

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

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SECOND 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 Twelve (12) different Motorways / Highways / Inter Cities Roads of Punjab, Khyber Pakhtunkhwa (KPK) and Balochistan. The name of Motorways / Highways / Inter Cities Roads along with survey dates are shown in **Table 1.1: QoS Survey Roads & Dates**:

S. #.	Province	City	Survey Dates
1.	Punjab	Lahore to Gujranwala	24 <sup>th</sup> May 2021
2.		Lahore to Kasur	31 <sup>st</sup> May 2021
3.		Lahore to Faisalabad	7 <sup>th</sup> June 2021
4.		Multan to Rahim Yar Khan	21 <sup>st</sup> June 2021
5.	Khyber Pakhtunkhwa	Peshawar to Kohat	24 <sup>th</sup> May 2021
6.		Peshawar to Swabi	31 <sup>st</sup> May 2021
7.		Peshawar to Haripur	7 <sup>th</sup> June 2021
8.		Peshawar to Abbottabad	14 <sup>th</sup> June 2021
9.	Balochistan	Quetta to Pishin	24 <sup>th</sup> May 2021
10.		Quetta to Sibbi	31 <sup>st</sup> May 2021
11.		Quetta to Noshki	7 <sup>th</sup> June 2021
12.		Quetta to Khuzdar	14 <sup>th</sup> June 2021

Table 1.1: QOS Survey Roads & Dates

## DRIVE TEST DETAILS

2.1. The QoS survey was carried out using 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 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 are mentioned in **Table 3.2: Compliance of 4G/LTE (RSRP) Signal Strength**.

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	7	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Quetta to Pishin, Quetta to Sibbi & Quetta to Noshki
2.	Telenor	4	Lahore to Gujranwala, Lahore to Faisalabad, Quetta to Pishin & Quetta to Noshki,
3.	Ufone	5	Lahore to Gujranwala, Peshawar to Kohat, Peshawar to Haripur, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	5	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan & Quetta to Pishin

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

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

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	5	Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Khuzdar
2.	Telenor	8	Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi & Quetta to Khuzdar
3.	Ufone	7	Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Swabi, Peshawar to Abbottabad, Quetta to Noshki & Quetta to Khuzdar
4.	ZonG	7	Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

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

3.3. In case of Jazz, Telenor and ZonG, the mobile handset majority of the time remained on 4G network, while in case of Ufone the mobile handset kept switching between 4G/LTE and 3G Networks based upon its availability on the 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 following.

- a. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 4.1: Compliance of 4G User Data Throughput > 2 Mbps**.

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	10	Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	8	Lahore to Gujranwala, Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Haripur, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
3.	Ufone	9	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar

Table 4.1: Compliance of 4G User Data Throughput > 2Mbps

- b. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant are mentioned in **Table 4.2: Non-Compliance of 4G User Data Throughput > 2Mbps.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	2	Lahore to Gujranwala & Lahore to Kasur
2.	Telenor	4	Lahore to Faisalabad, Peshawar to Kohat, Peshawar to Swabi & Peshawar to Abbottabad
3.	Ufone	3	Multan to Rahim Yar Khan, Quetta to Noshki & Quetta to Khuzdar

Table 4.2: Non-Compliance of 4G User Data Throughput > 2Mbps

## 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.** The analysis of QoS KPI **Network Accessibility > 99%** in all surveyed Motorways / Highways / Inter Cities Roads revealed following:
- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 5.1: Compliance of Network Accessibility > 99%**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	9	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Pishin
2.	Telenor	8	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat,

			Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Pishin
3.	Ufone	8	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur & Quetta to Pishin,
4.	ZonG	9	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Pishin

Table 5.1: Compliance of Network Accessibility > 99%

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant are mentioned in **Table 5.2: Non-Compliance of Network Accessibility > 99%**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	3	Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	4	Peshawar to Swabi, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
3.	Ufone	4	Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
4.	ZonG	3	Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

Table 5.2: Non-Compliance of Network Accessibility > 99%

- b. **SERVICE ACCESSIBILITY.** The analysis of QoS KPI **Service Accessibility of > 98%** on 12 x surveyed Motorways / Highways / Inter Cities Roads revealed following.

- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 5.1: Compliance of Service Accessibility > 98%**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	1	Lahore to Kasur
2.	Telenor	1	Lahore to Kasur
3.	Ufone	2	Lahore to Gujranwala & Lahore to Kasur
4.	ZonG	4	Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan & Quetta to Pishin

Table 5.1: Compliance of Service Accessibility > 98%

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

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	11	Lahore to Gujranwala, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar
2.	Telenor	11	Lahore to Gujranwala, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
		Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar	
3.	Ufone	10	Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
4.	ZonG	8	Lahore to Gujranwala, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

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 Motorways / Highways / Inter Cities Roads where CMOs remained compliant are 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	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Quetta to Pishin & Quetta to Sibbi
2.	Telenor	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar
3.	Ufone	9	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	6	Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Haripur, Quetta to Pishin & Quetta to Sibbi

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 are 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	7	Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Noshki & Quetta to Khuzdar
2.	Ufone	3	Multan to Rahim Yar Khan, Quetta to Noshki & Quetta to Khuzdar
3.	ZonG	6	Lahore to Gujranwala, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Abbottabad, Quetta to Noshki & Quetta to Khuzdar

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

- d. **CALL COMPLETION 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 are mentioned in **Table 5.5: Compliance of Call Completion Ratio > 98%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	6	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur & Quetta to Pishin
2.	Telenor	4	Lahore to Gujranwala, Lahore to Kasur, Peshawar to Kohat & Quetta to Pishin
3.	Ufone	5	Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Kohat, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	3	Multan to Rahim Yar Khan, Peshawar to Kohat & Quetta to Pishin

Table 5.5: Compliance of Call Completion Ratio > 98%

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

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	6	Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	8	Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
3.	Ufone	7	Lahore to Gujranwala, Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Noshki & Quetta to Khuzdar
4.	ZonG	9	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

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

- e. **END-TO-END SPEECH QUALITY / MEAN OPINION SCORE.** Only one of the CMOs has achieved the QoS KPI **End-to-End Speech Quality/ Mean Opinion Score of > 3** in all the surveyed Motorways / Highways / Inter Cities Roads. Results revealed following:

- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 5.7: Compliance of Mean Opinion Score > 3.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	5	Lahore to Kasur, Lahore to Faisalabad, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Pishin
2.	Telenor	7	Lahore to Gujranwala, Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Swabi, Quetta to Pishin, Quetta to Sibbi & Quetta to Khuzdar

3.	Ufone	8	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar

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

ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant are 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 Gujranwala, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	5	Lahore to Faisalabad, Peshawar to Kohat, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Noshki
3.	Ufone	4	Multan to Rahim Yar Khan, Peshawar to Kohat, Quetta to Noshki & Quetta to Khuzdar

**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 12 x surveyed Motorways / Highways / Inter Cities Roads revealed following:

i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 5.9: ISHO for Circuit Switched Voice ≥ 98%.**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	10	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Swabi, Peshawar to Haripur, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	11	Lahore to Gujranwala, Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
3.	Ufone	7	Lahore to Gujranwala, Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Kohat, Quetta to Pishin, Quetta to Sibbi & Quetta to Khuzdar
4.	ZonG	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar

**Table 5.9: ISHO for Circuit Switched Voice ≥ 98%.**

- ii. **NON-COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained non-compliant are mentioned in **Table 5.10: ISHO for Circuit Switched Voice  $\geq 98\%$ .**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	2	Peshawar to Kohat & Peshawar to Abbottabad,
2.	Telenor	1	Lahore to Faisalabad
3.	Ufone	5	Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad & Quetta to Noshki

Table 5.10: ISHO for Circuit Switched Voice  $\geq 98\%$ .

- g. **RAB SETUP SUCCESS RATE.** Except Ufone at Pishin, all CMOs have achieved the QoS KPI RAB Setup Success Rate  $> 98\%$  in all 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 12 x surveyed Motorways / Highways / Inter Cities Roads revealed following:
- i. **COMPLIANCE.** The Motorways / Highways / Inter Cities Roads where CMOs remained compliant are mentioned in **Table 6.1: Compliance of SMS Success Rate  $> 99\%$ .**

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	2	Lahore to Gujranwala & Quetta to Pishin
2.	Telenor	4	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad & Quetta to Pishin,
3.	Ufone	3	Lahore to Gujranwala, Lahore to Faisalabad & Quetta to Pishin
4.	Zong	6	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Haripur & Quetta to Pishin

Table 6.1: Compliance of SMS Success Rate  $> 99\%$

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

S. #.	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	10	Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
2.	Telenor	8	Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

3.	Ufone	9	Lahore to Kasur, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar
4.	ZonG	6	Peshawar to Kohat, Peshawar to Swabi, Peshawar to Abbottabad, Quetta to Sibbi, Quetta to Noshki & Quetta to Khuzdar

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 12 x surveyed Motorways / Highways / Inter Cities Roads, revealed following:

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

S. #	Operator	Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Jazz	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar
2.	Telenor	10	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Quetta to Pishin, Quetta to Noshki & Quetta to Khuzdar
3.	Ufone	7	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Peshawar to Swabi, Peshawar to Haripur, Quetta to Pishin & Quetta to Sibbi
4.	ZonG	12	Lahore to Gujranwala, Lahore to Kasur, Lahore to Faisalabad, Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Swabi, Peshawar to Haripur, Peshawar to Abbottabad, Quetta to Pishin, Quetta to Sibbi, Quetta to Noshki, Quetta to Khuzdar

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

S. #	Operator	Motorways / Highways / Inter Motorways / Highways / Inter Cities Roads	
		Count	Names
1.	Telenor	2	Peshawar to Abbottabad & Quetta to Sibbi
2.	Ufone	5	Multan to Rahim Yar Khan, Peshawar to Kohat, Peshawar to Abbottabad, Quetta to Noshki & Quetta to Khuzdar

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

## SURVEY MAPS & GRAPHICAL RESULTS

7.1 The 4G/LTE (RSRP) and 3G (RSCP) Signal Strength (i.e. wherever available) 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-Motorways / Highways / Inter Cities Roads of Punjab, Sindh & Khyber Pakhtunkhwa respectively.

## **STANDING IN SURVEY**

8.1. CMOs have been 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 Signal Strength of 4G/LTE on Surveyed Motorways / Highways / Inter Cities Roads is shown in **Table 8.1: CMOs Standing in Mobile Network Coverage.**

S. #.	Operator	Compliance Level		Standing	
		Number of Motorways / Highways / Roads			
		Compliant	Non-Compliant		
1.	Jazz	7	5	1 <sup>st</sup>	
2.	Ufone	5	7	2 <sup>nd</sup>	
3.	Zong	5	7	2 <sup>nd</sup>	
4.	Telenor	4	8	3 <sup>rd</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 / Inter Cities Roads is shown in **Table 8.2: CMOs Standing in Mobile Broadband Service.**

S. #.	Operator	4G Highest Throughput				Standing
		Motorways / Highways /Roads	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	
1.	Zong	9	3	-	-	1 <sup>st</sup>
2.	Jazz	3	6	1	2	2 <sup>nd</sup>
3.	Telenor	-	1	7	4	3 <sup>rd</sup>
4.	Ufone	-	2	4	6	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 Compliant Voice QoS KPIs on Surveyed Motorways / Highways / 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	58	26	1 <sup>st</sup>
2.	Telenor	55	29	2 <sup>nd</sup>
3.	Ufone	50	34	3 <sup>rd</sup>
4.	Jazz	48	36	4 <sup>th</sup>

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

- d. **SMS SERVICE.** The categorization of each CMOs, as per the maximum Compliant SMS QoS KPIs on Surveyed Motorways / Highways / 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	18	6	1 <sup>st</sup>
2.	Telenor	14	10	2 <sup>nd</sup>
3.	Jazz	14	10	2 <sup>nd</sup>
4.	Ufone	10	14	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>
1.	Mobile Network Coverage	Jazz	Ufone & ZonG	Telenor	-
2.	Mobile Broadband	ZonG	Jazz	Telenor	Ufone
3.	Voice	ZonG	Telenor	Ufone	Jazz
4.	SMS	ZonG	Jazz & Telenor	Ufone	-

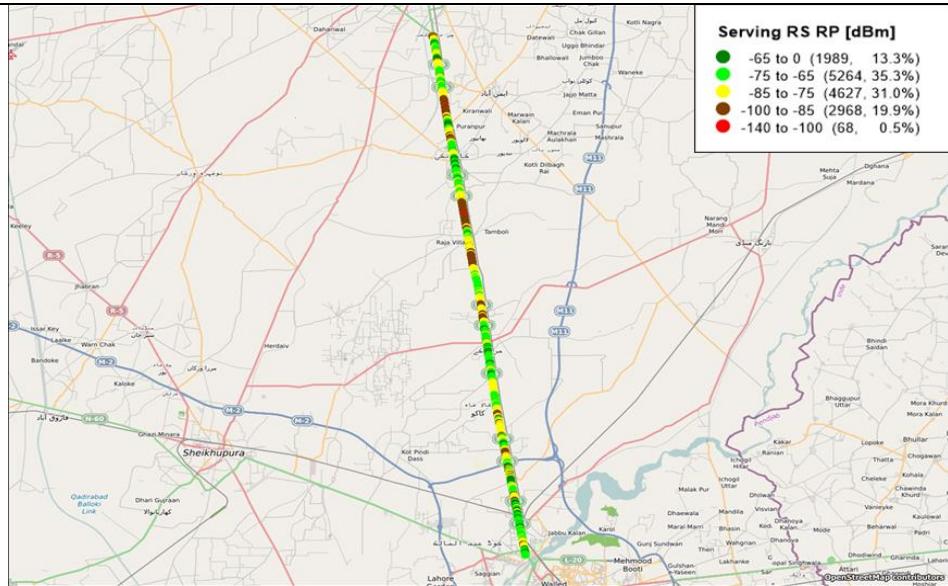
**Table 8.5: CMOs Overall Standing in QoS Survey**

**ANNEX - A**

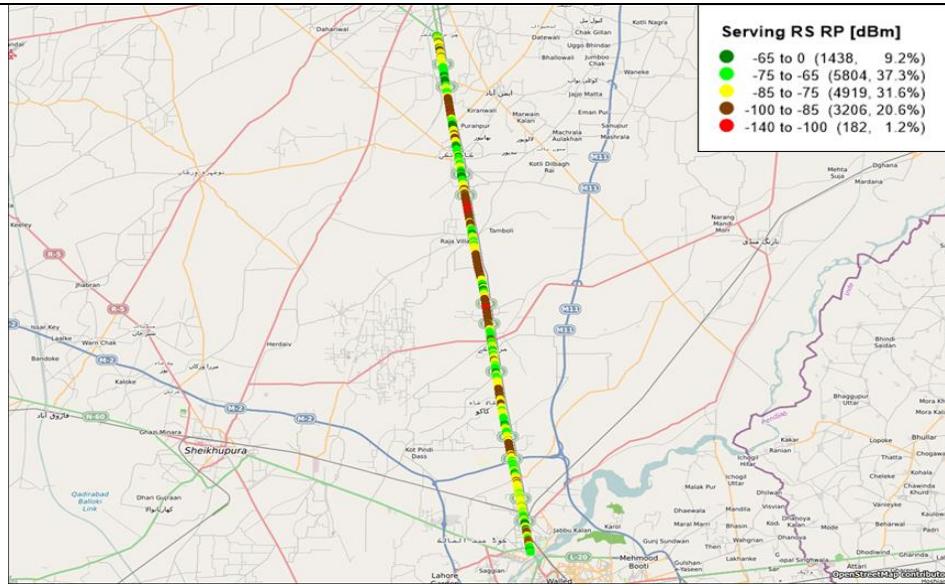
**PUNJAB**

## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

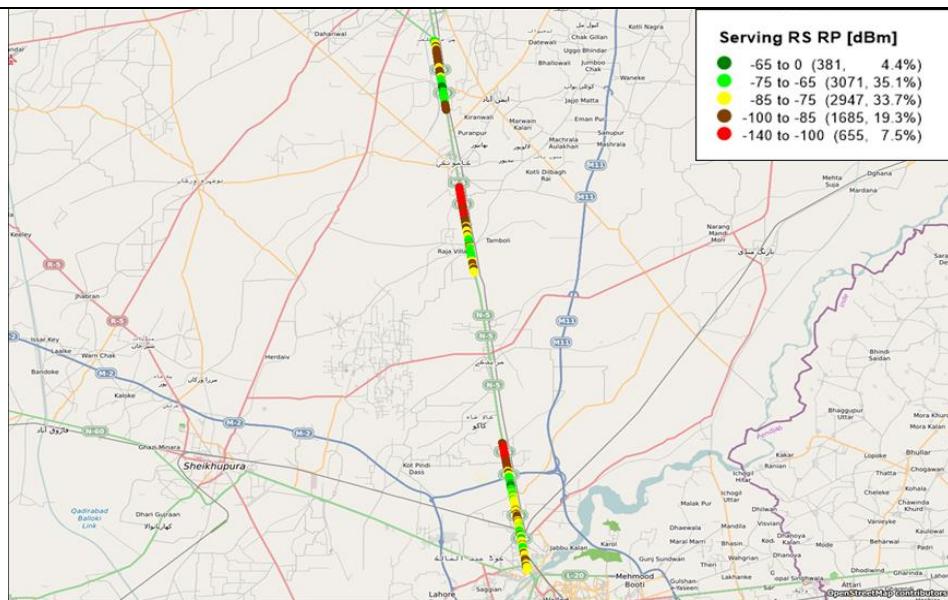
JAZZ 4G NETWORK COVERAGE – LAHORE TO GUJRALWALA



