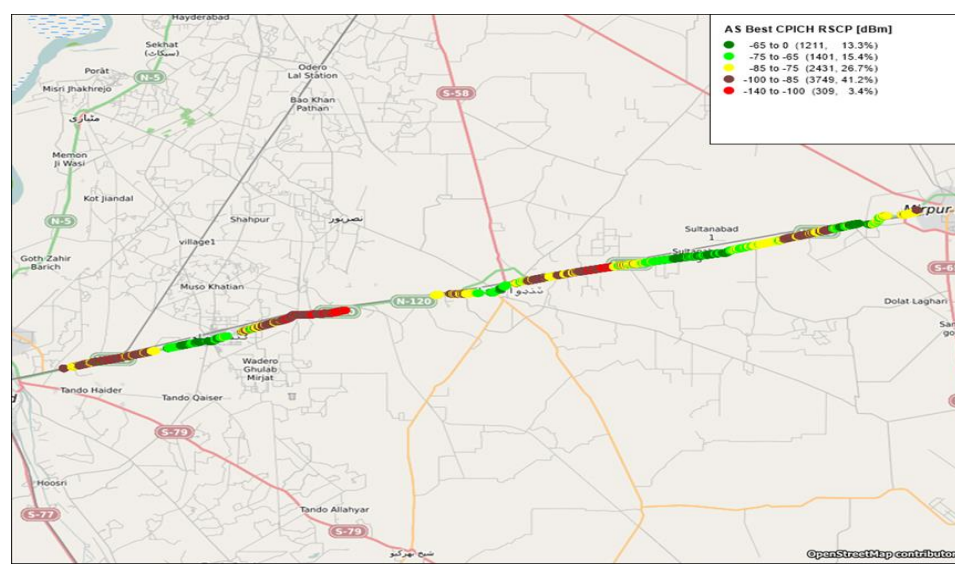
## JAZZ 3G COVERAGE (RSCP) - HYDERABAD TO MIRPUR KHAS



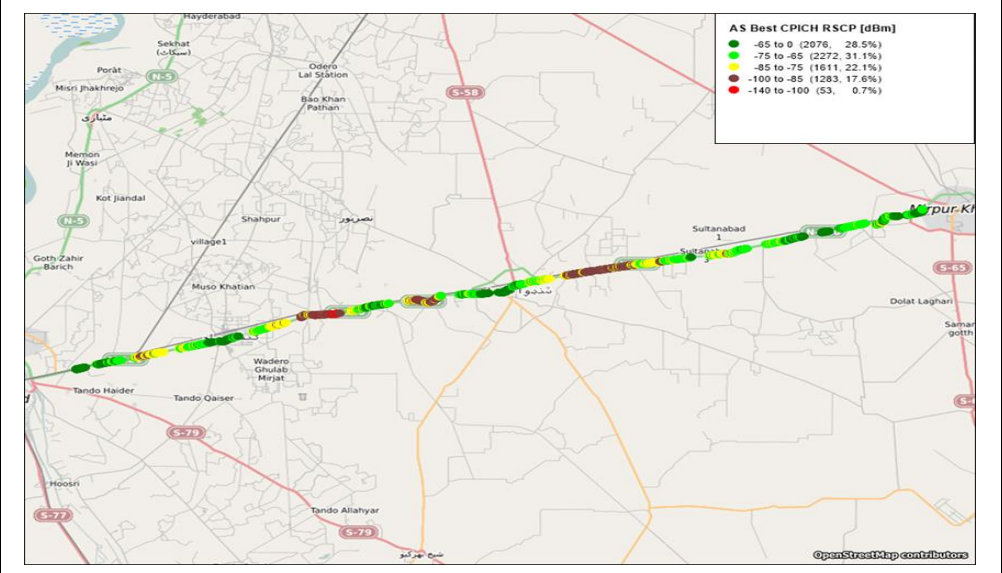
## TELEOR 3G COVERAGE (RSCP) - HYDERABAD TO MIRPUR KHAS



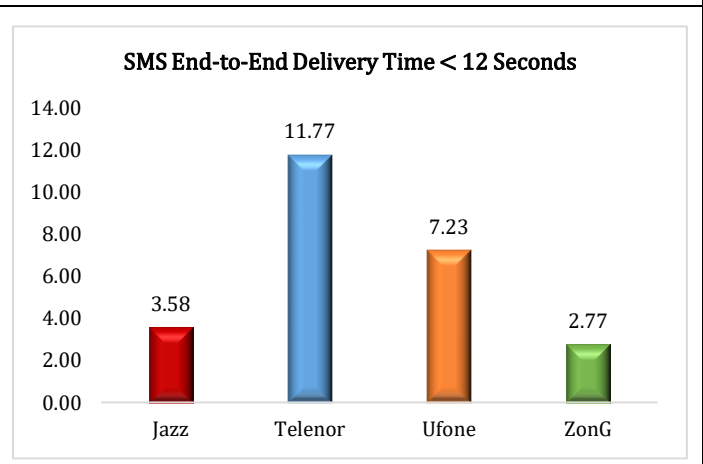
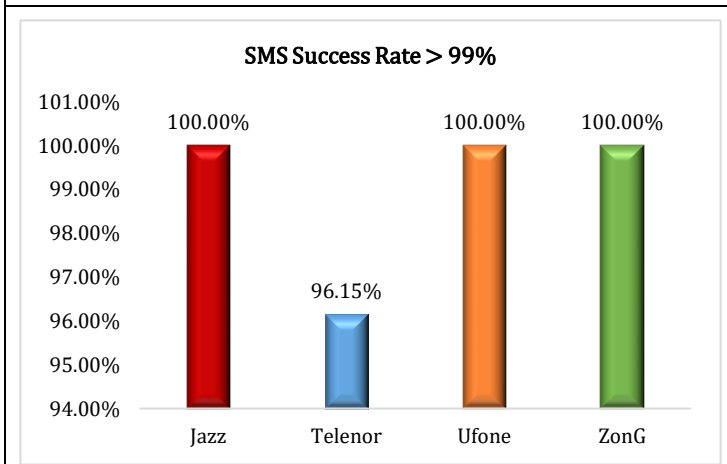
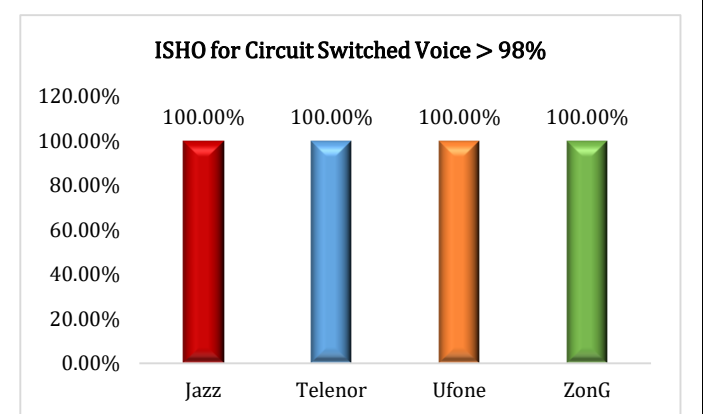