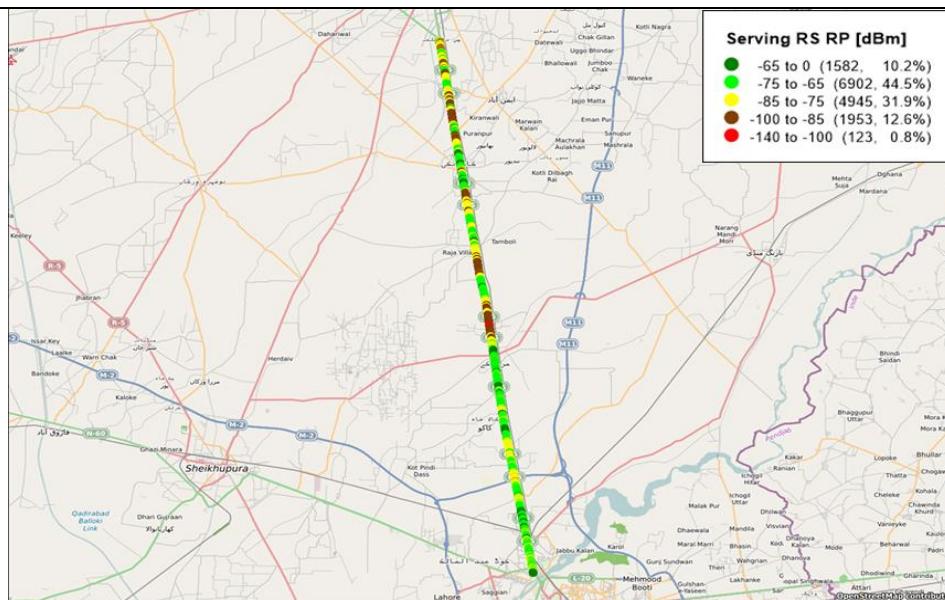
TELENOR 4G NETWORK COVERAGE – LAHORE TO GUJRALWALA



UFONE 4G NETWORK COVERAGE – LAHORE TO GUJRALWALA

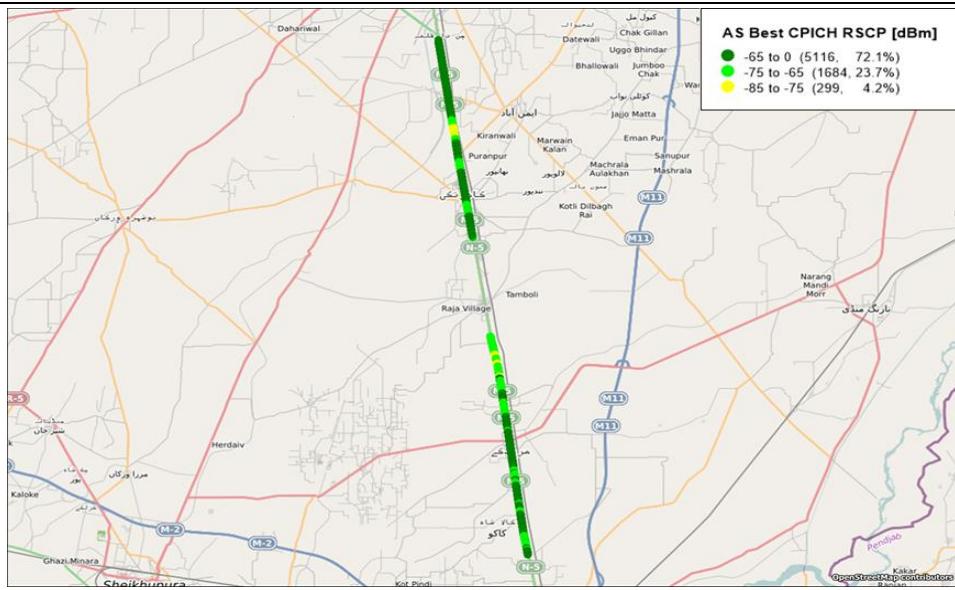


ZONG 4G NETWORK COVERAGE – LAHORE TO GUJRALWALA

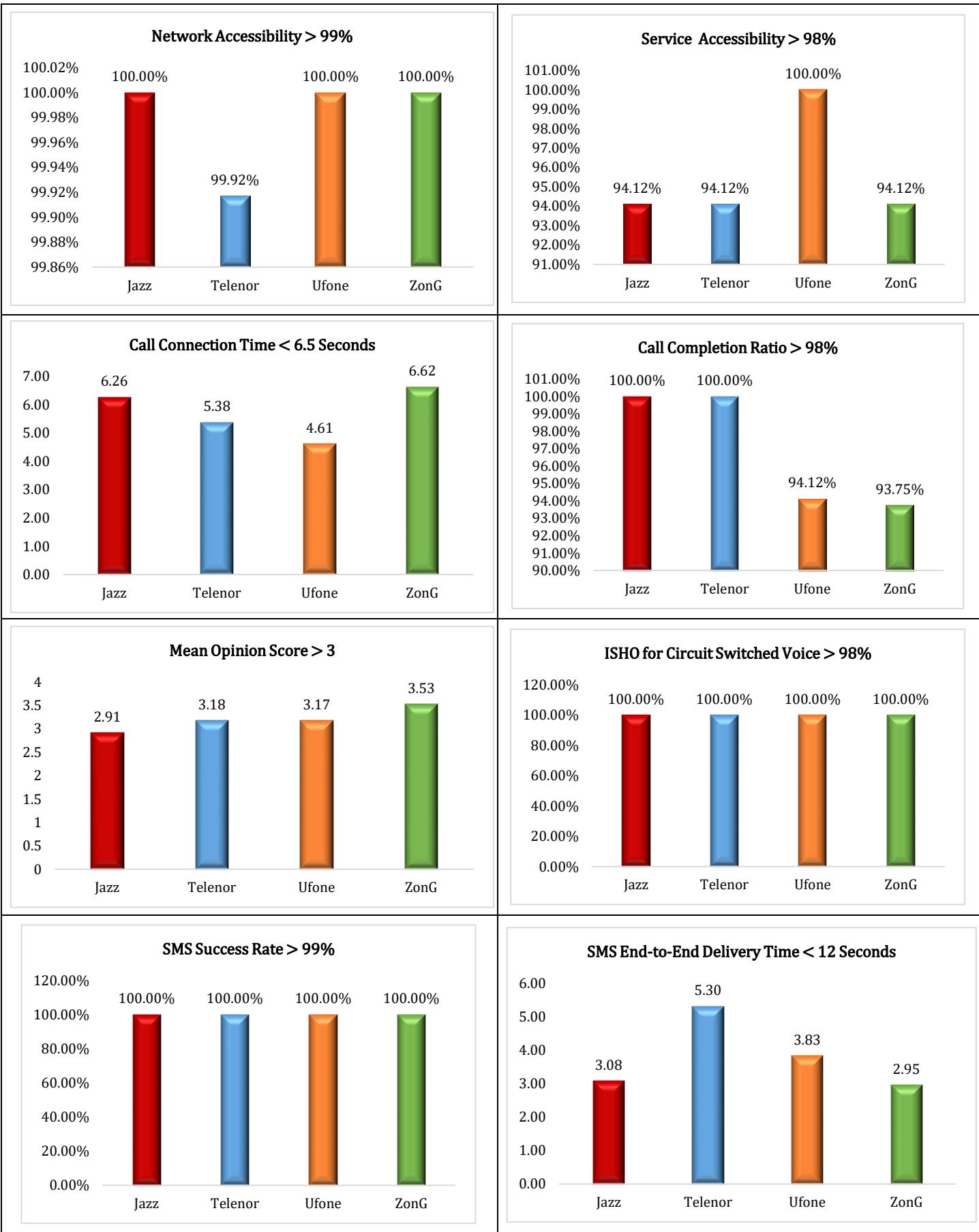


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

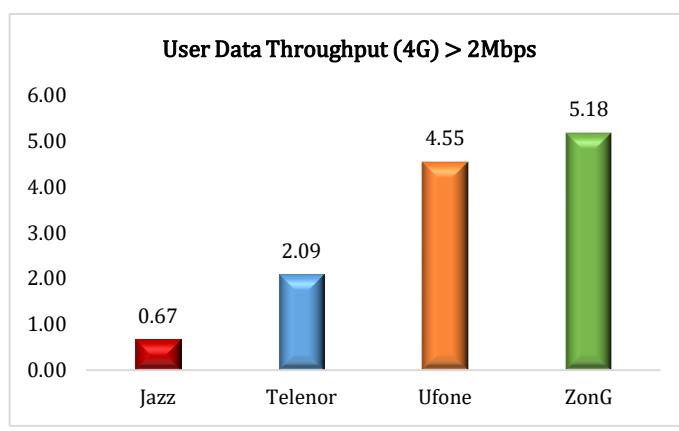
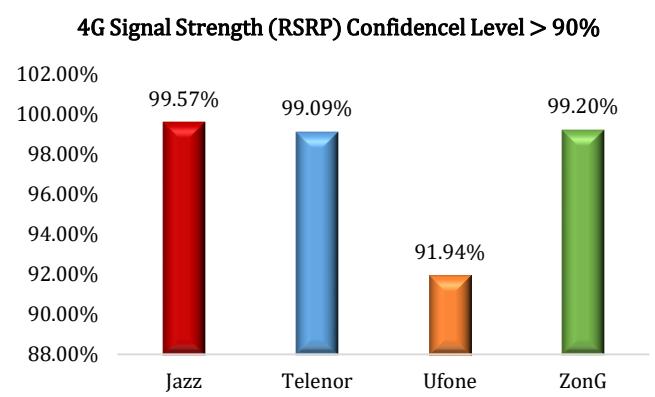
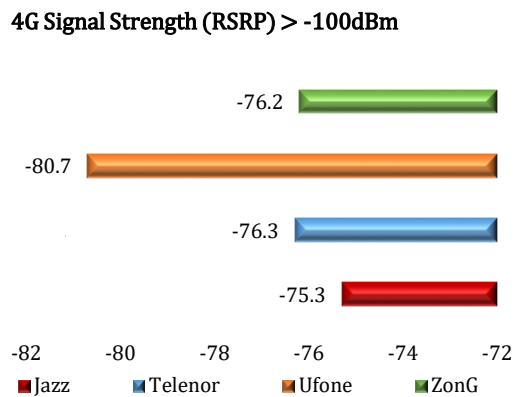
### UFONE 3G NETWORK COVERAGE – LAHORE TO GUJARANWALA



## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO GUJRANWALA

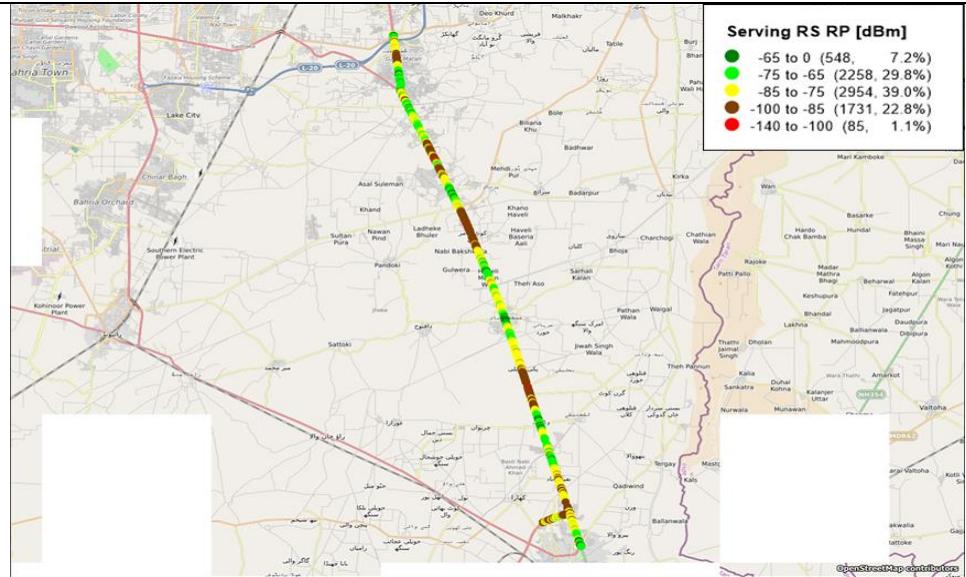


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO GUJRANWALA

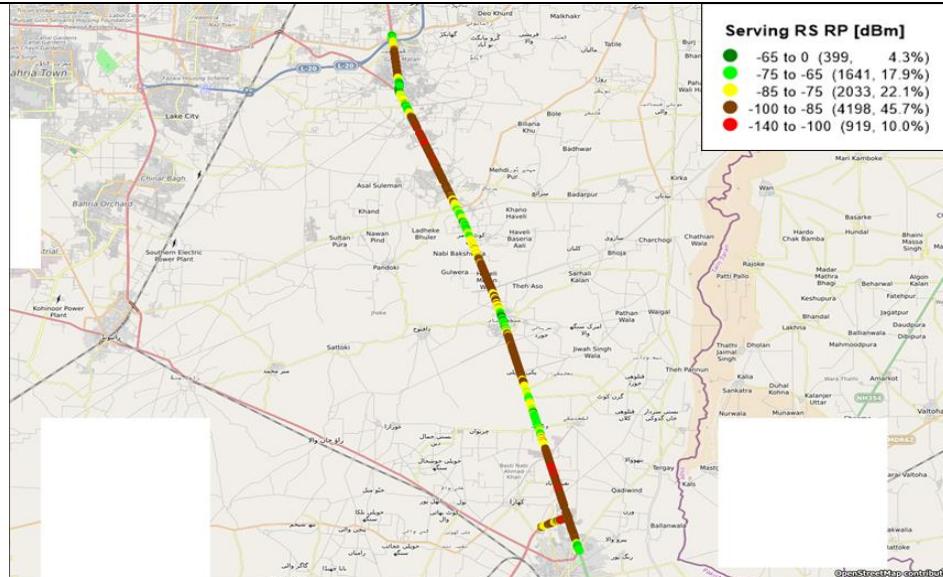


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

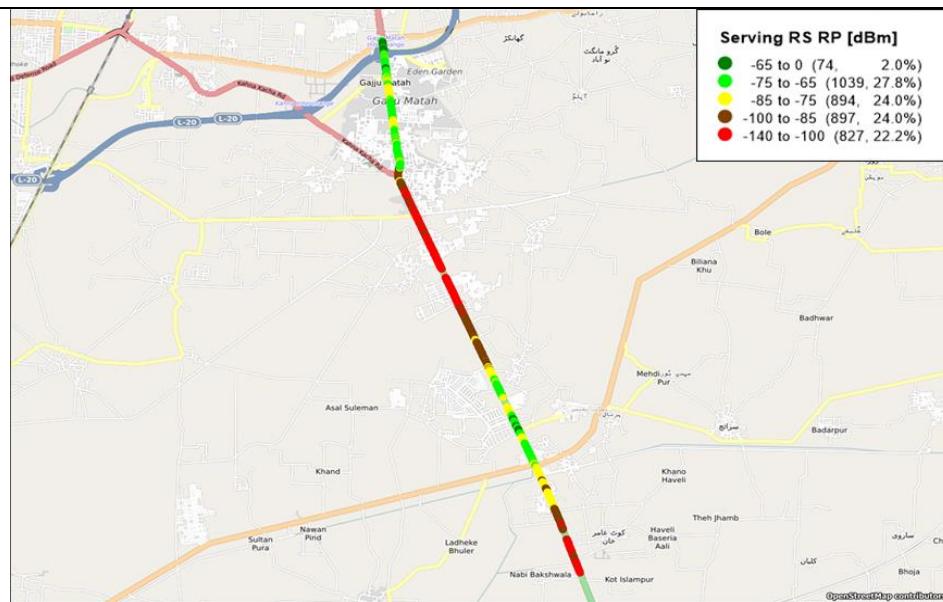
JAZZ 4G NETWORK COVERAGE – LAHORE TO KASUR



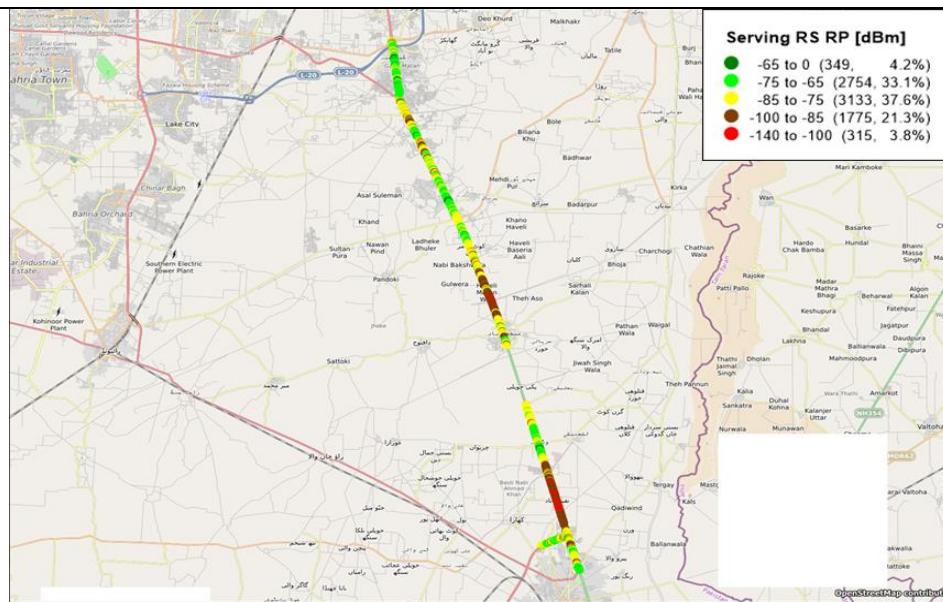
TELENOR 4G NETWORK COVERAGE – LAHORE TO KASUR



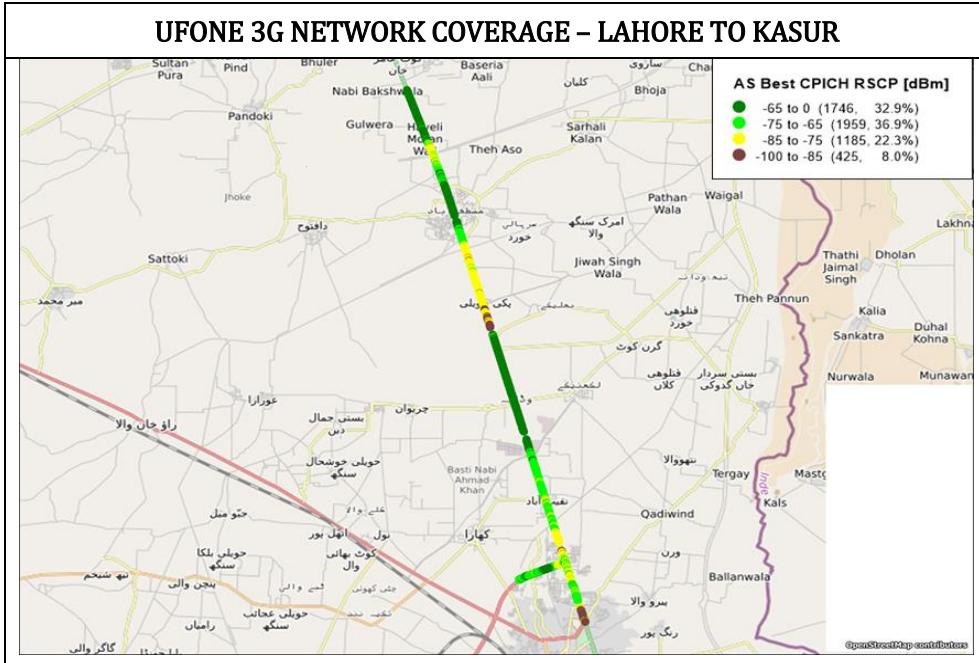
UFONE 4G NETWORK COVERAGE – LAHORE TO KASUR



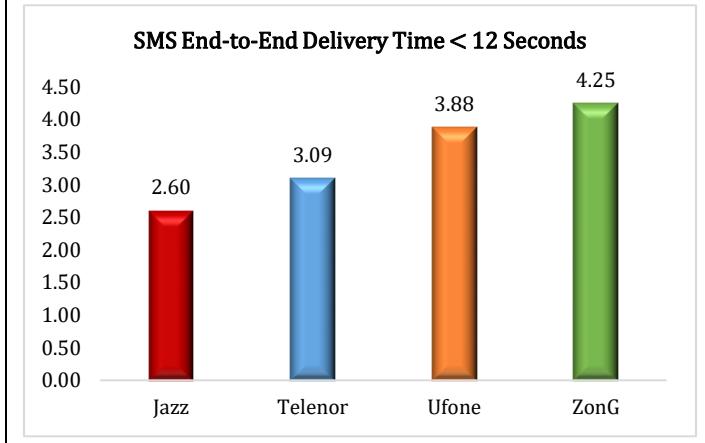
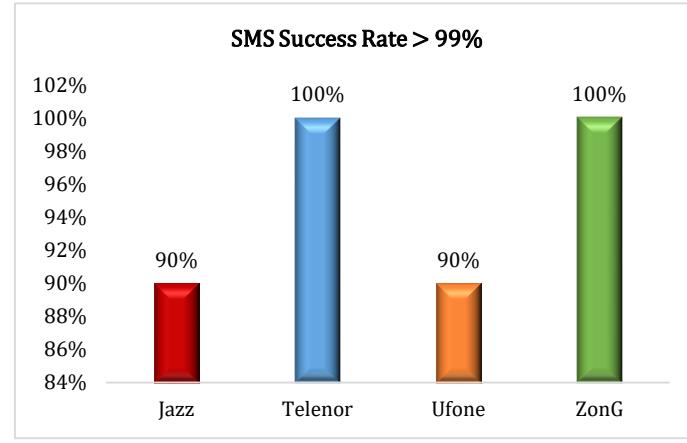
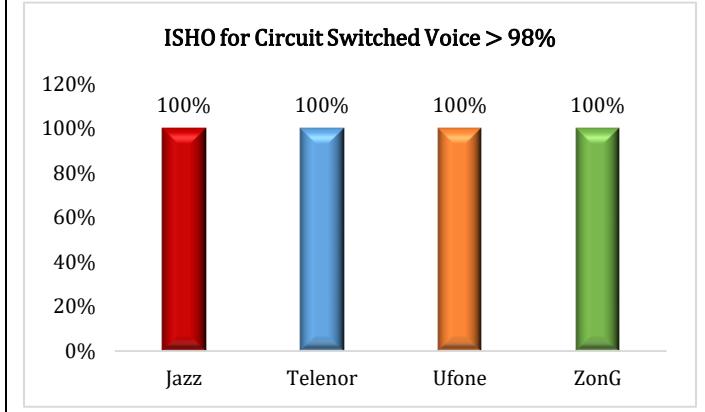
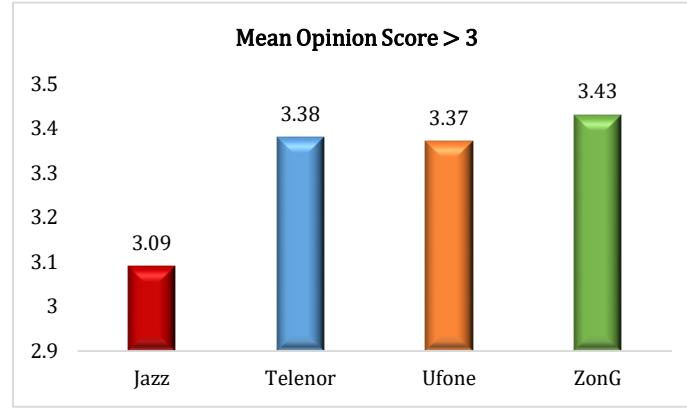
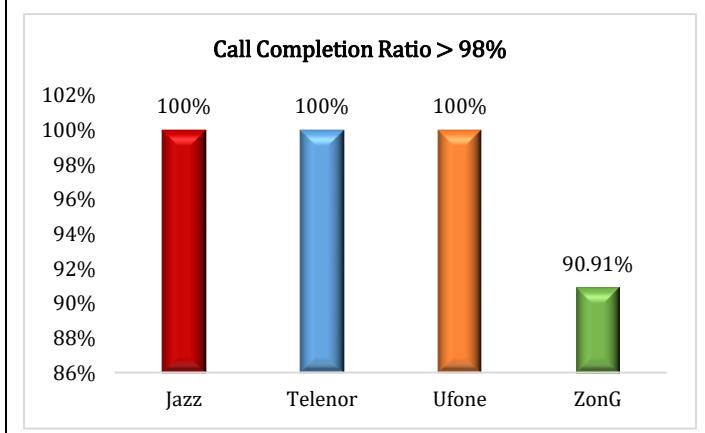
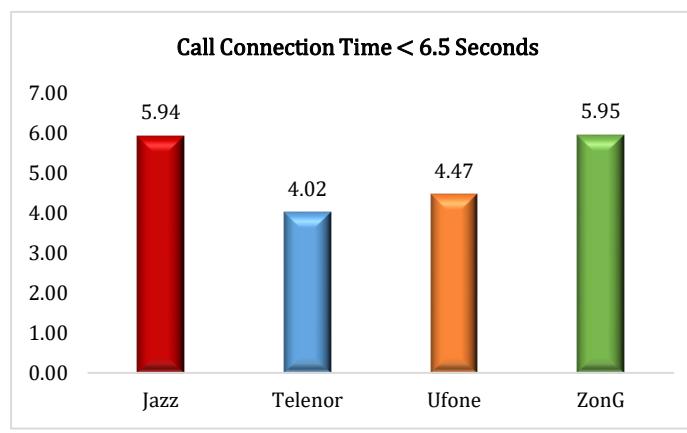
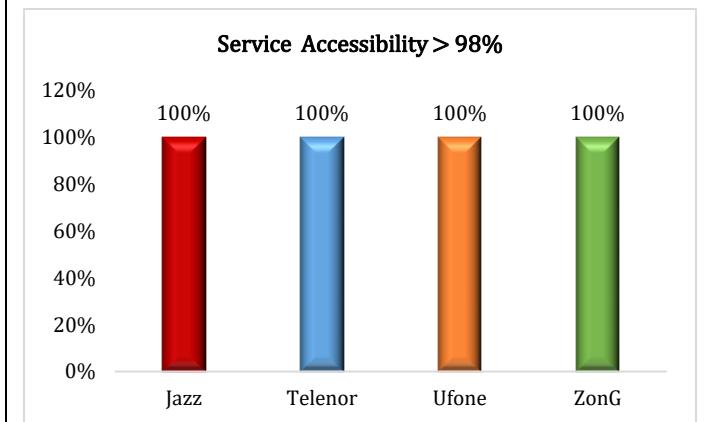
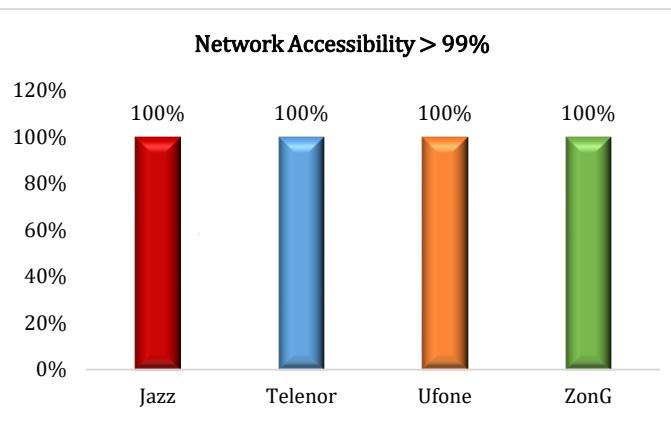
ZONG 4G NETWORK COVERAGE – LAHORE TO KASUR



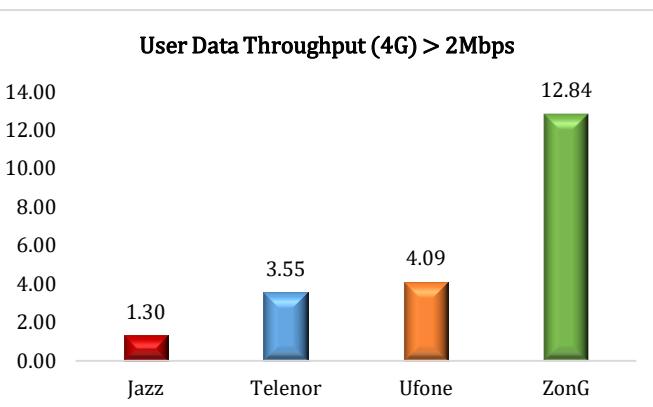
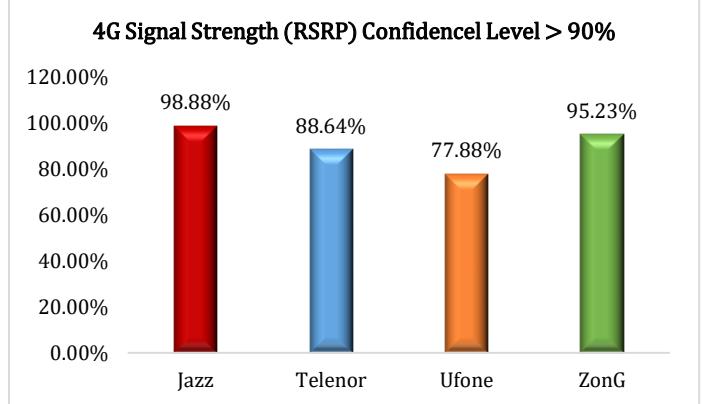
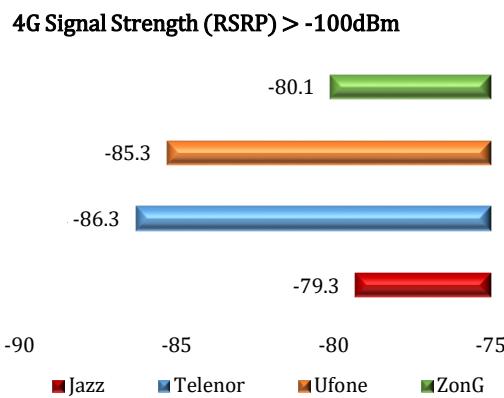
## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)



## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO KASUR

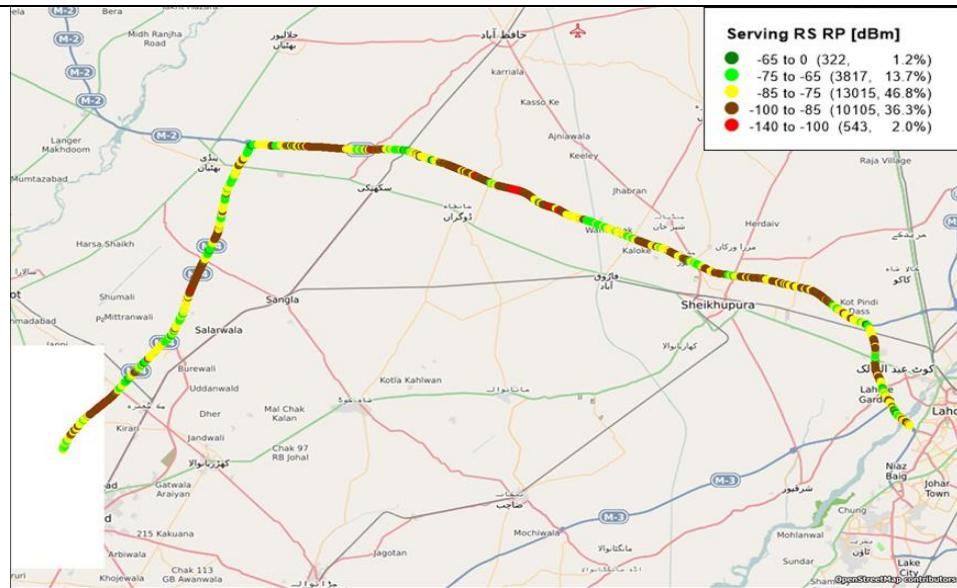


## QUALITY OF SERVICE SURVEY RESULTS -LAHORE TO KASUR

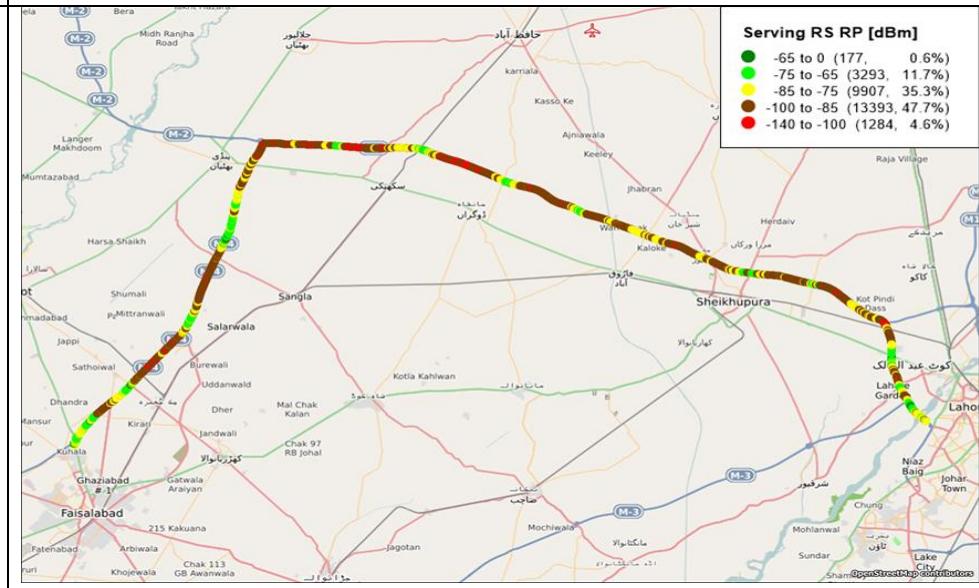


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

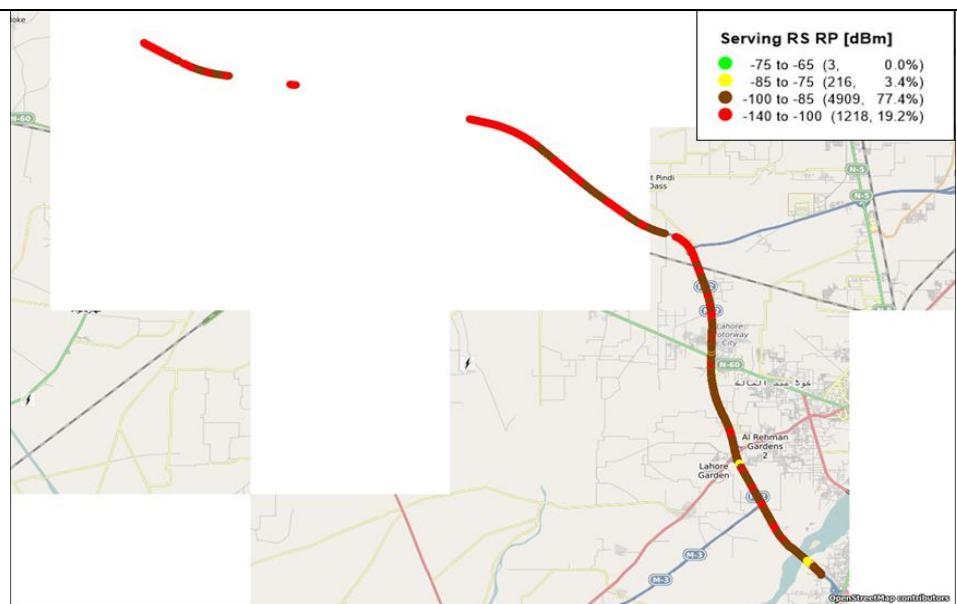
JAZZ 4G NETWORK COVERAGE – LAHORE TO FAISALABAD



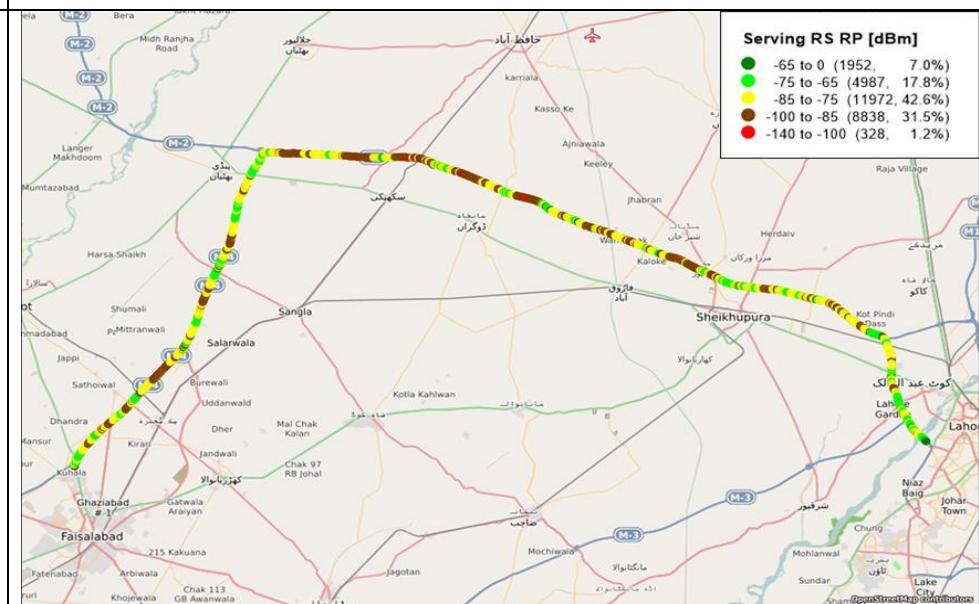
TELENOR 4G NETWORK COVERAGE – LAHORE TO FAISALABAD



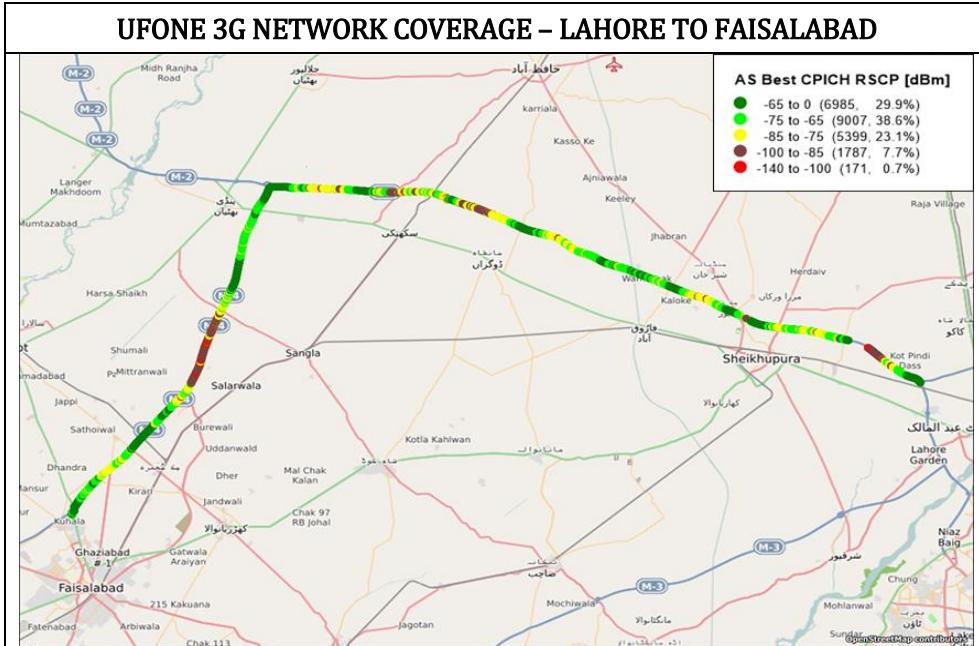
UFONE 4G NETWORK COVERAGE – LAHORE TO FAISALABAD



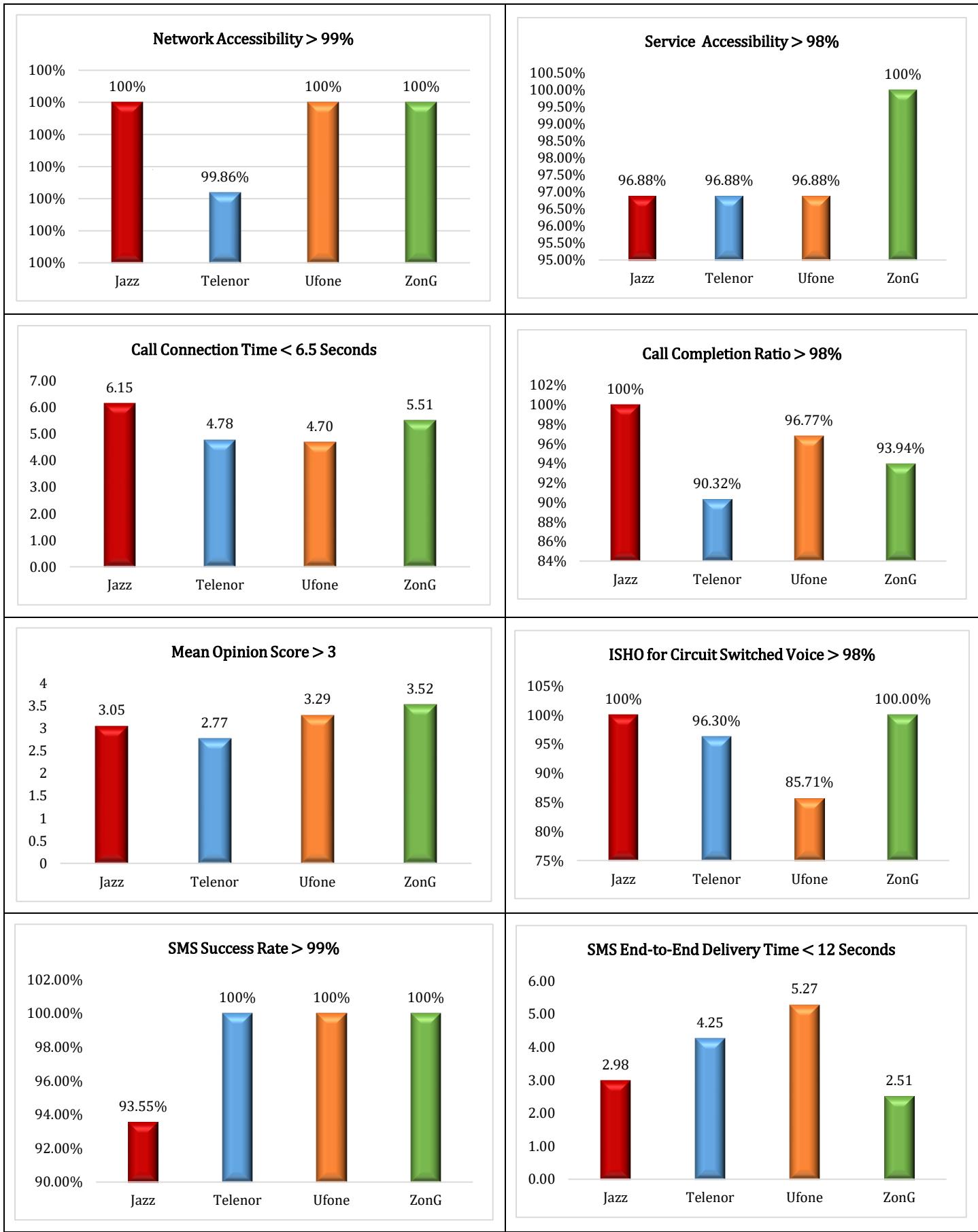
ZONG 4G NETWORK COVERAGE – LAHORE TO FAISALABAD



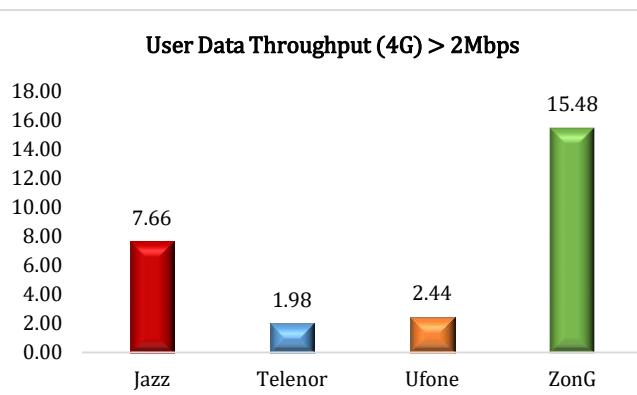
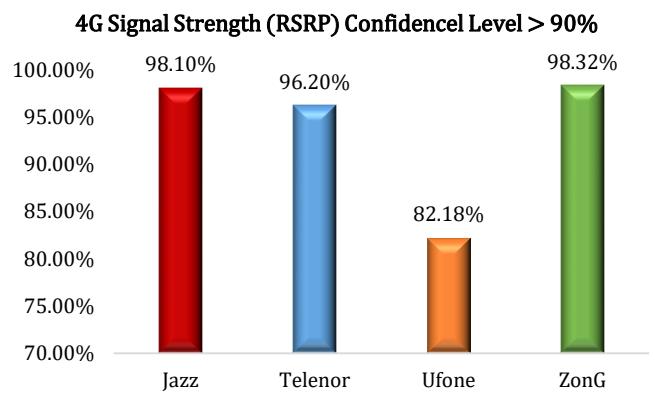
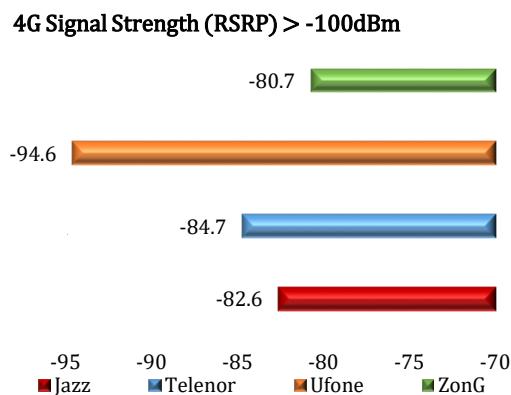
## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)



## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO FAISALABAD

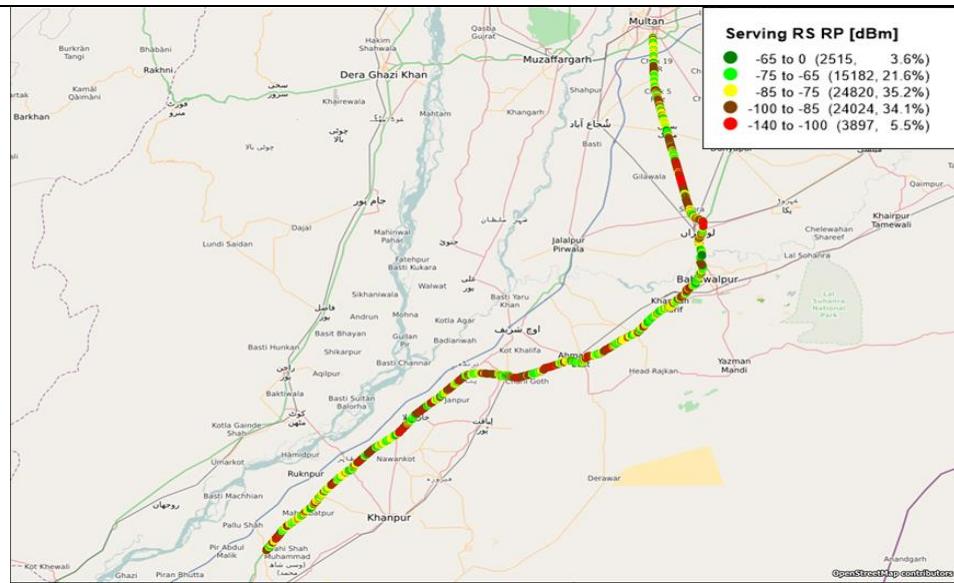


## QUALITY OF SERVICE SURVEY RESULTS – LAHORE TO FAISALABAD

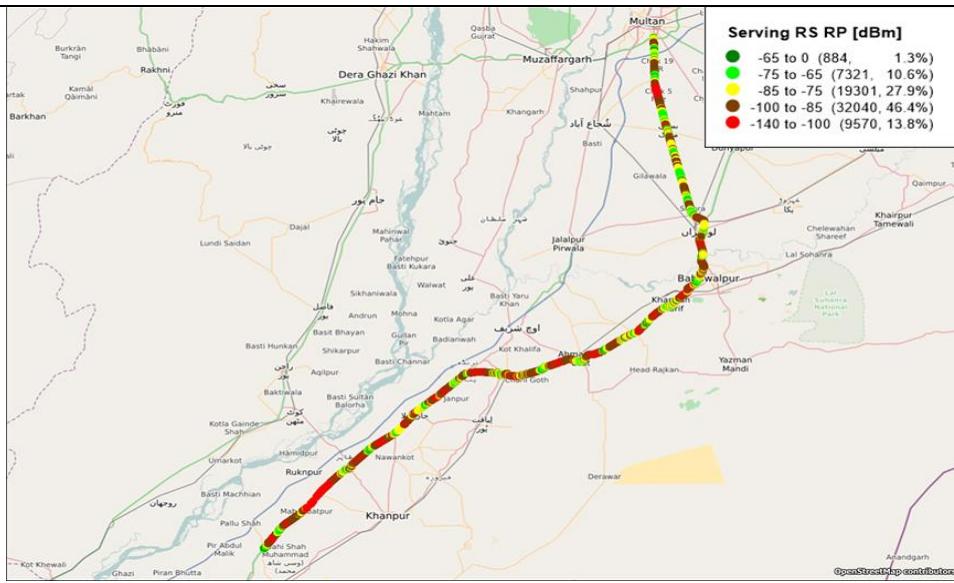


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

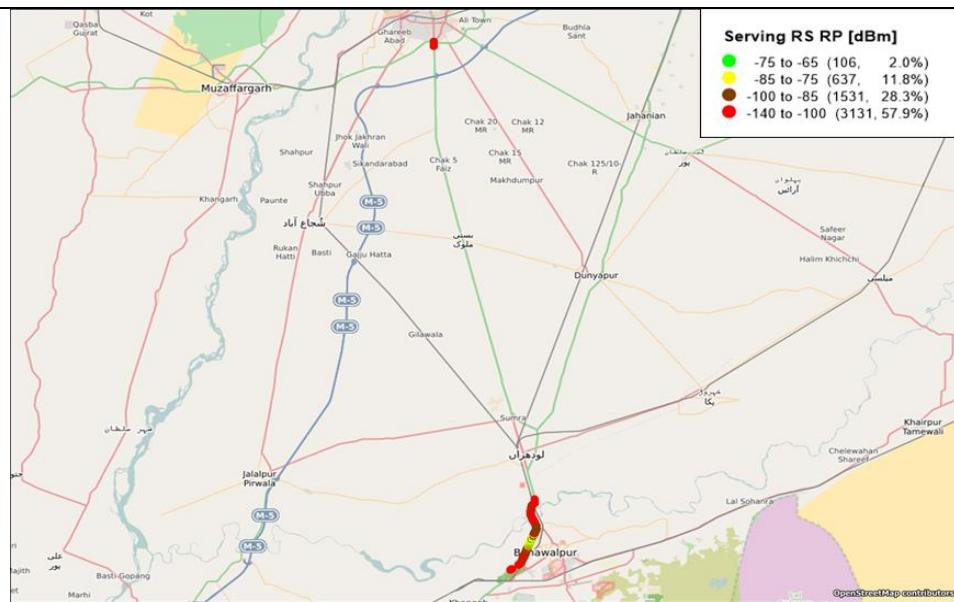
JAZZ 4G NETWORK COVERAGE – RAHIM YAR KHAN TO MULTAN (N5)



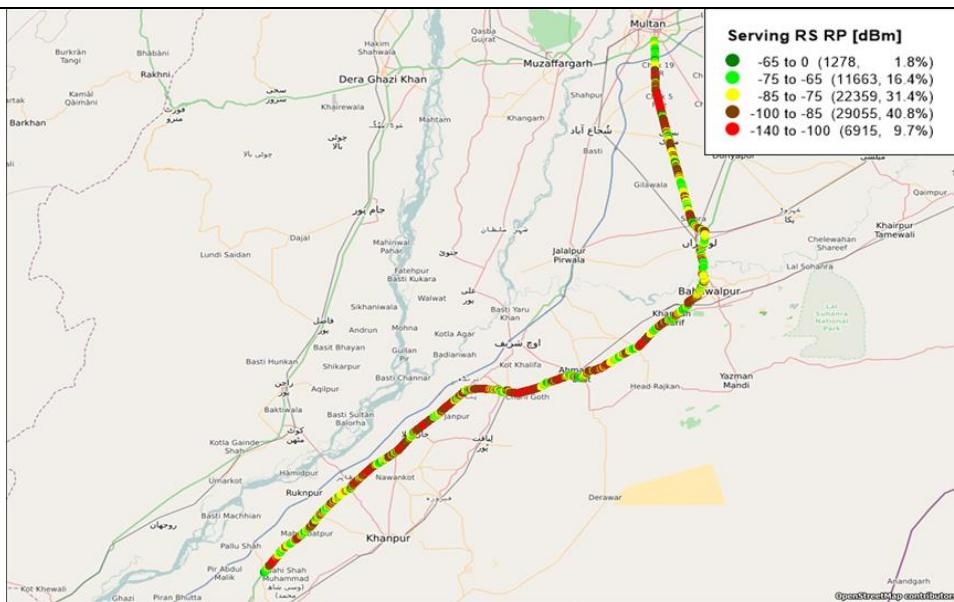
TELENOR 4G NETWORK COVERAGE – RAHIM YAR KHAN TO MULTAN (N5)



UFONE 4G NETWORK COVERAGE – RAHIM YAR KHAN TO MULTAN (N5)

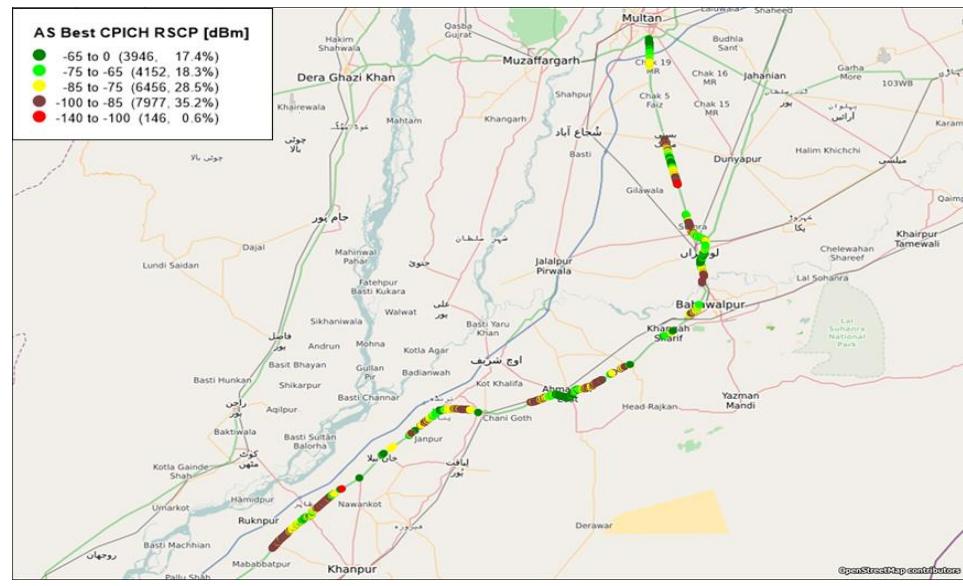


ZONG 4G NETWORK COVERAGE – RAHIM YAR KHAN TO MULTAN (N5)

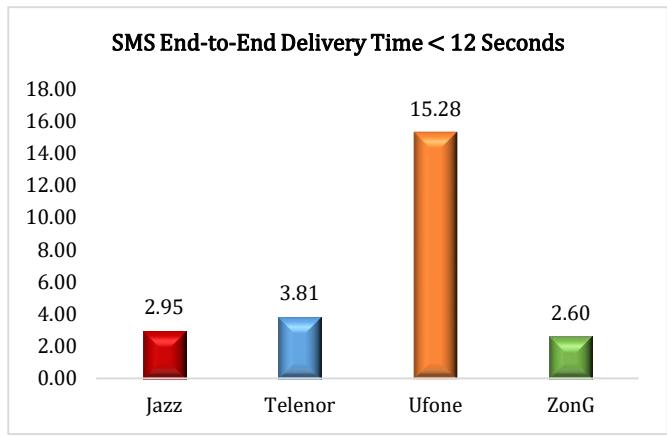
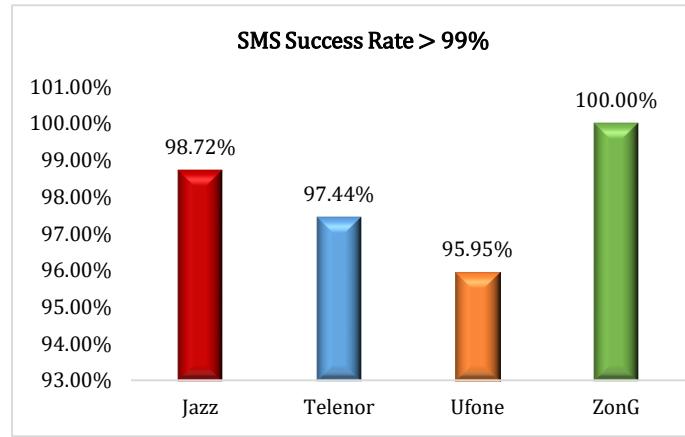
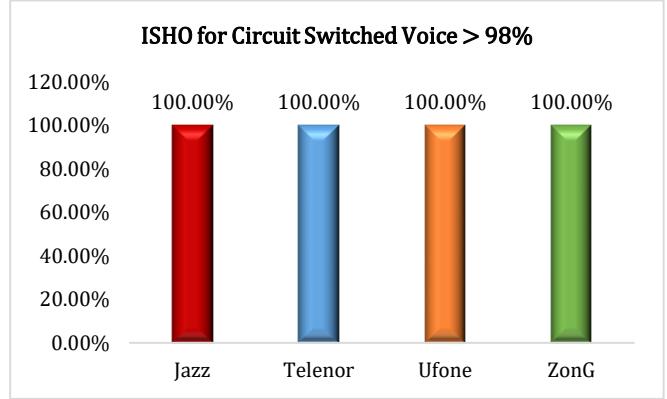
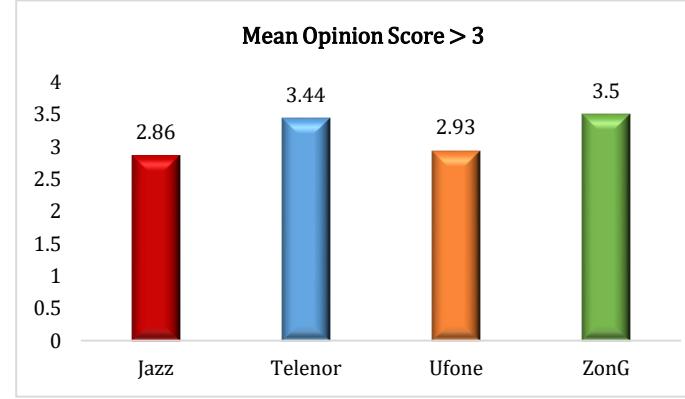
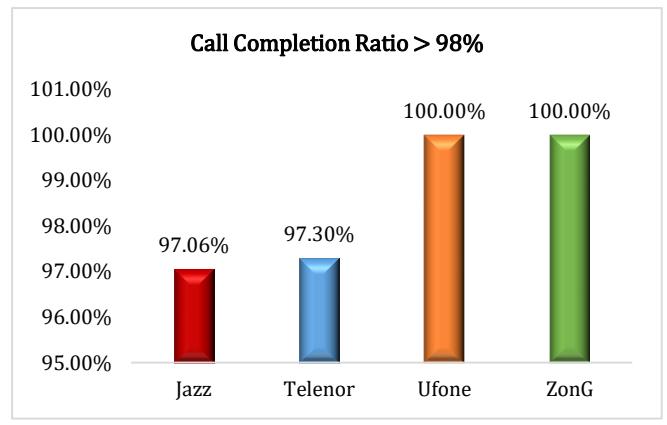
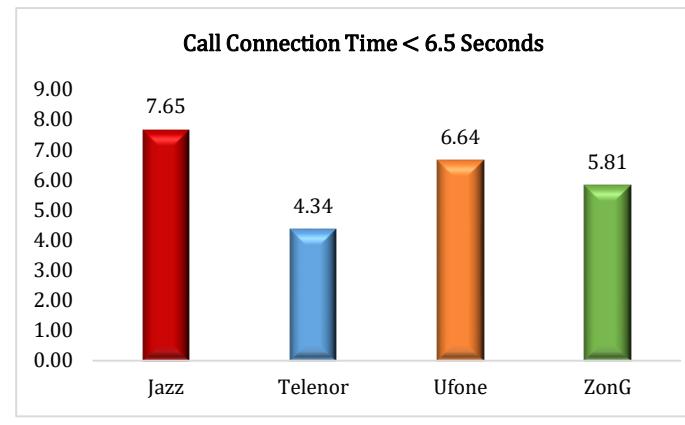
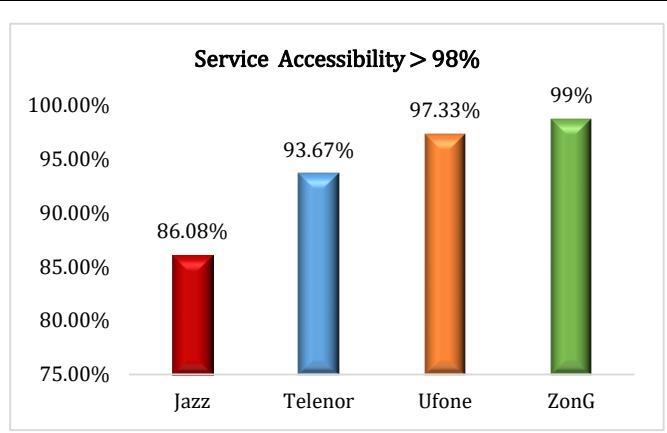
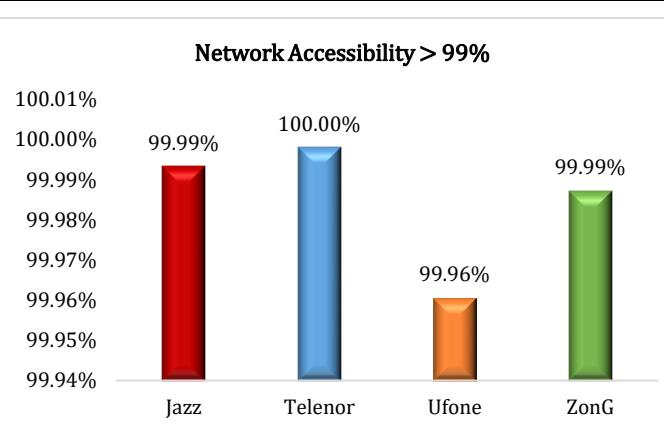