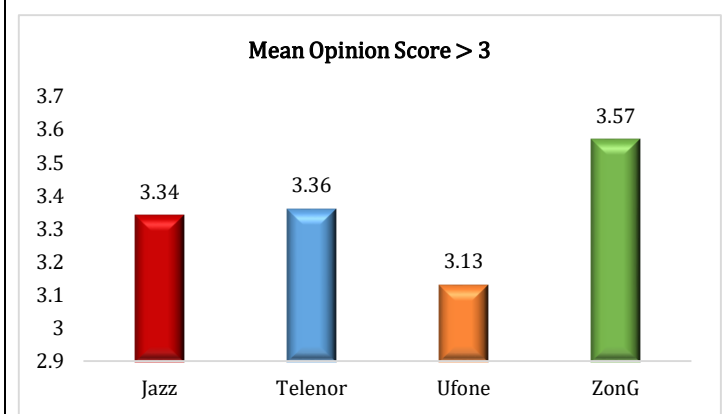
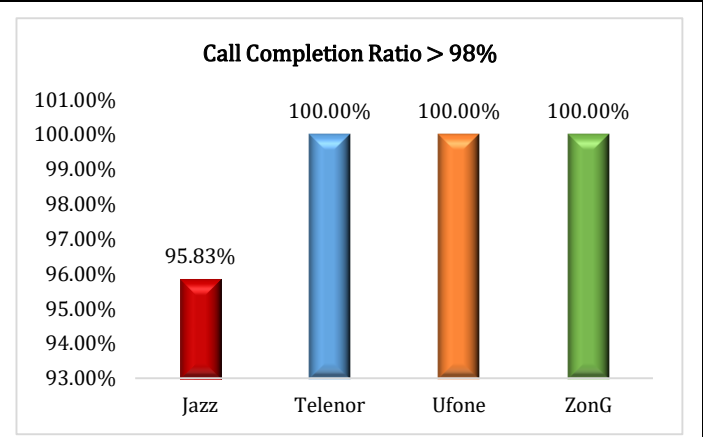
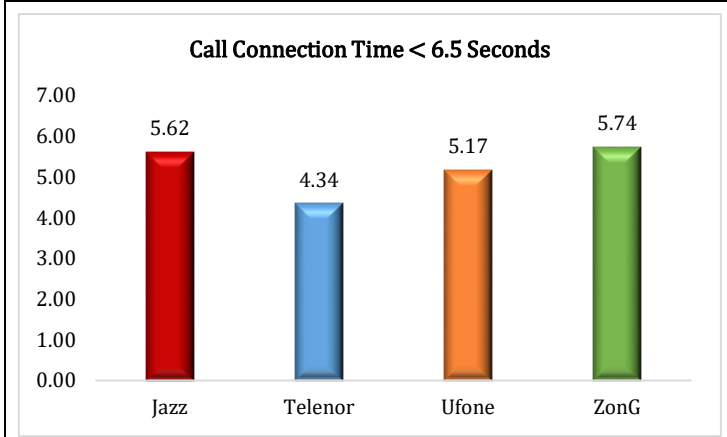
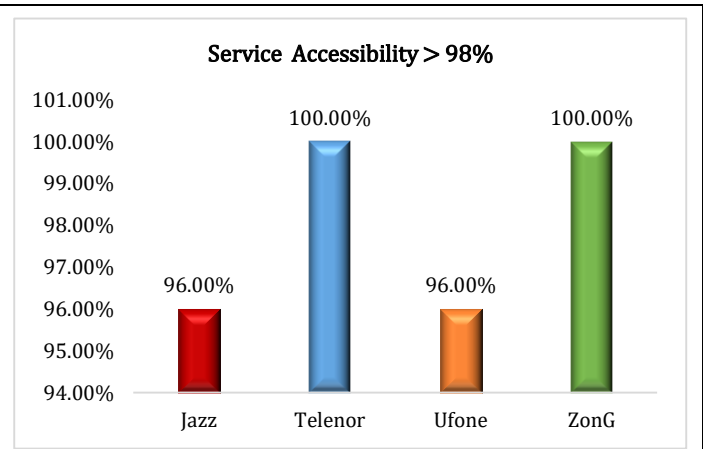
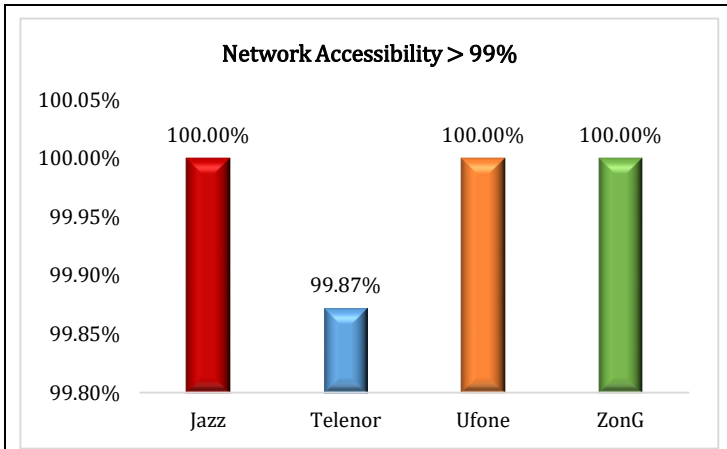
## UFONE 3G COVERAGE (RSCP) - HYDERABAD TO MIRPUR KHAS