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

### UFONE 3G NETWORK COVERAGE – RAHIM YAR KHAN TO MULTAN (N5)

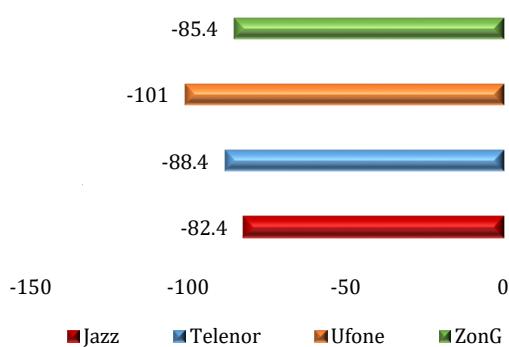


## QUALITY OF SERVICE SURVEY RESULTS – RAHIM YAR KHAN TO MULTAN (N5)

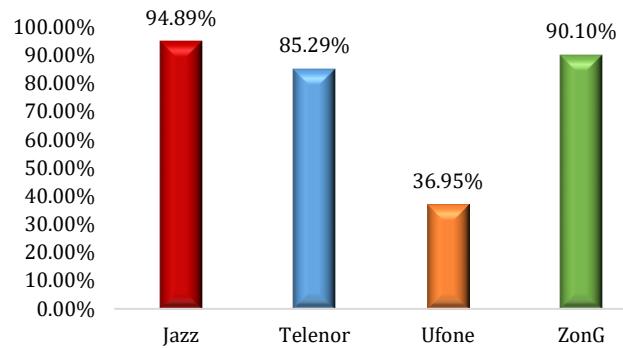


## QUALITY OF SERVICE SURVEY RESULTS – RAHIM YAR KHAN TO MULTAN (N5)

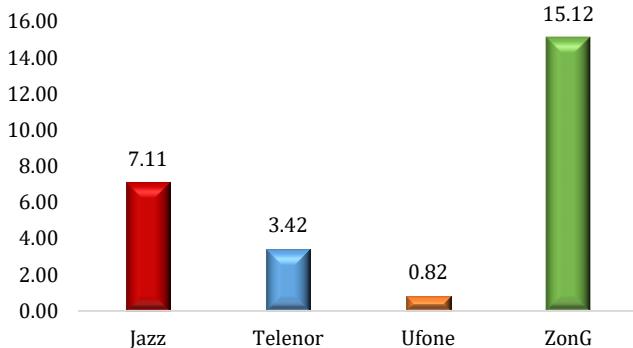
**4G Signal Strength (RSRP) > -100dBm**



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



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

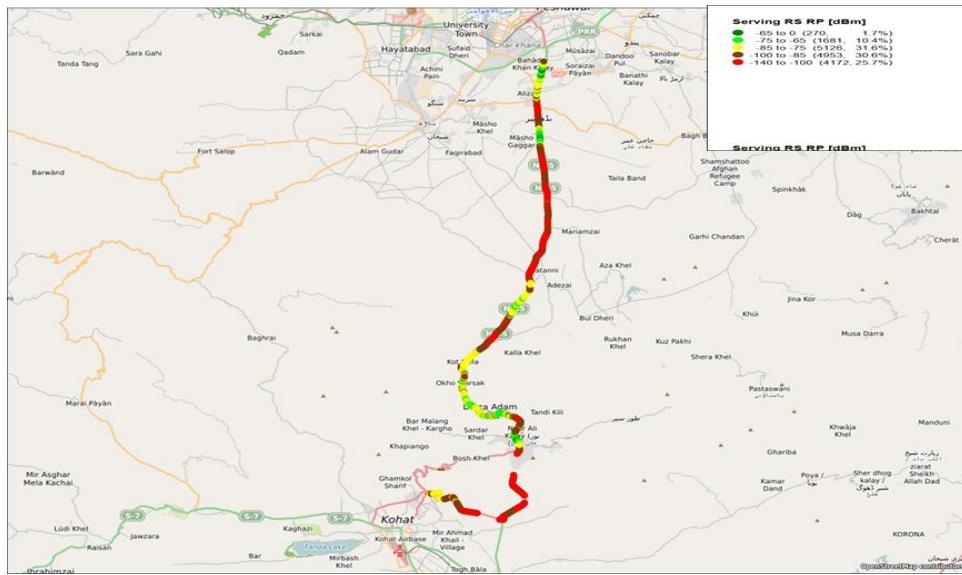


**ANNEX – B**

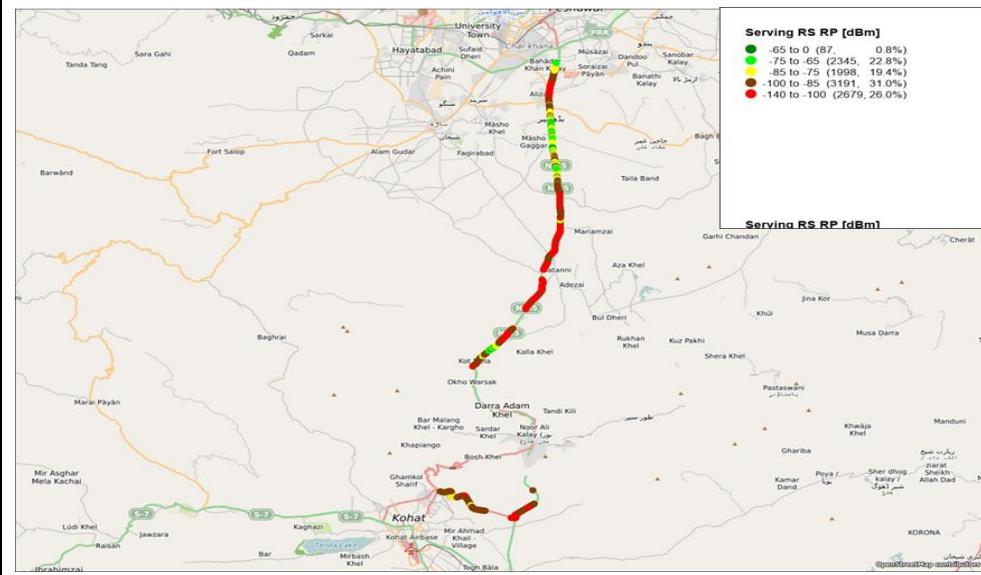
**KHYBER PAKHTUNKHWA**

## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

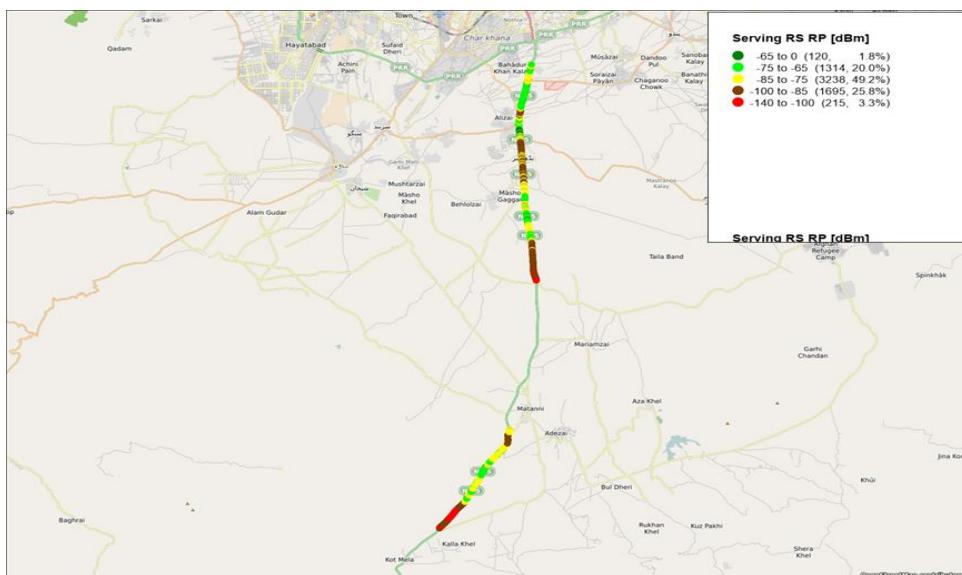
JAZZ 4G NETWORK COVERAGE – PESHAWAR TO KOHAT



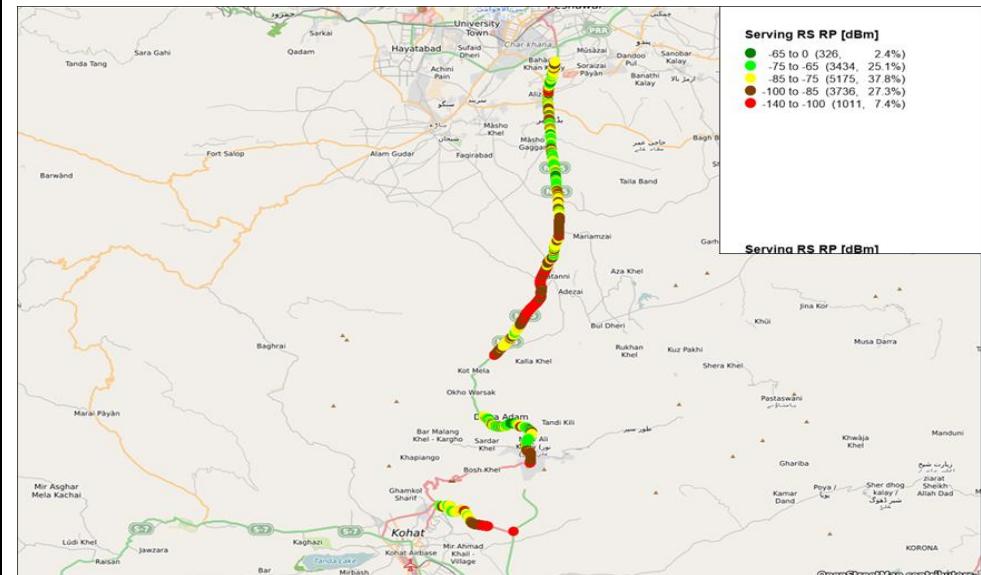
TELENOR 4G NETWORK COVERAGE – PESHAWAR TO KOHAT



UFONE 4G NETWORK COVERAGE – PESHAWAR TO KOHAT

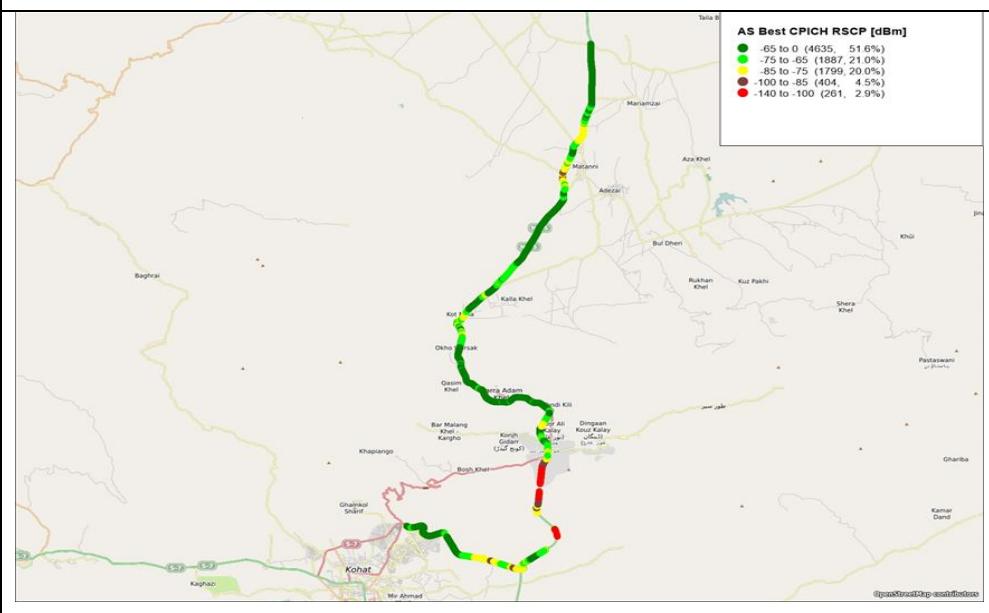


ZONG 4G NETWORK COVERAGE – PESHAWAR TO KOHAT

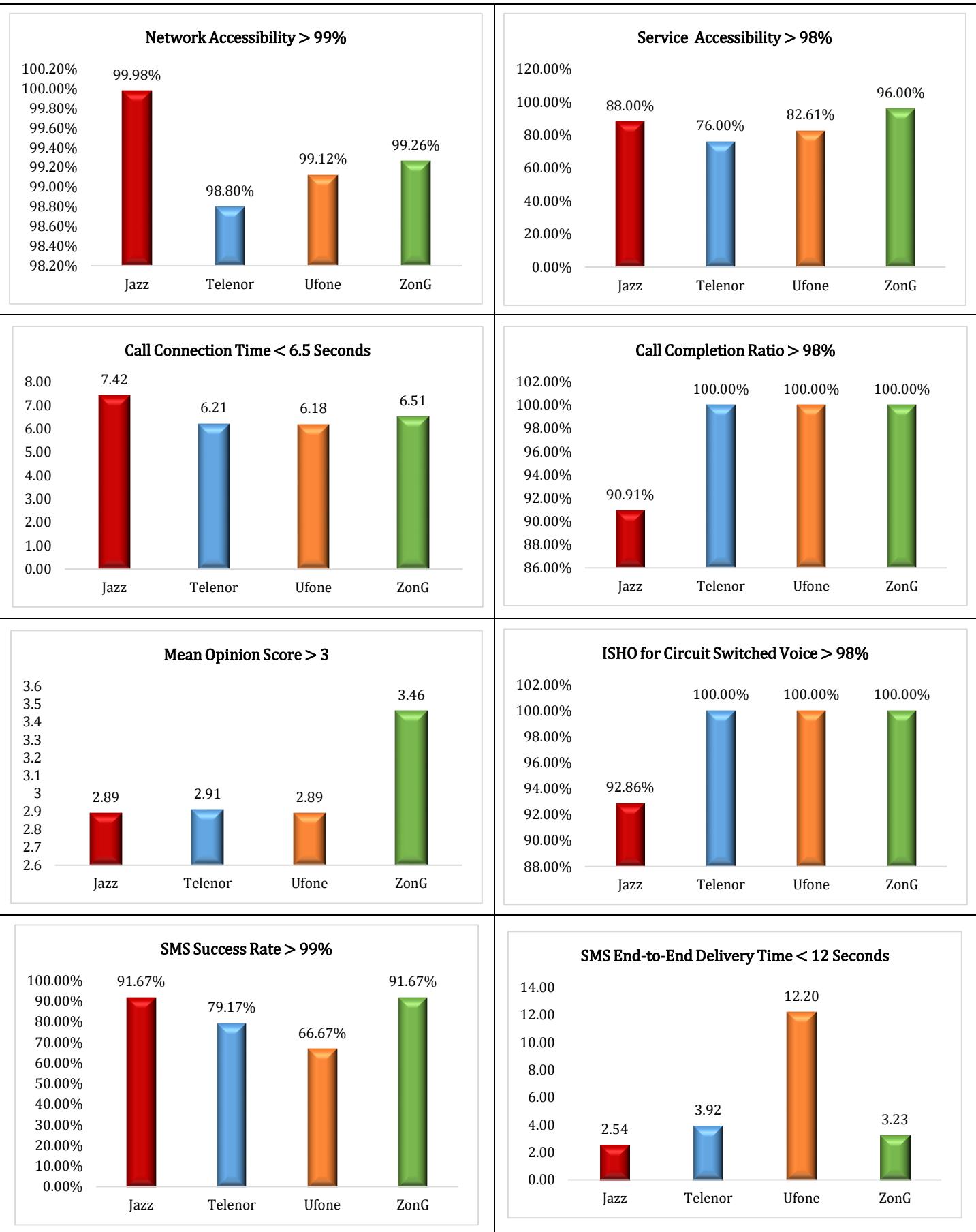


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

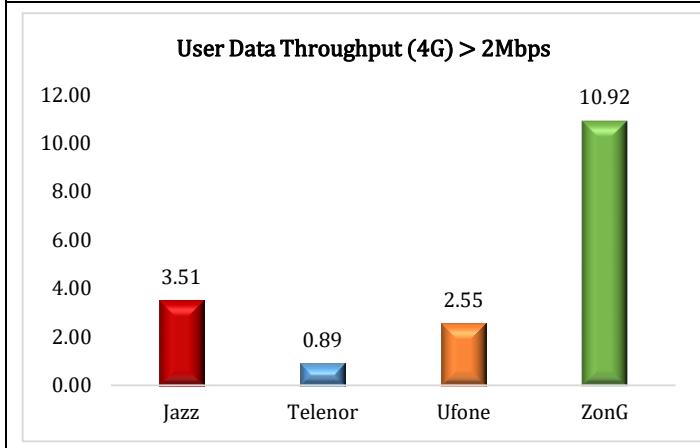
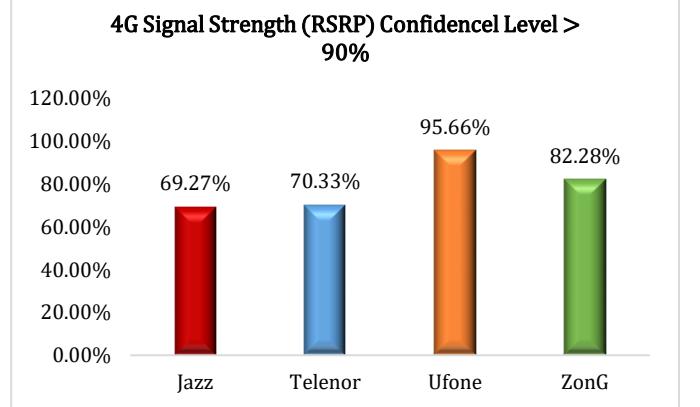
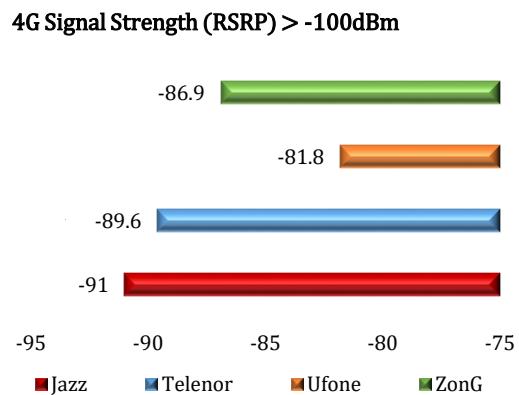
UFONE 3G NETWORK COVERAGE – PESHAWAR TO KOHAT



## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO KOHAT

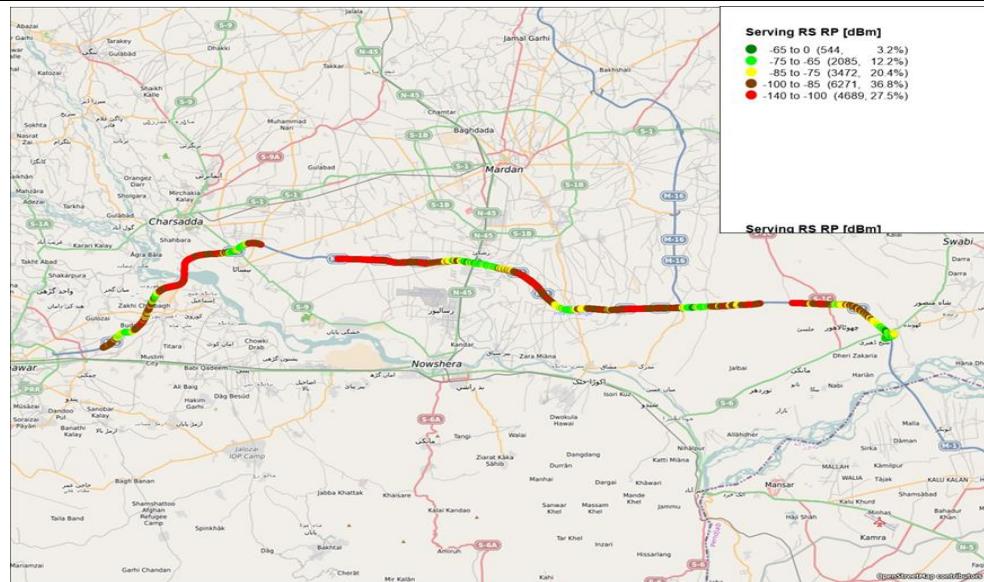


## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO KOHAT

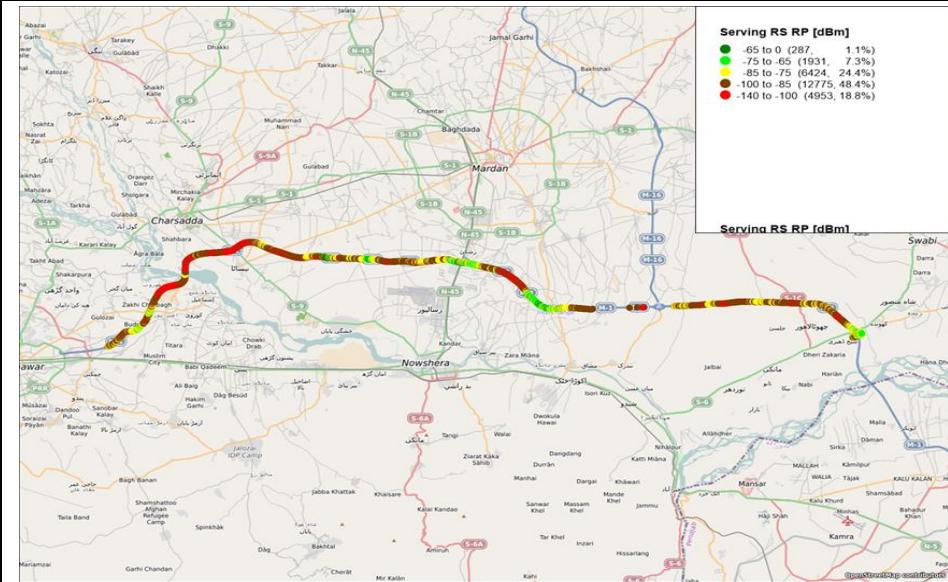


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

JAZZ 4G NETWORK COVERAGE – PESHAWAR TO SWABI



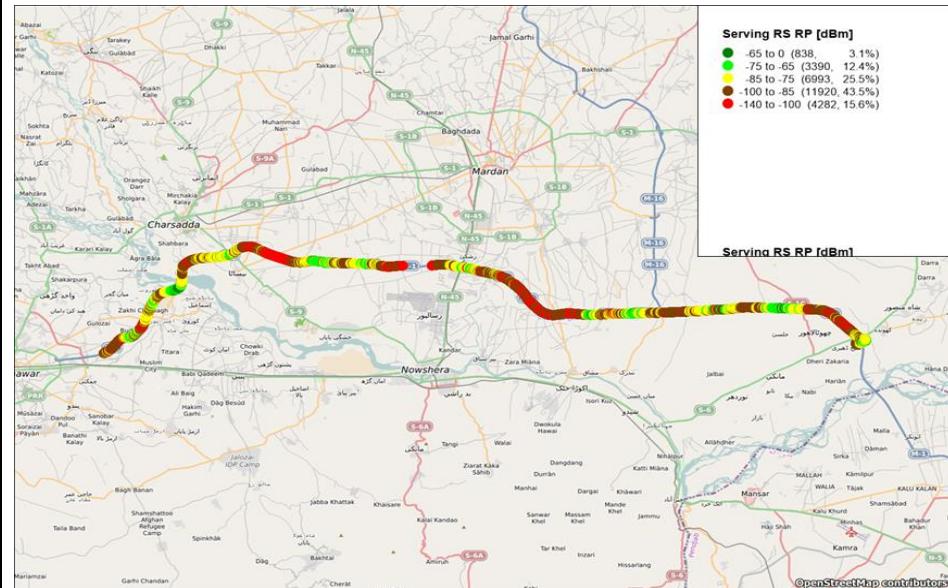
TELENOR 4G NETWORK COVERAGE – PESHAWAR TO SWABI



UFONE 4G NETWORK COVERAGE – PESHAWAR TO SWABI

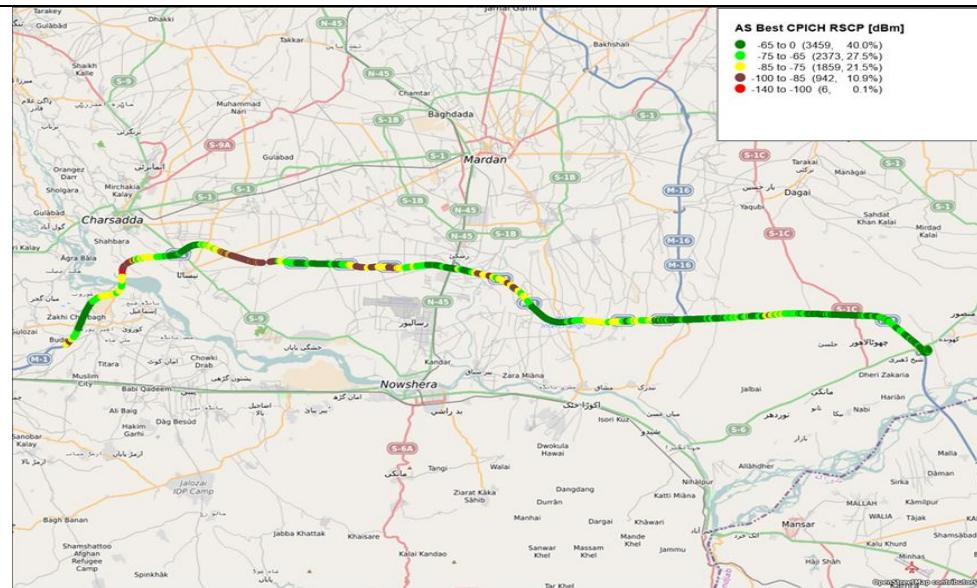
NO 4G NETWORK

ZONG 4G NETWORK COVERAGE – PESHAWAR TO SWABI

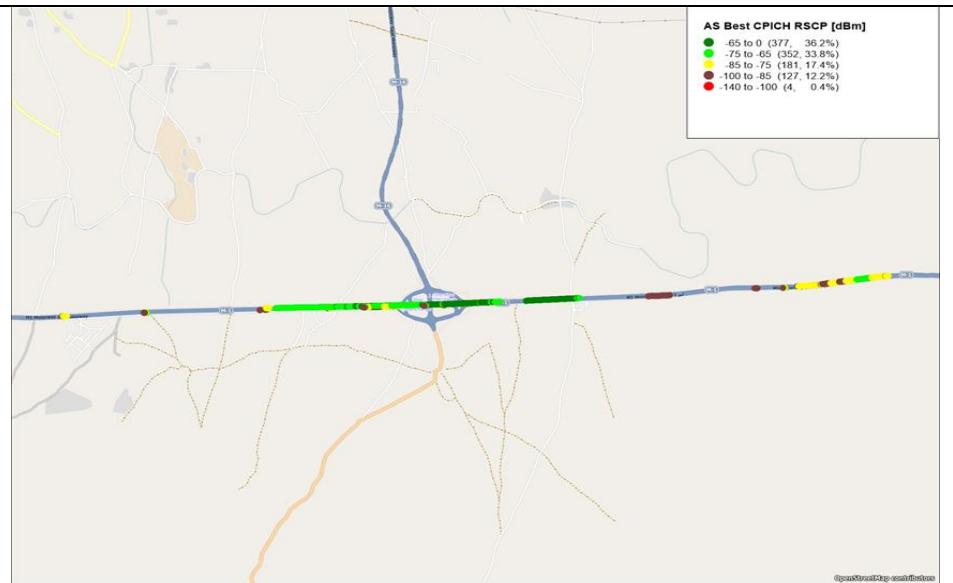


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

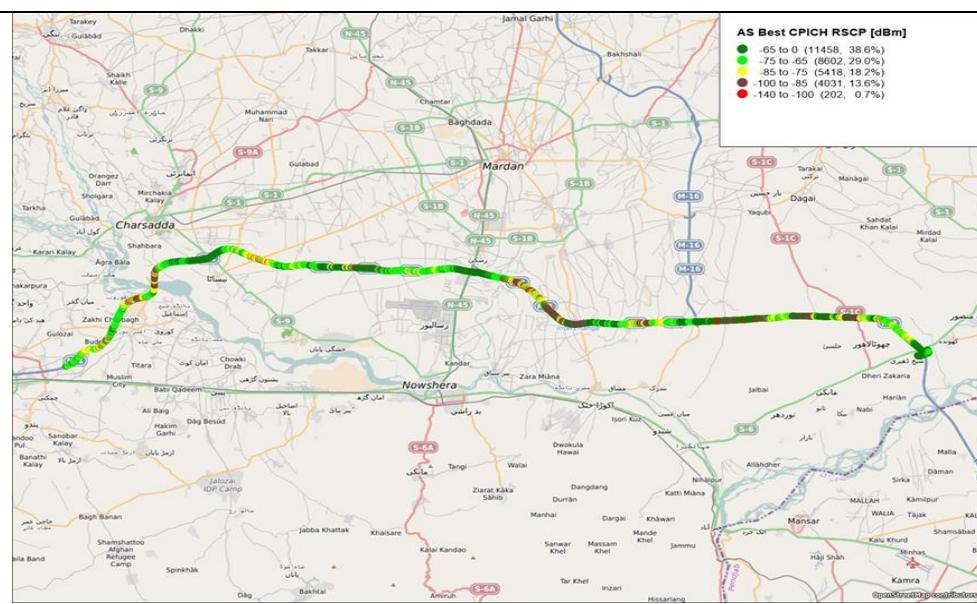
JAZZ 3G NETWORK COVERAGE – PESHAWAR TO SWABI



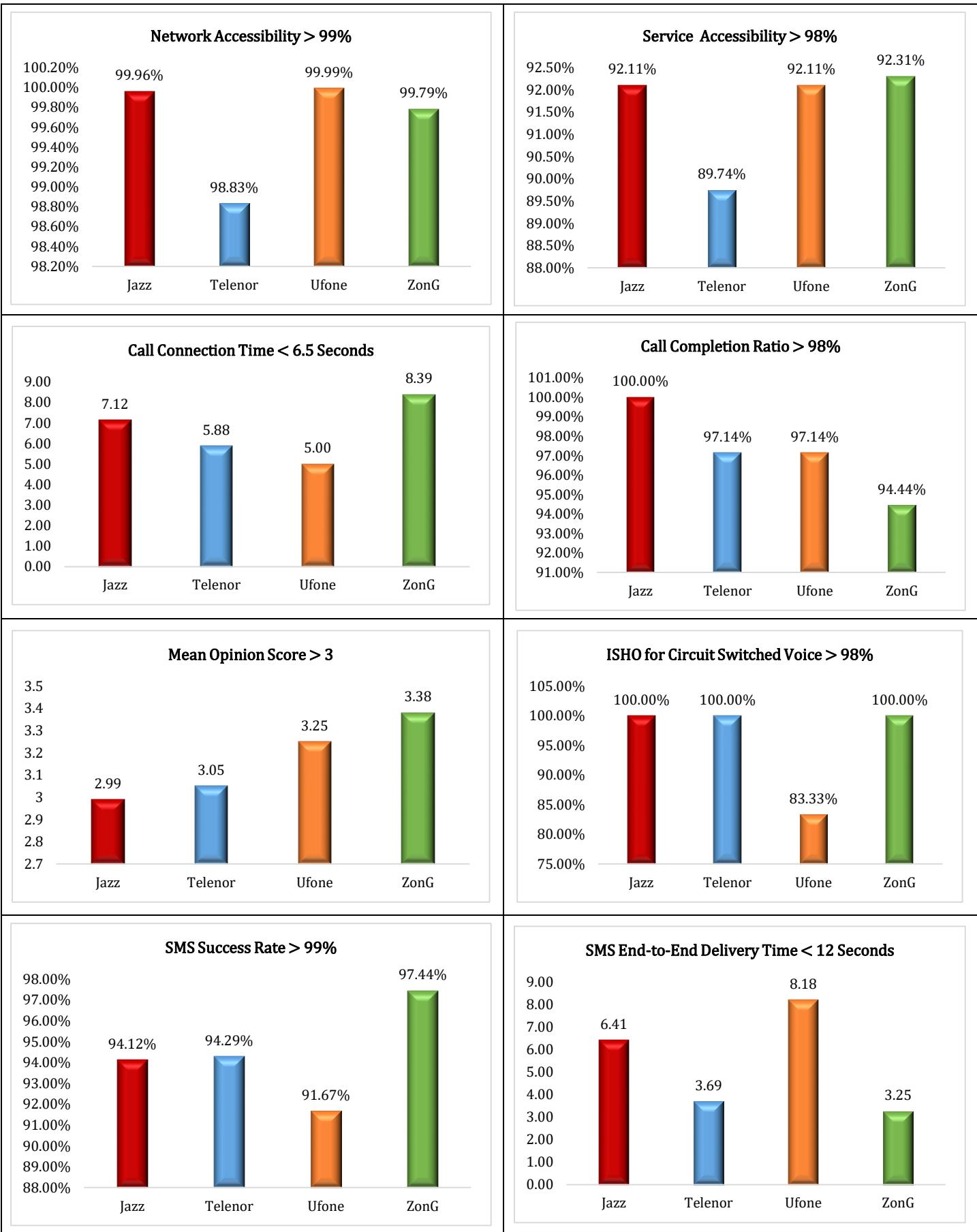
TELENOR 3G NETWORK COVERAGE – PESHAWAR TO SWABI



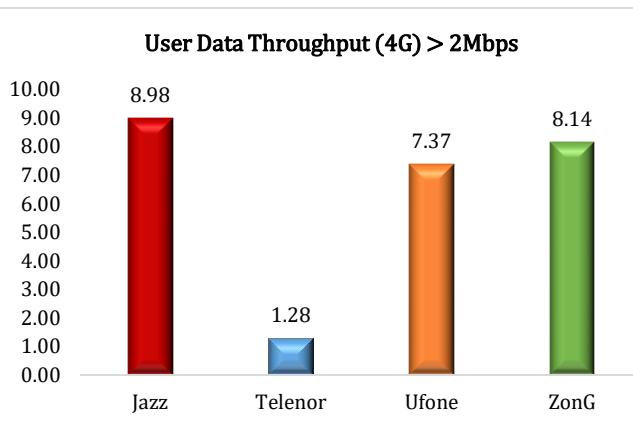
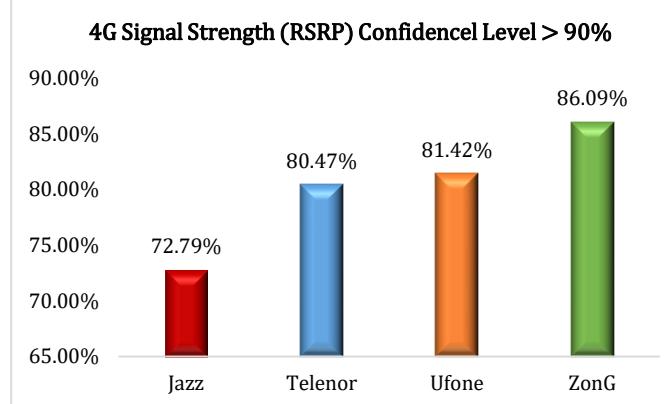
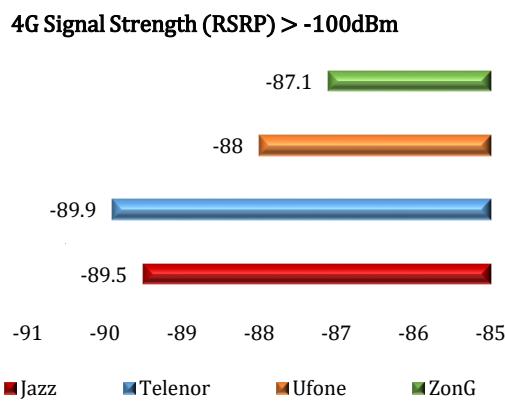
UFONE 3G NETWORK COVERAGE – PESHAWAR TO SWABI



## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO SWABI

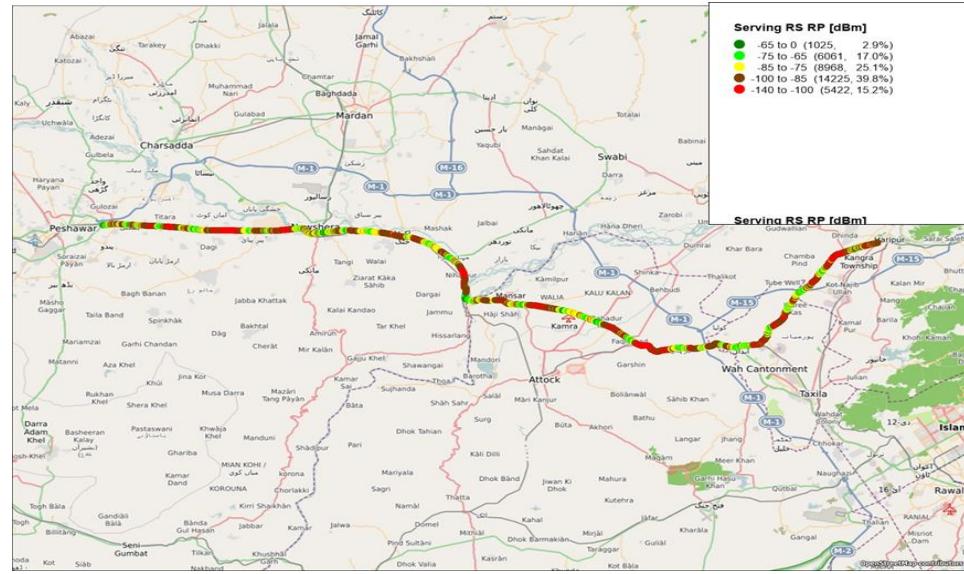


## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO SWABI

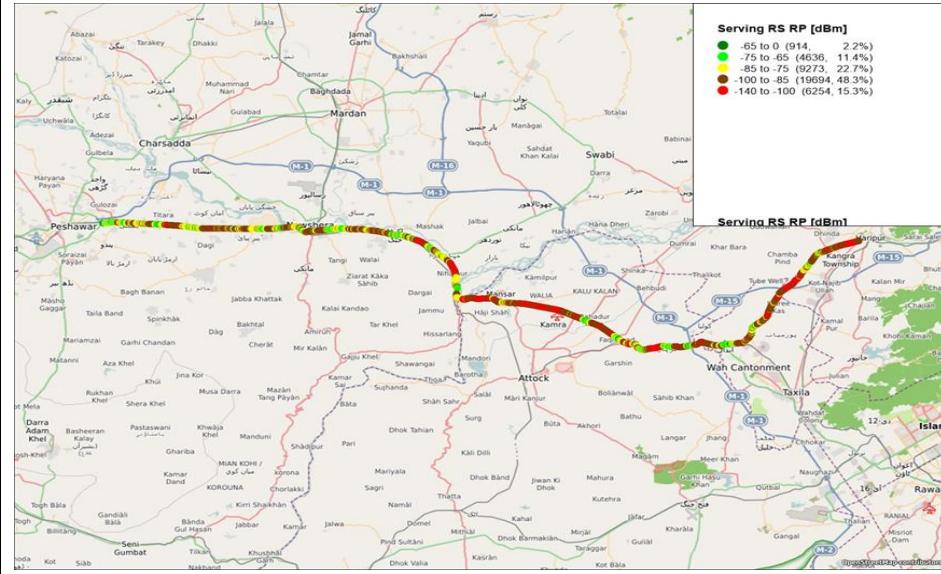


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

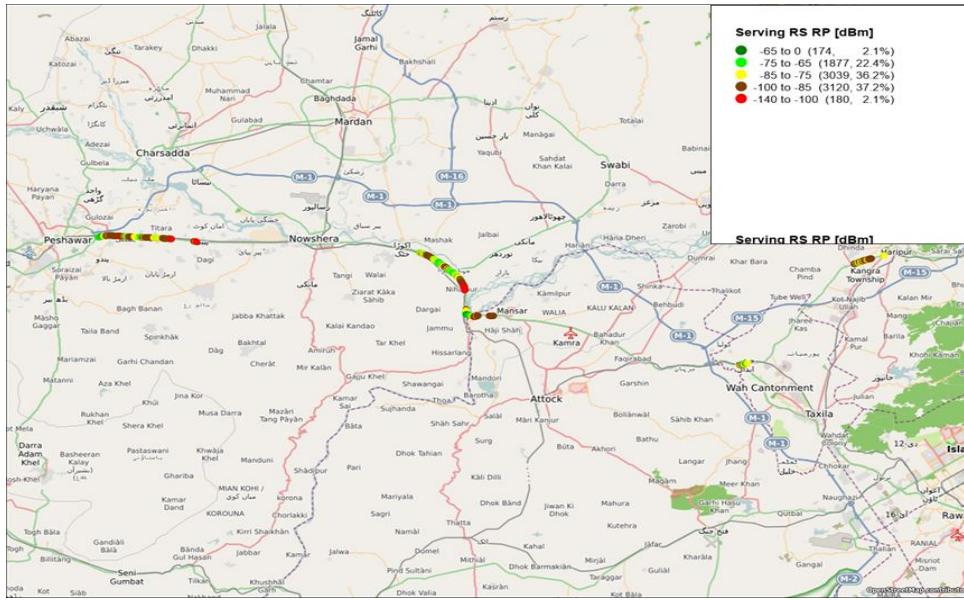
JAZZ 4G NETWORK COVERAGE – PESHAWAR TO HARIPUR



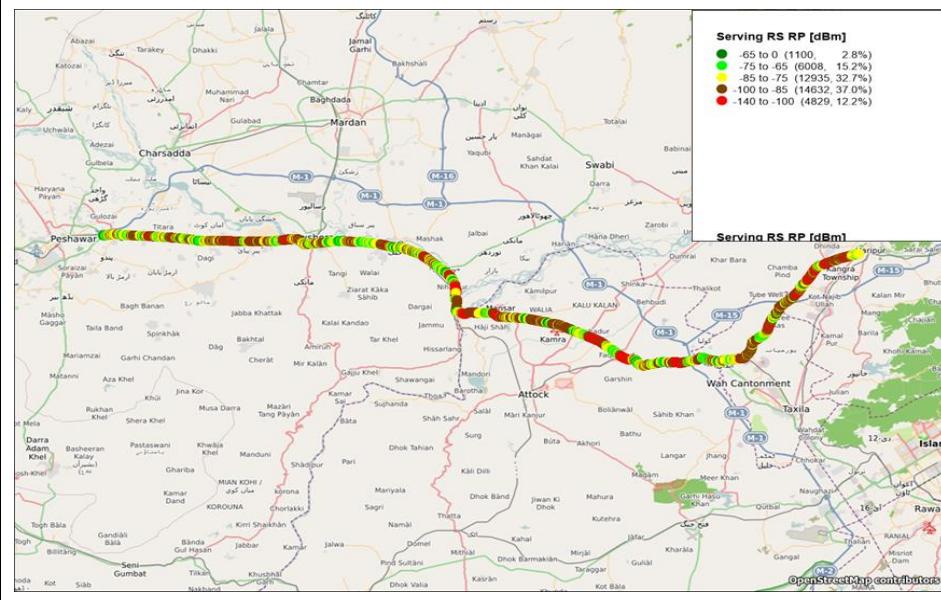
TELENOR 4G NETWORK COVERAGE – PESHAWAR TO HARIPUR