## ZONG 3G COVERAGE (RSCP) - HYDERABAD TO MIRPUR KHAS



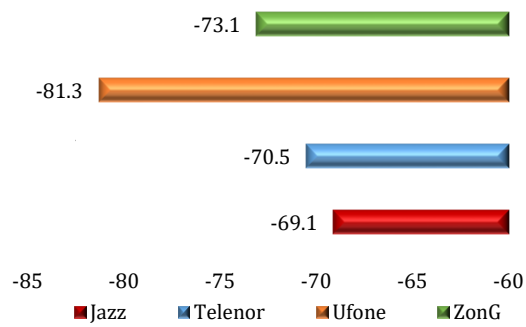
# QUALITY OF SERVICE SURVEY RESULTS – HYDERABAD TO MIRPUR KHAS



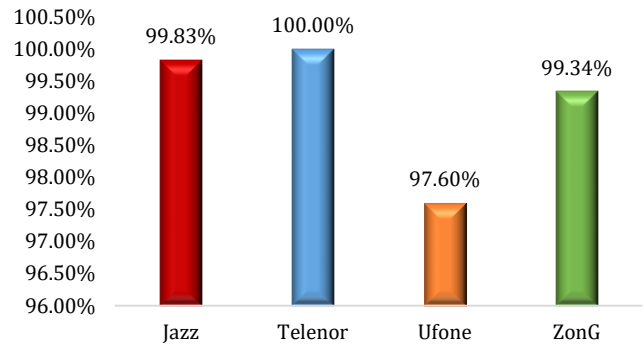


# QUALITY OF SERVICE SURVEY RESULTS – HYDERABAD TO MIRPUR KHAS

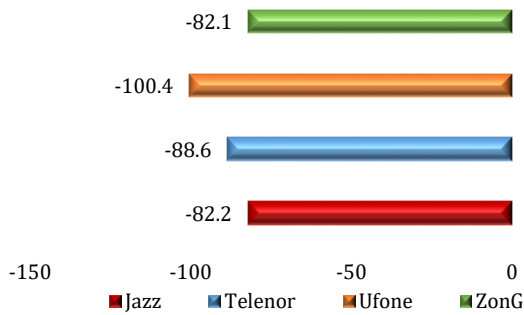
3G Signal Strength (RSCP) > -100dBm



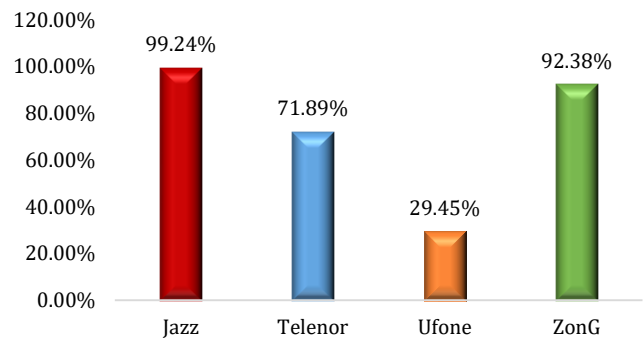
3G Signal Strength (RSCP) Confidencel Level > 90%



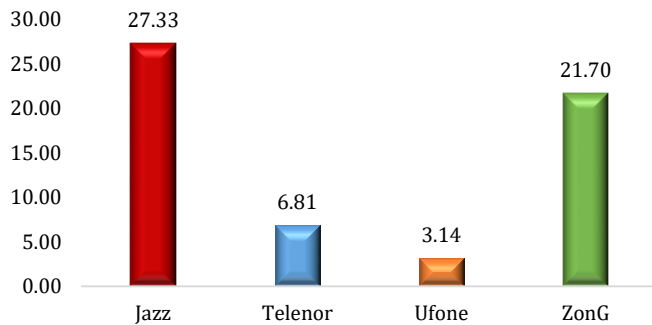
4G Signal Strength (RSRP) > -100dBm



4G Signal Strength (RSRP) Confidencel Level > 90%



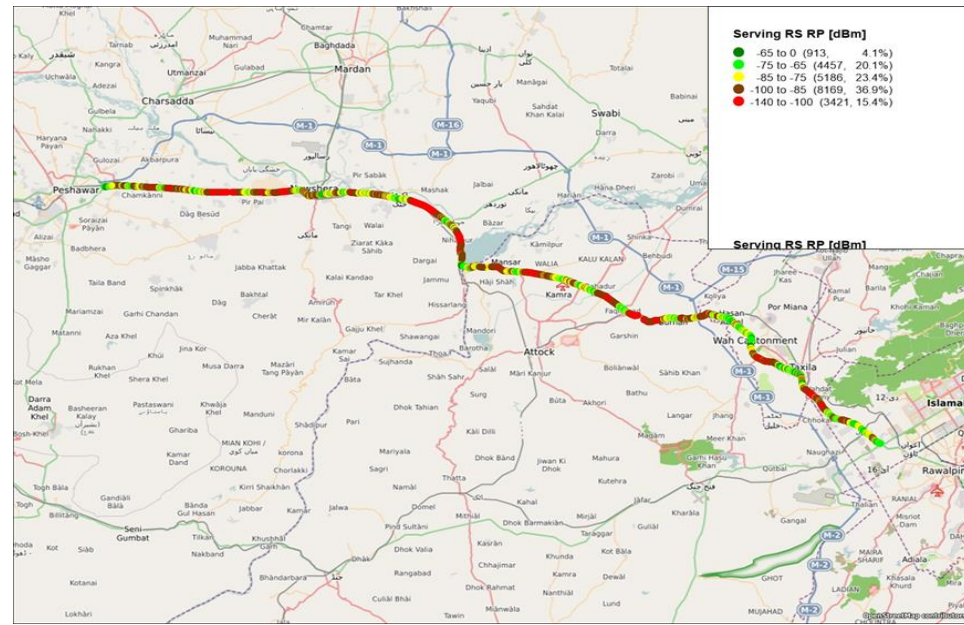
User Data Throughput (4G) > 2Mbps



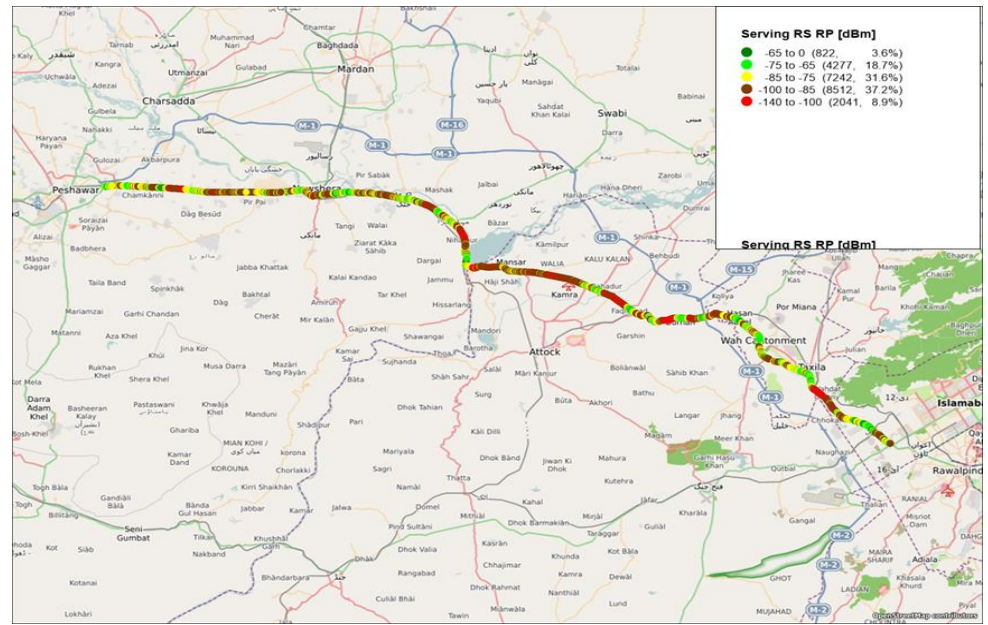
**KHYBER PAKHTUNKHWA**

# 4G NETWORK COVERAGE / SIGNAL STRENGTH (RSRP)

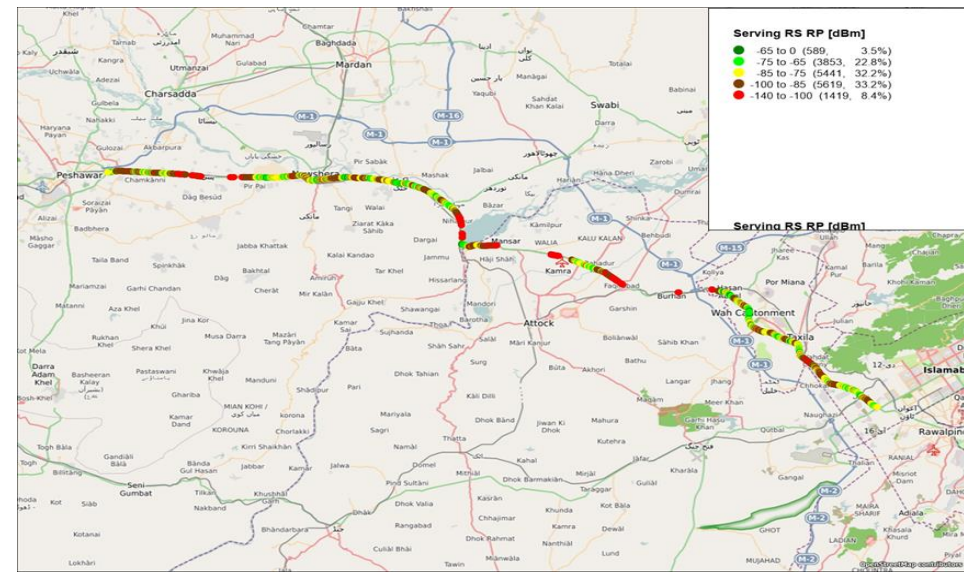
## JAZZ 4G COVERAGE (RSRP) – PESHAWAR TO RAWALPINDI



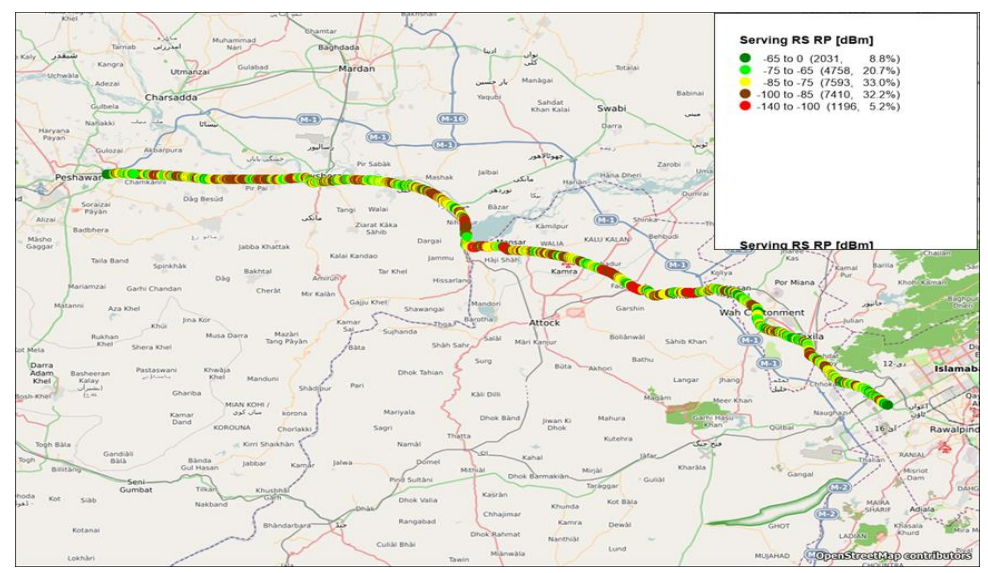
## TELENOR 4G COVERAGE (RSRP) - PESHAWAR TO RAWALPINDI



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

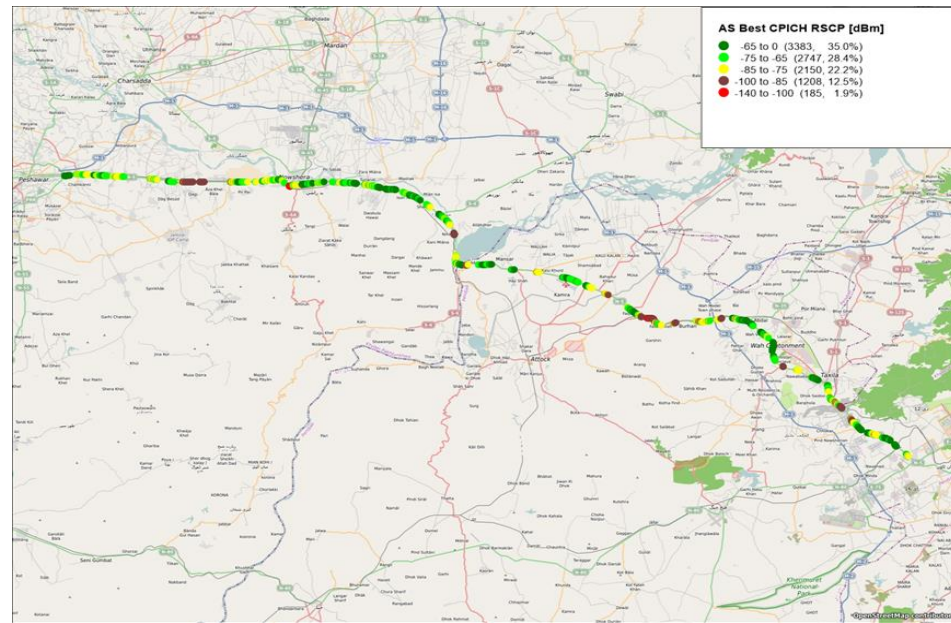


## ZONG 4G COVERAGE (RSRP) - PESHAWAR TO RAWALPINDI

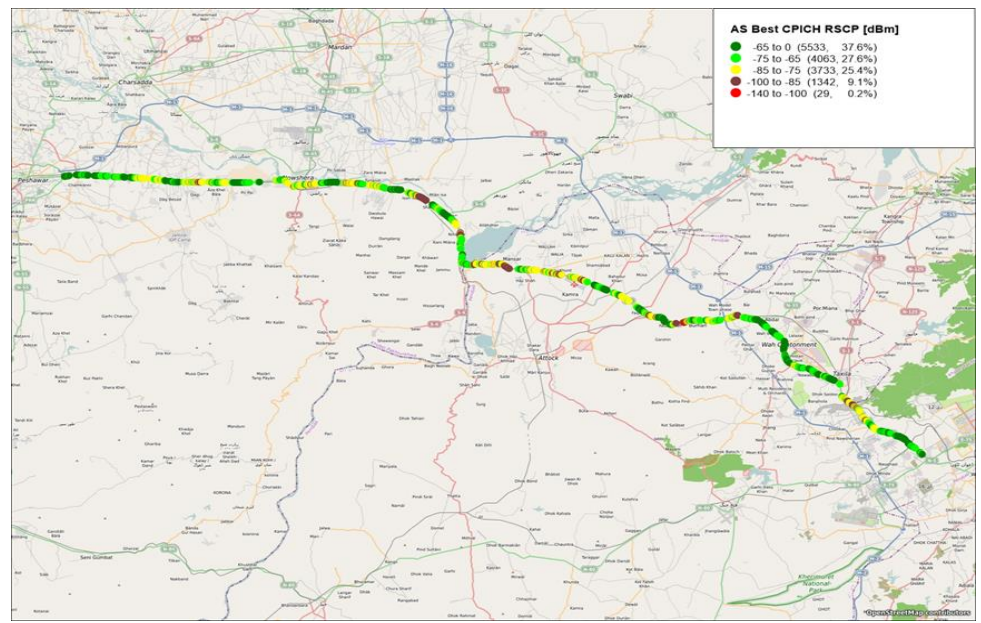


# 3G NETWORK COVERAGE / SIGNAL STRENGTH (RSCP)

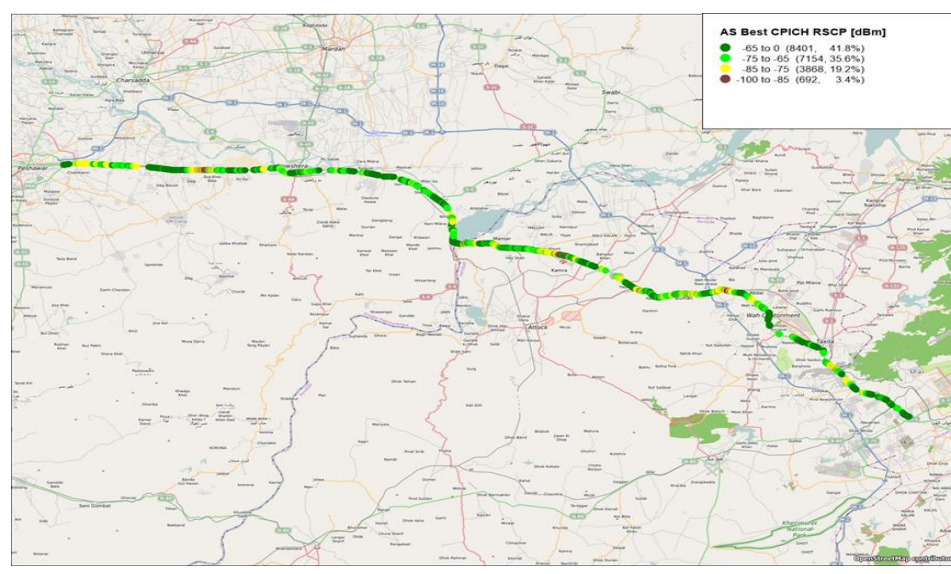
## JAZZ 3G COVERAGE (RSCP) - PESHAWAR TO RAWALPINDI



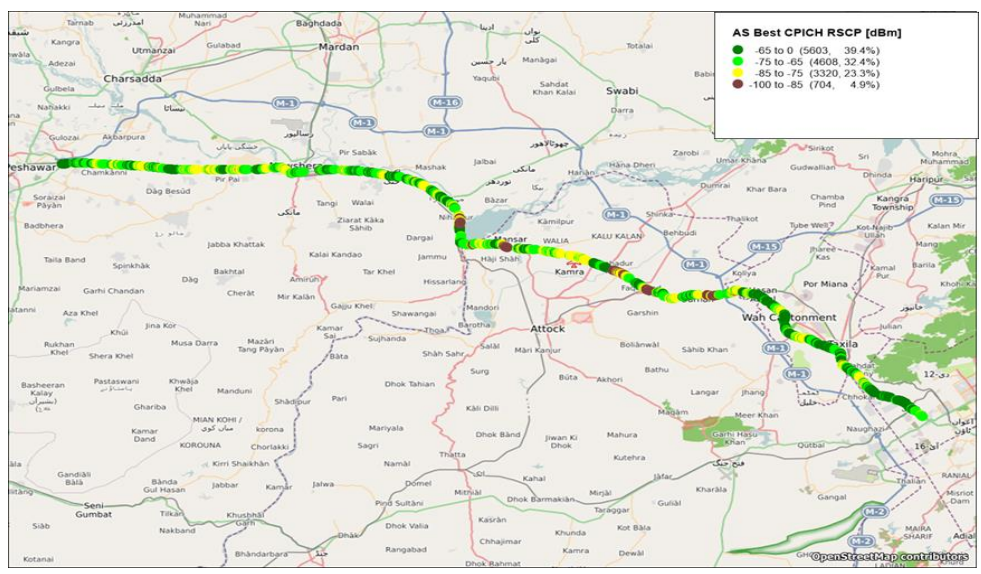
## TELEOR 3G COVERAGE (RSCP) - PESHAWAR TO RAWALPINDI



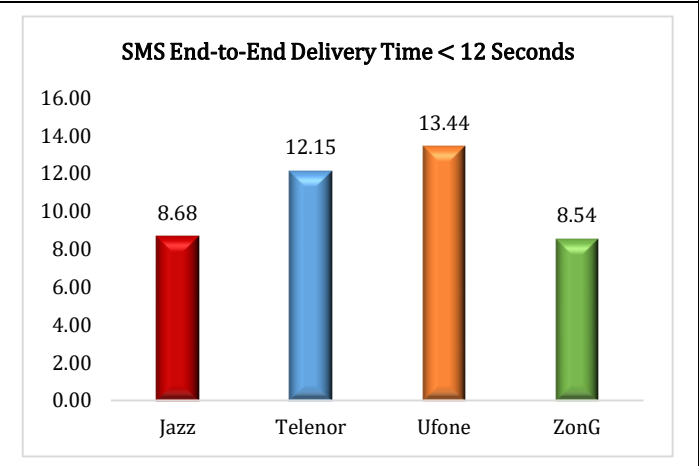
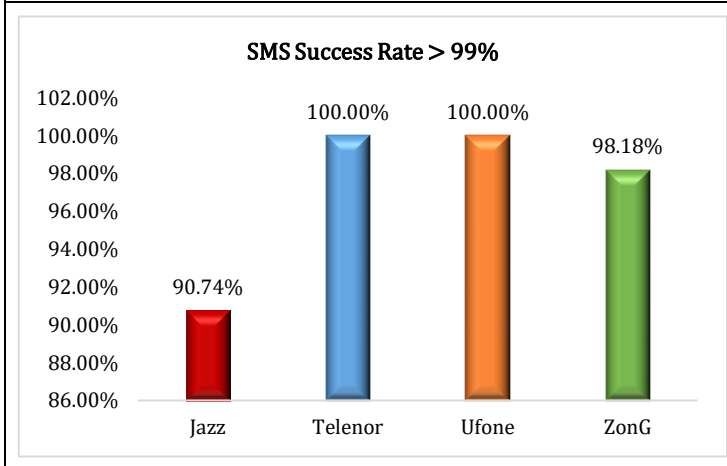
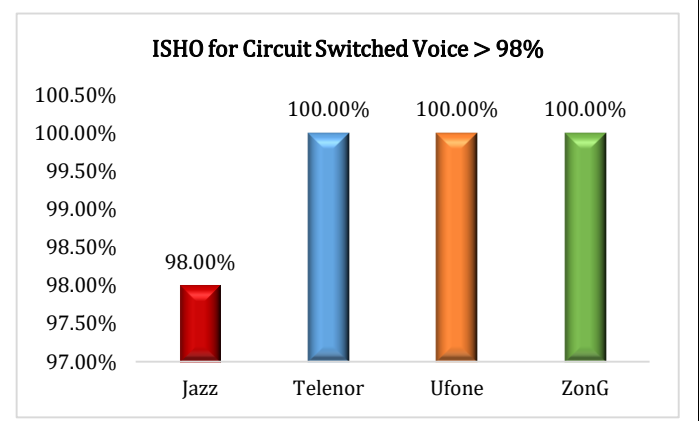
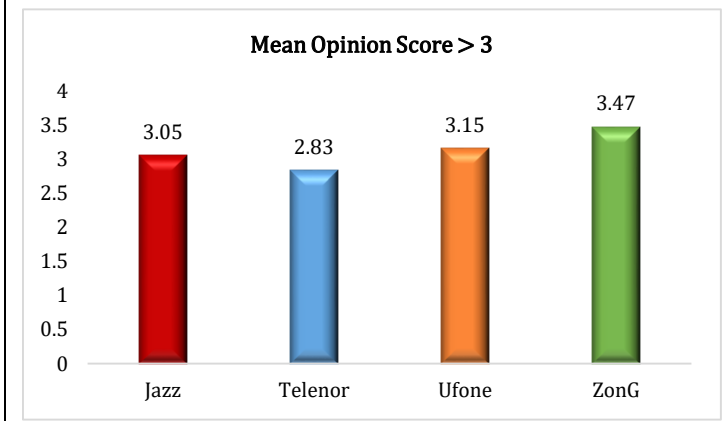
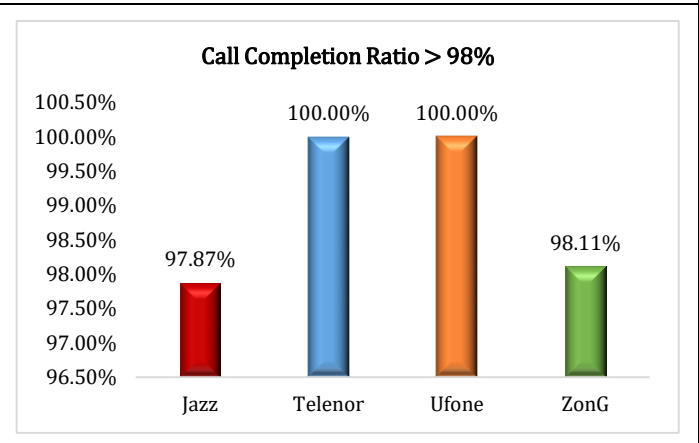
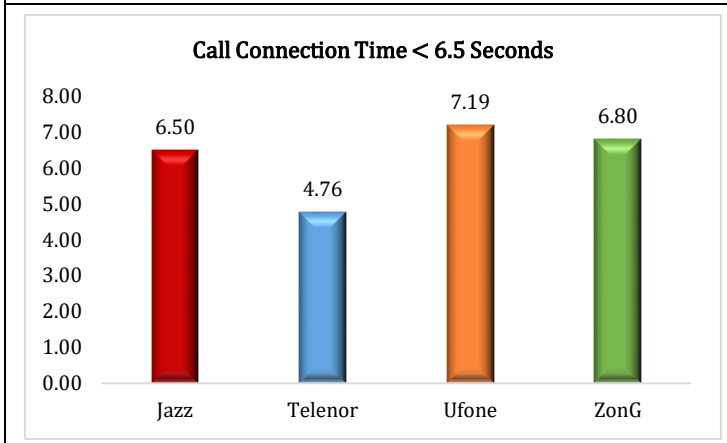
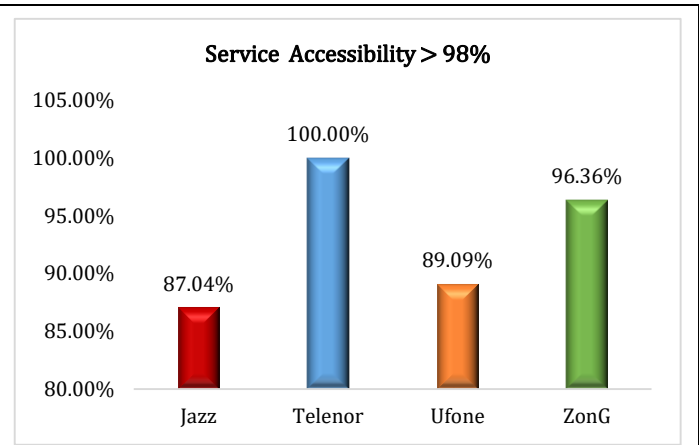
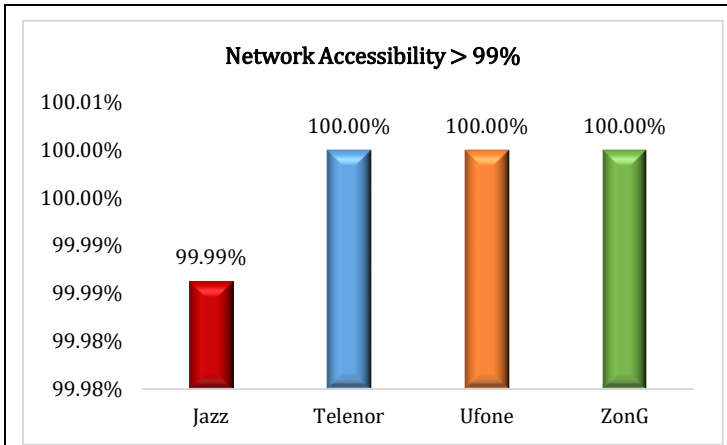
## UFONE 3G COVERAGE (RSCP) - PESHAWAR TO RAWALPINDI



## ZONG 3G COVERAGE (RSCP) - PESHAWAR TO RAWALPINDI

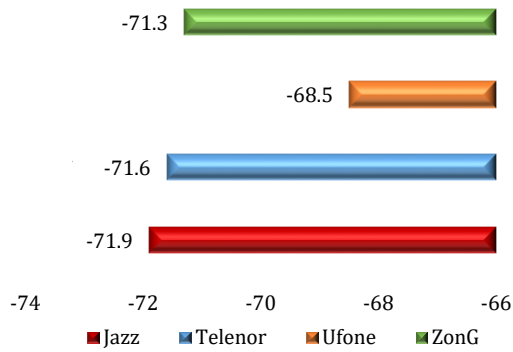


# QUALITY OF SERVICE SURVEY RESULTS – GT ROAD PESHAWAR TO RAWALPINDI

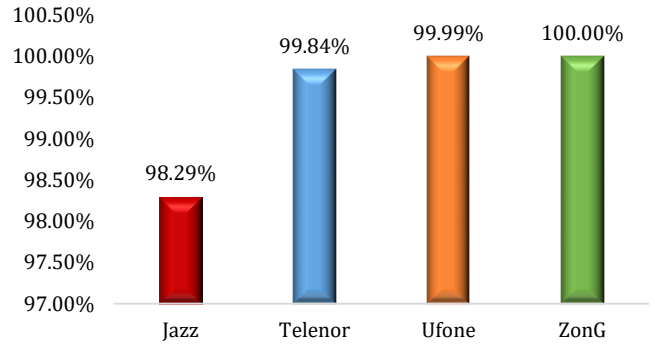


# QUALITY OF SERVICE SURVEY RESULTS – GT ROAD PESHAWAR TO RAWALPINDI

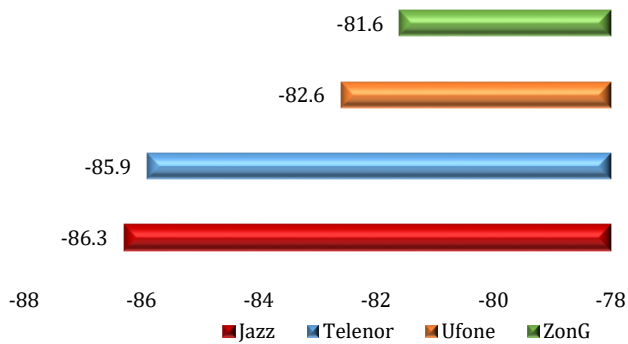
**3G Signal Strength (RSCP) > -100dBm**



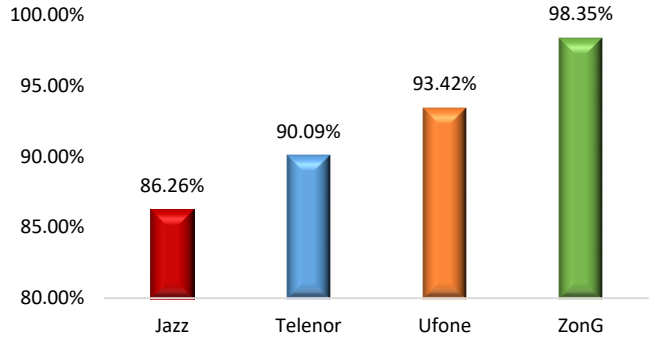
**3G Signal Strength (RSCP) Confidencel Level > 90%**



**4G Signal Strength (RSRP) > -100dBm**



**4G Signal Strength (RSRP) Confidencel Level > 90%**



**User Data Throughput (4G) > 2Mbps**