UFONE 4G NETWORK COVERAGE – PESHAWAR TO HARIPUR

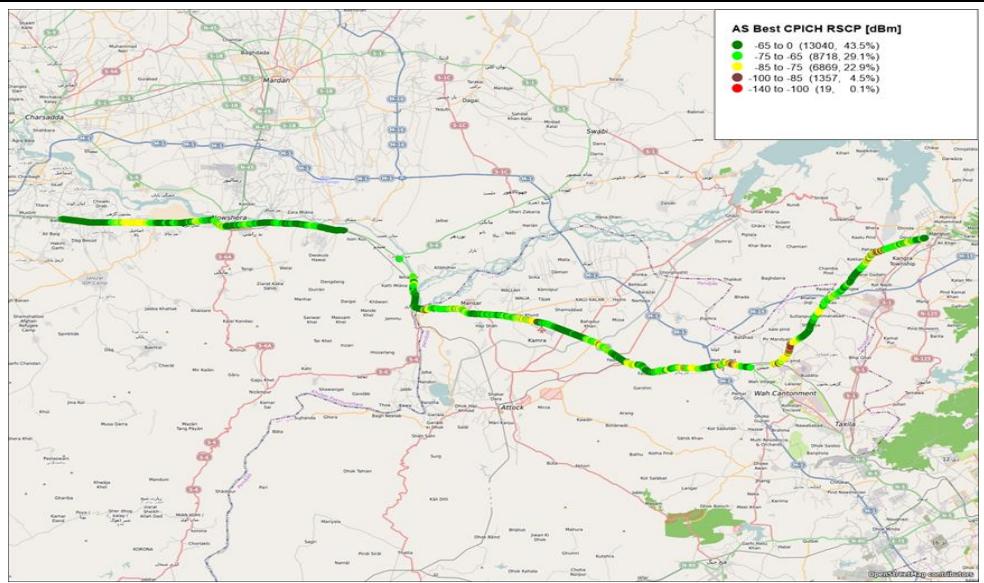


ZONG 4G NETWORK COVERAGE – PESHAWAR TO HARIPUR

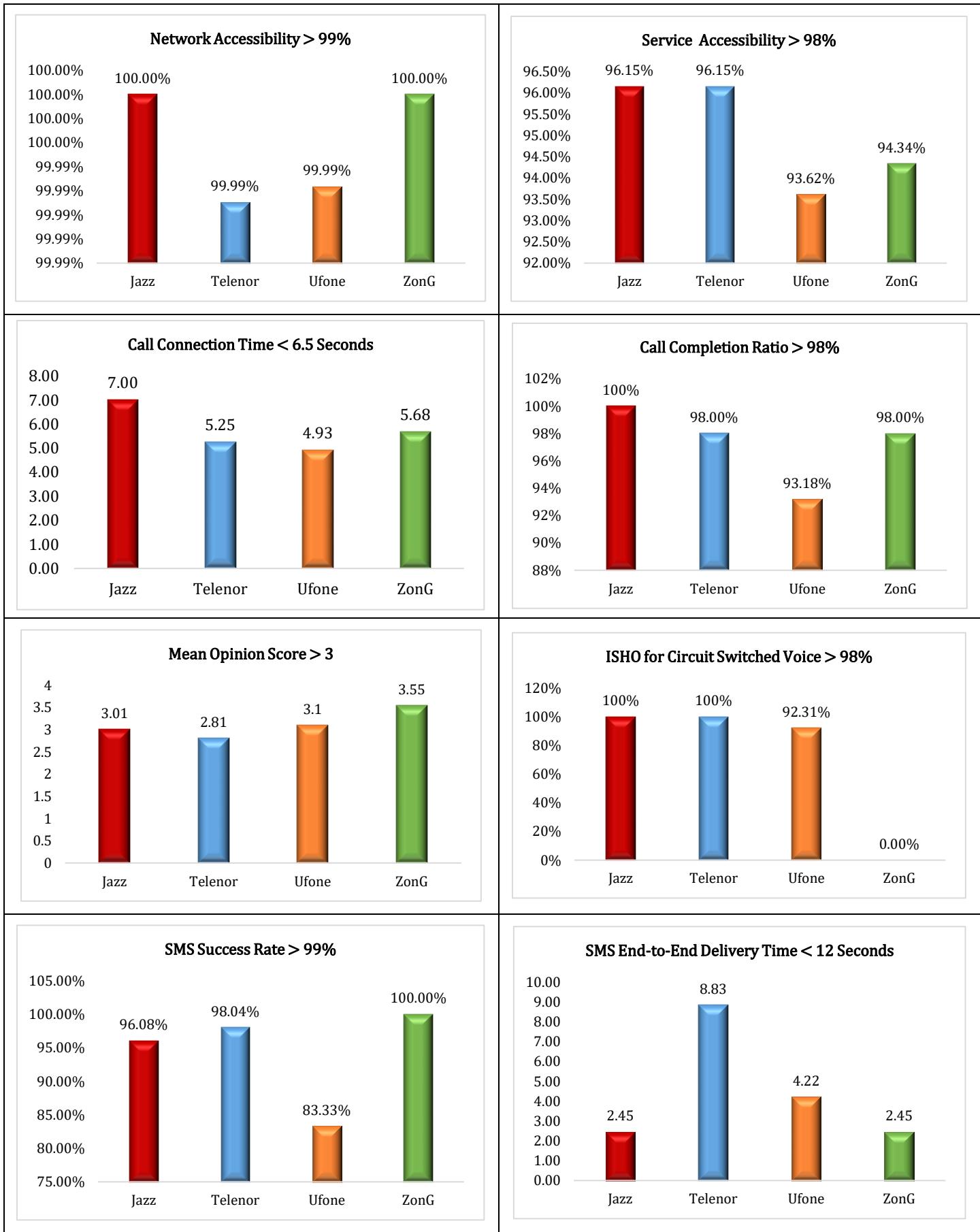


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

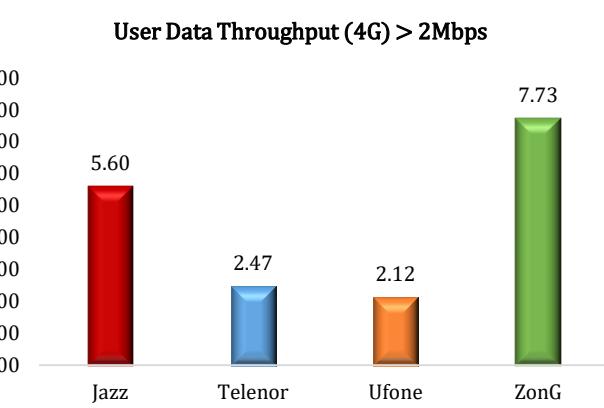
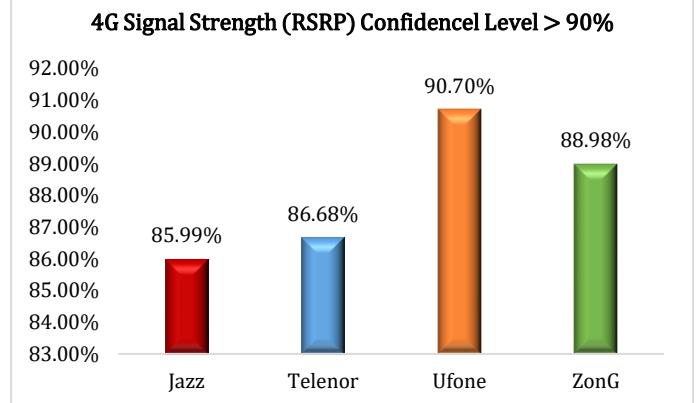
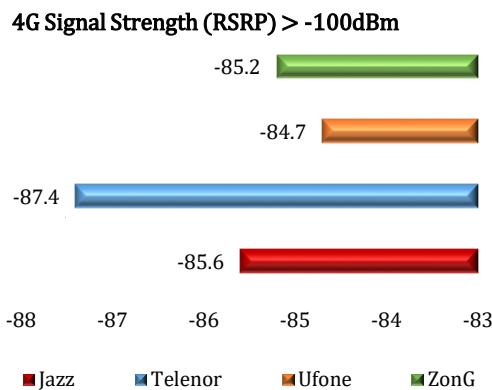
### UFONE 3G NETWORK COVERAGE – PESHAWAR TO HARIPUR



## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO HARIPUR

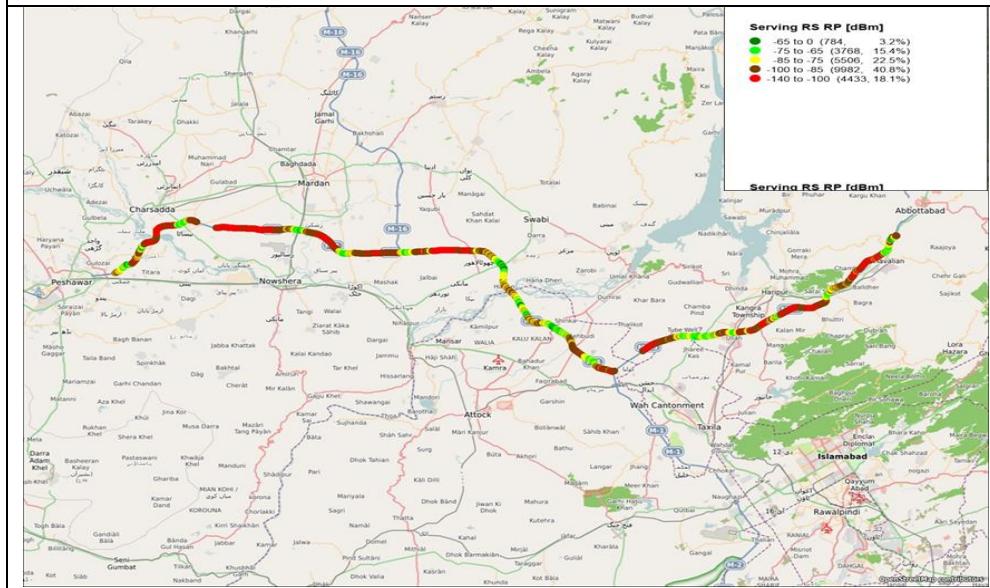


## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO HARIPUR

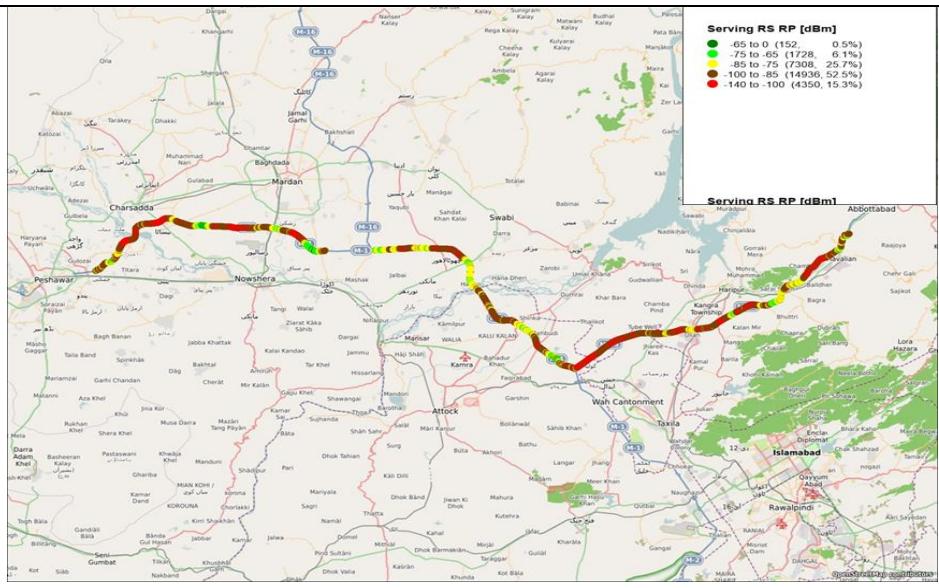


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

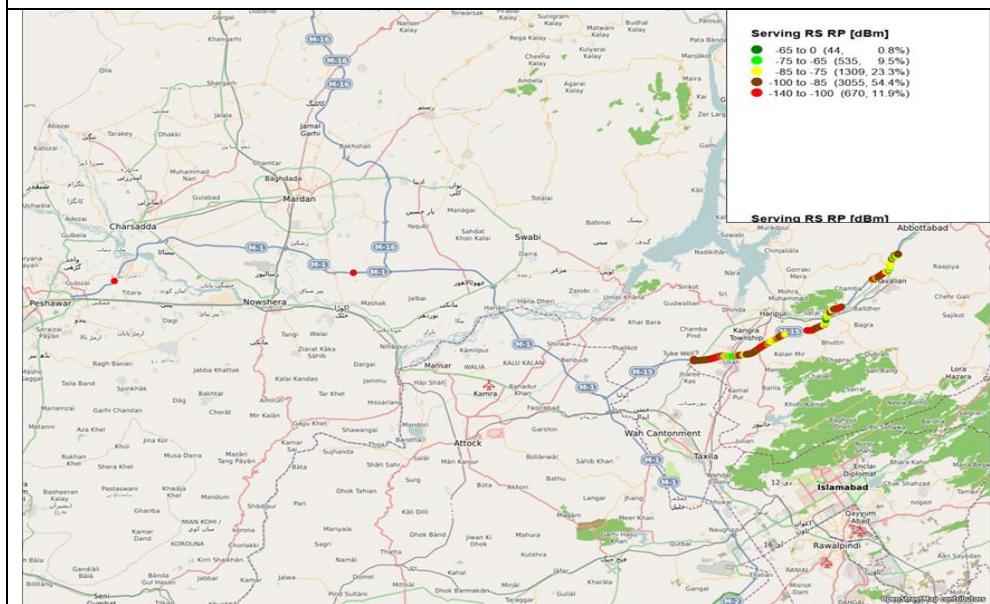
JAZZ 4G NETWORK COVERAGE – PESHAWAR TO ABBOTTABAD



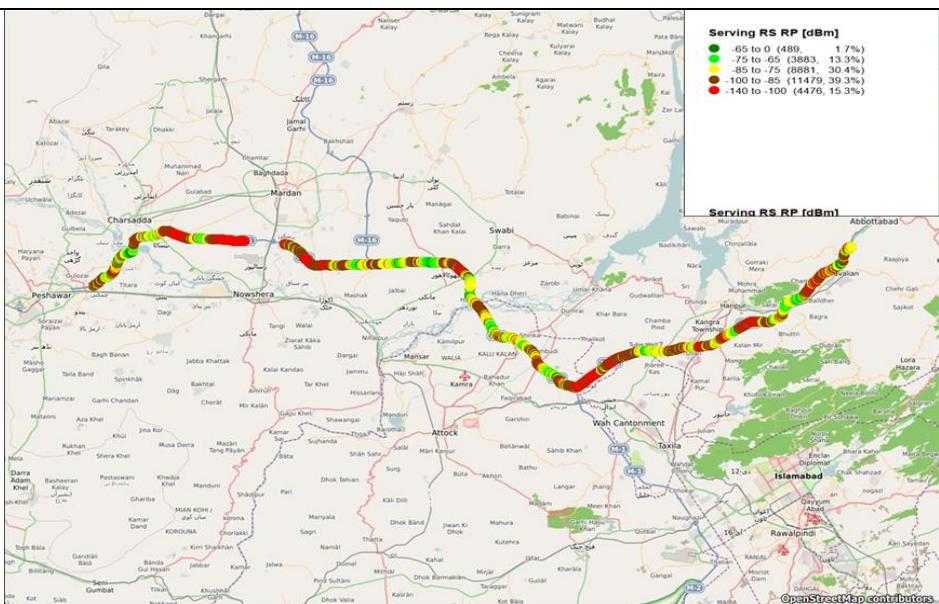
TELENOR 4G NETWORK COVERAGE – PESHAWAR TO ABBOTTABAD



UFONE 4G NETWORK COVERAGE – PESHAWAR TO ABBOTTABAD

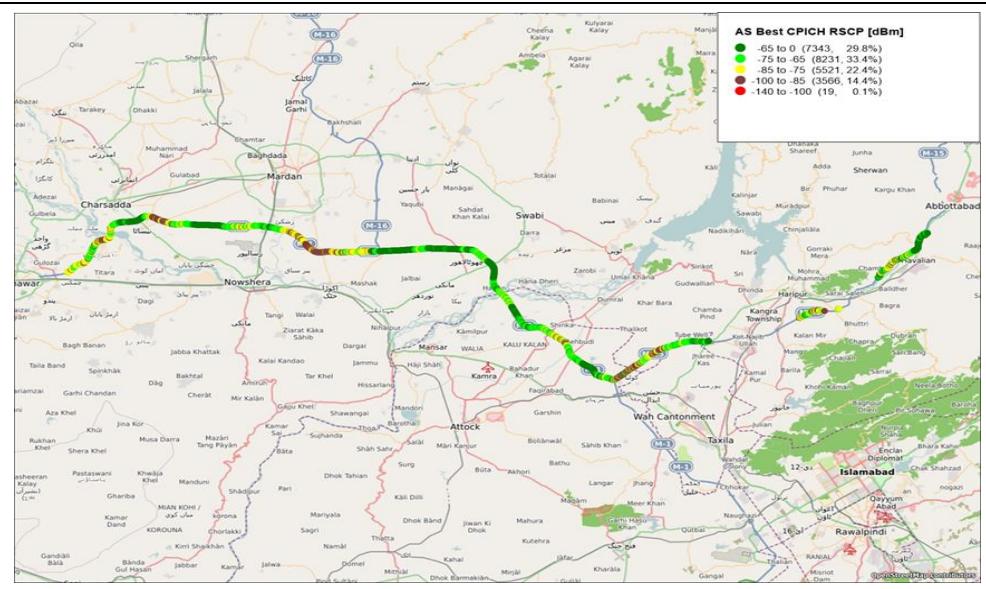


ZONG 4G NETWORK COVERAGE – PESHAWAR TO ABBOTTABAD

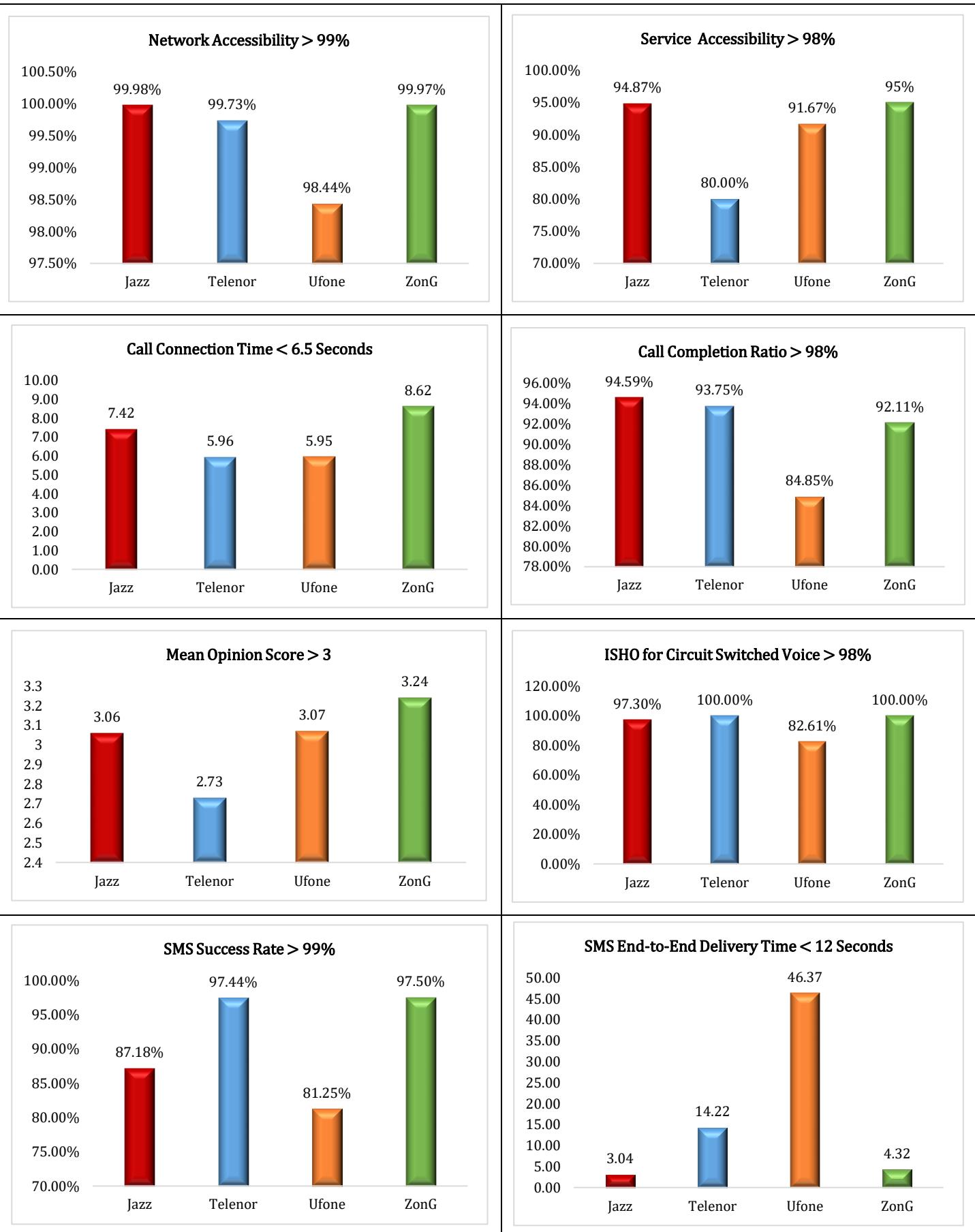


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

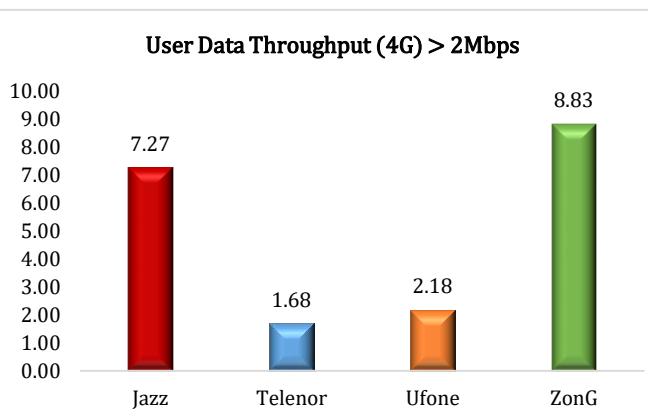
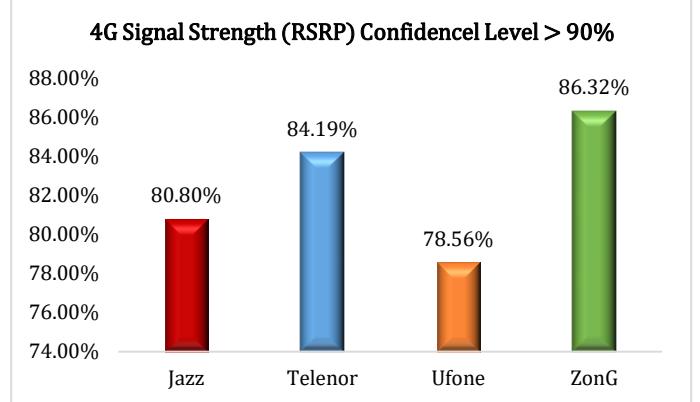
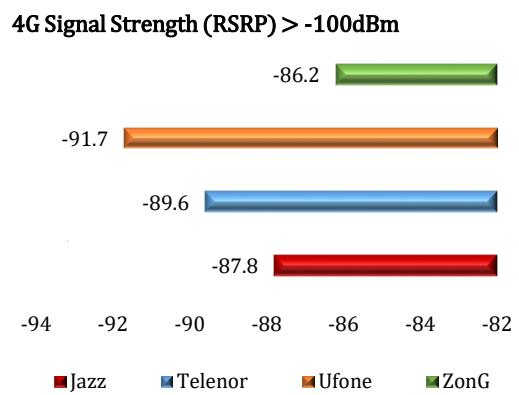
### UFONE 3G NETWORK COVERAGE – PESHAWAR TO ABBOTTABAD



## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO ABBOTTABAD



## QUALITY OF SERVICE SURVEY RESULTS – PESHAWAR TO ABBOTTABAD

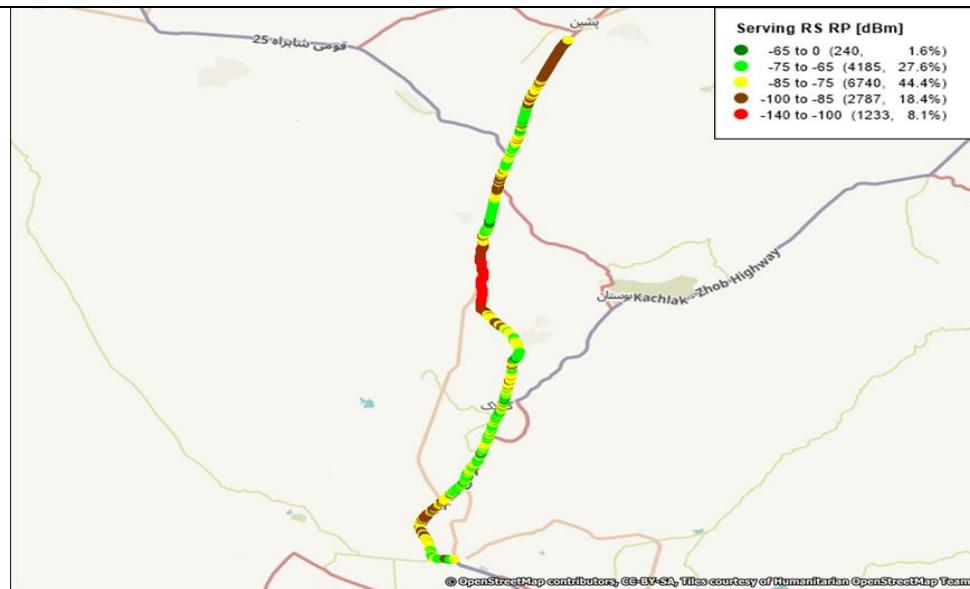


## **ANNEX – C**

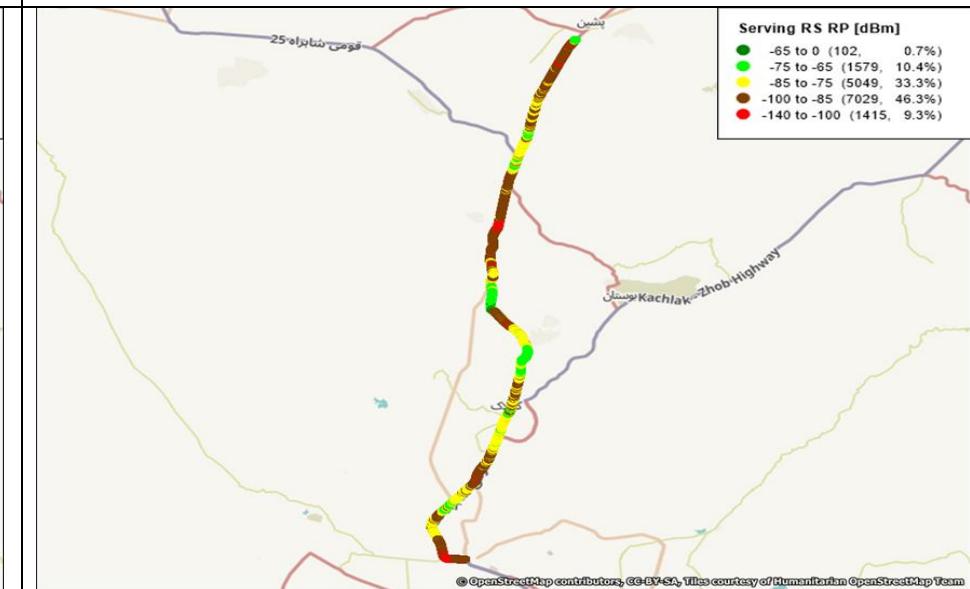
# **BALOCHISTAN**

## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

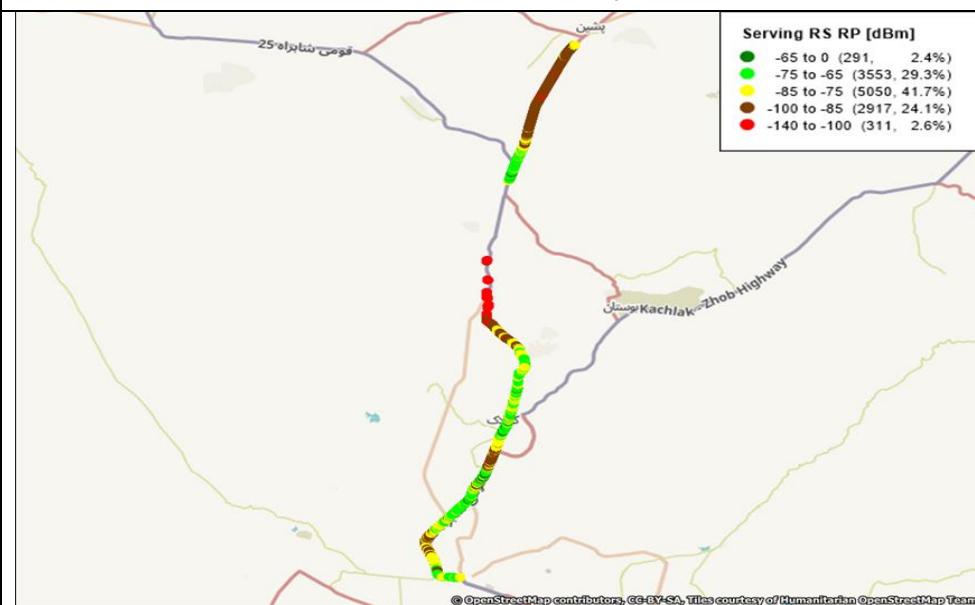
JAZZ 4G NETWORK COVERAGE – QUETTA TO PISHIN



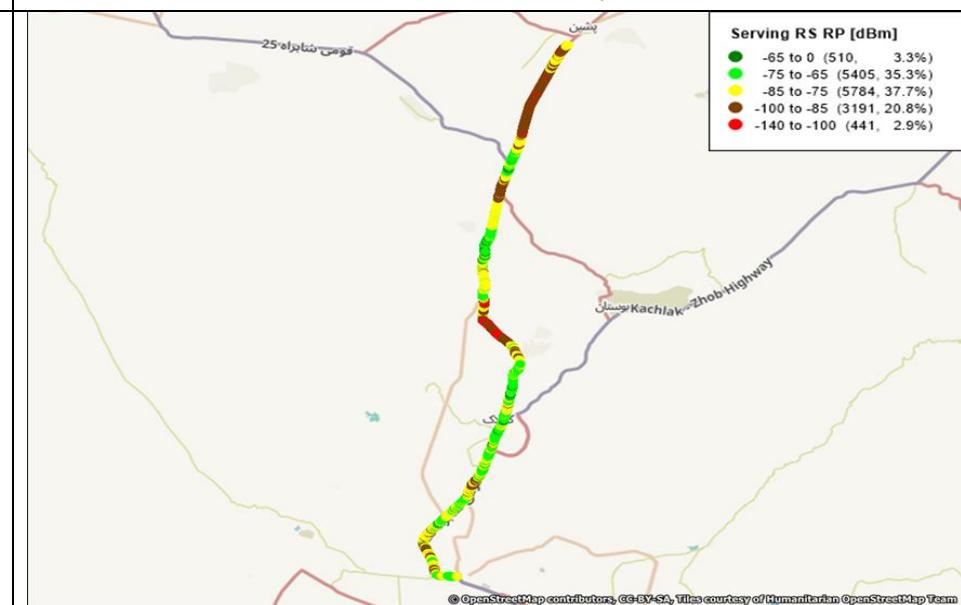
TELENOR 4G NETWORK COVERAGE – QUETTA TO PISHIN



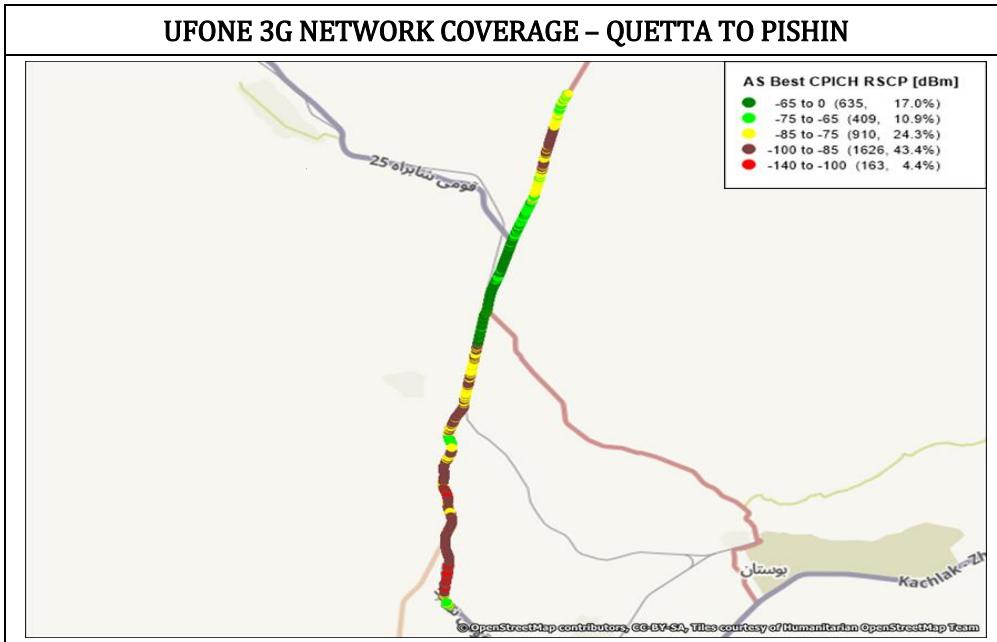
UFONE 4G NETWORK COVERAGE – QUETTA TO PISHIN



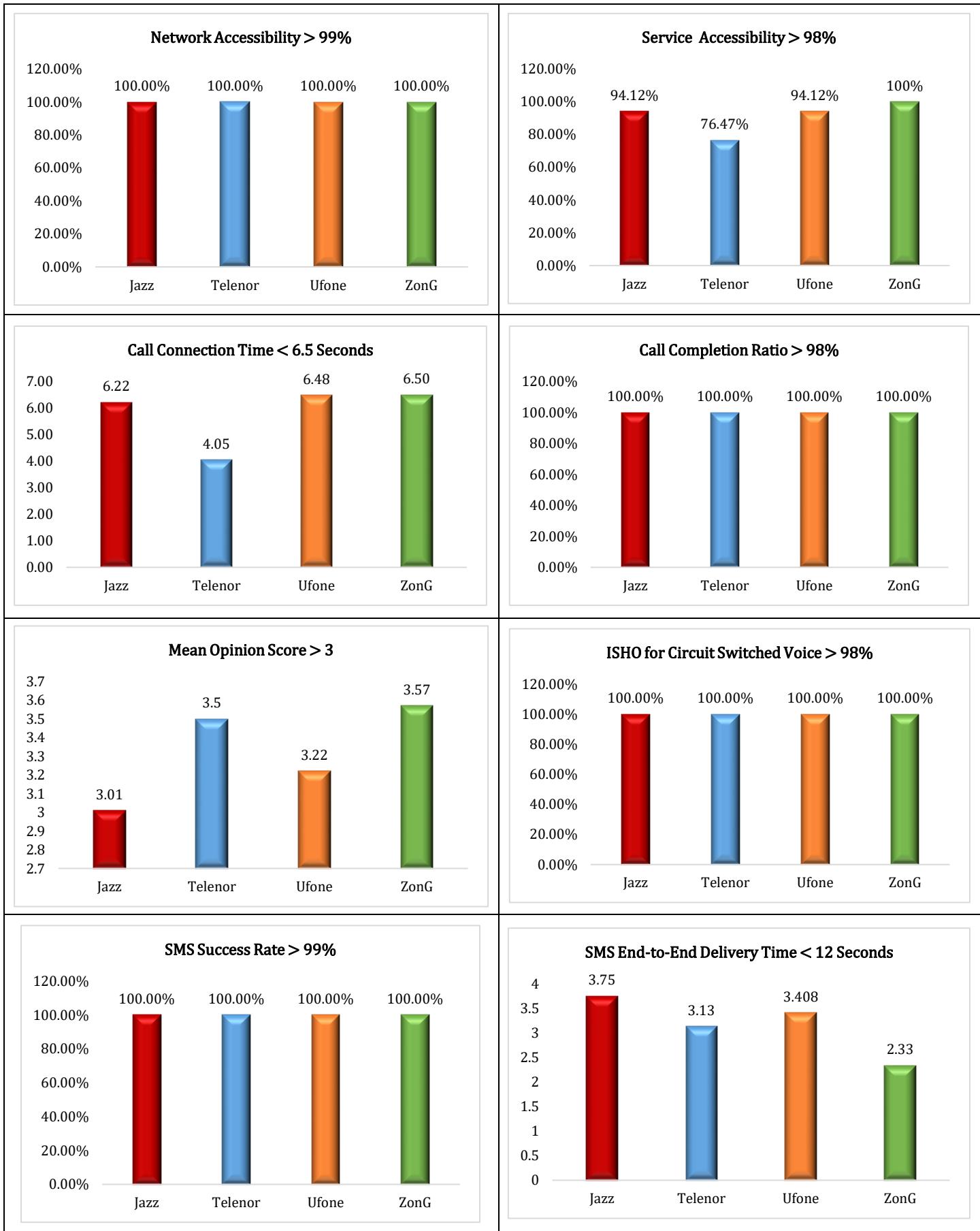
ZONG 4G NETWORK COVERAGE – QUETTA TO PISHIN



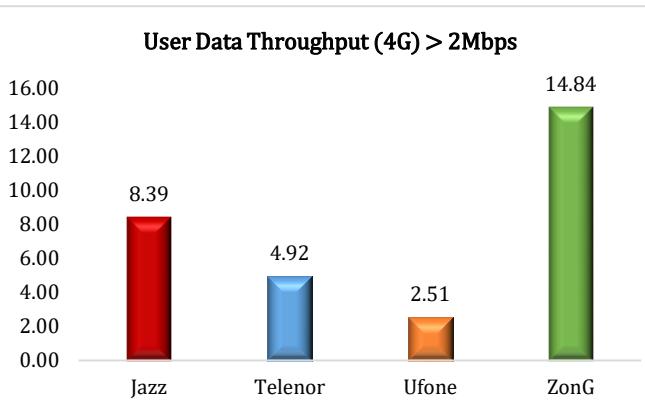
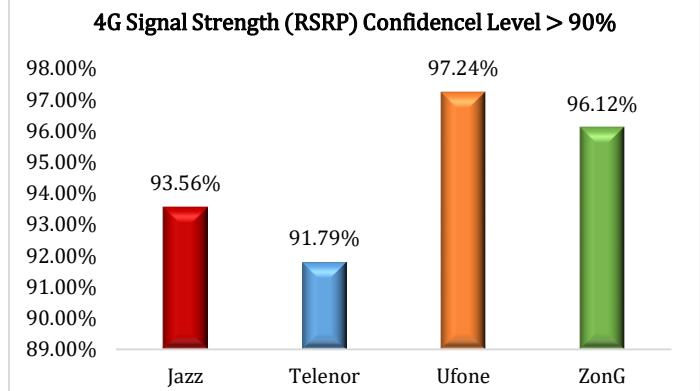
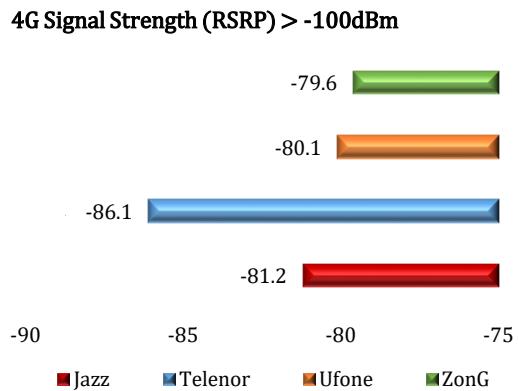
## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)



## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO PISHIN

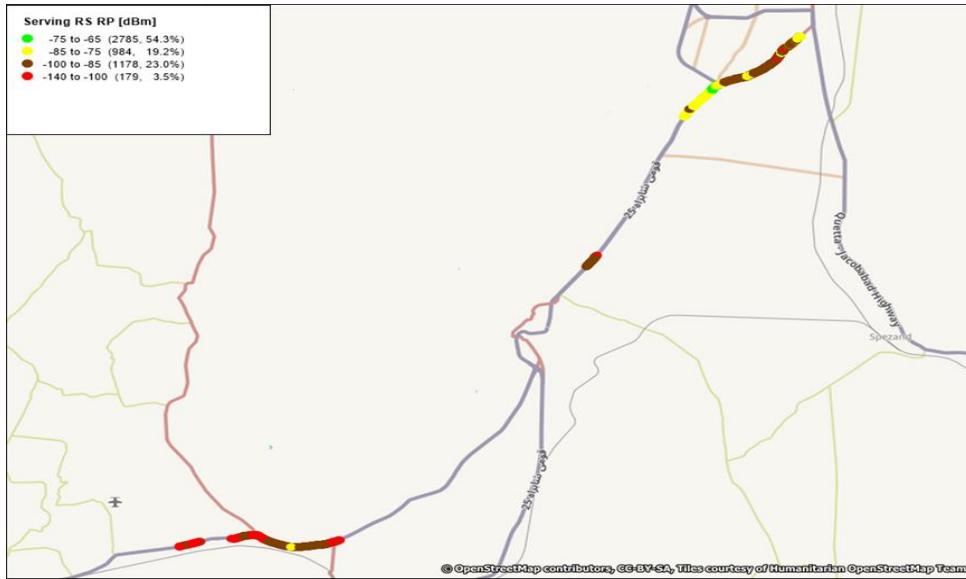


## QUALITY OF SERVICE SURVEY RESULTS -QUETTA TO PISHIN

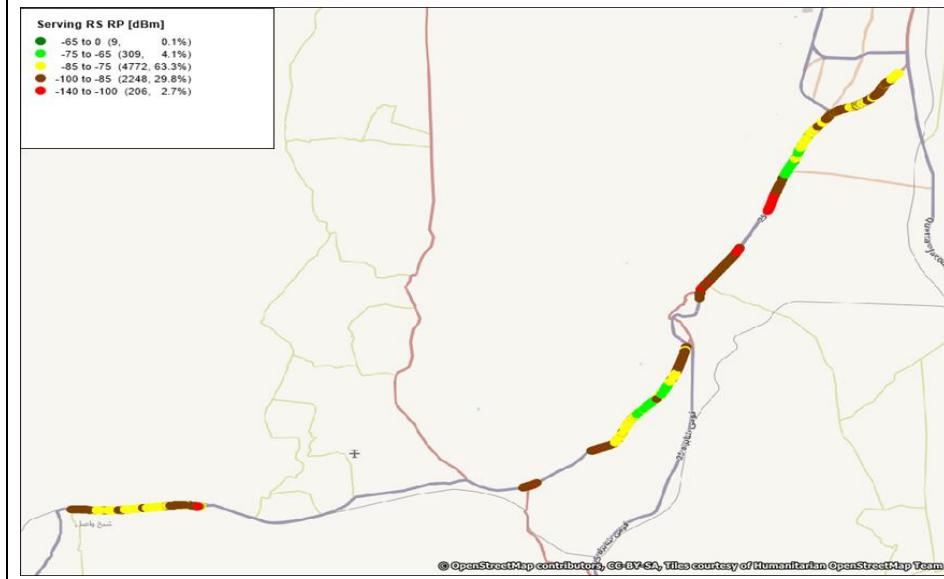


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

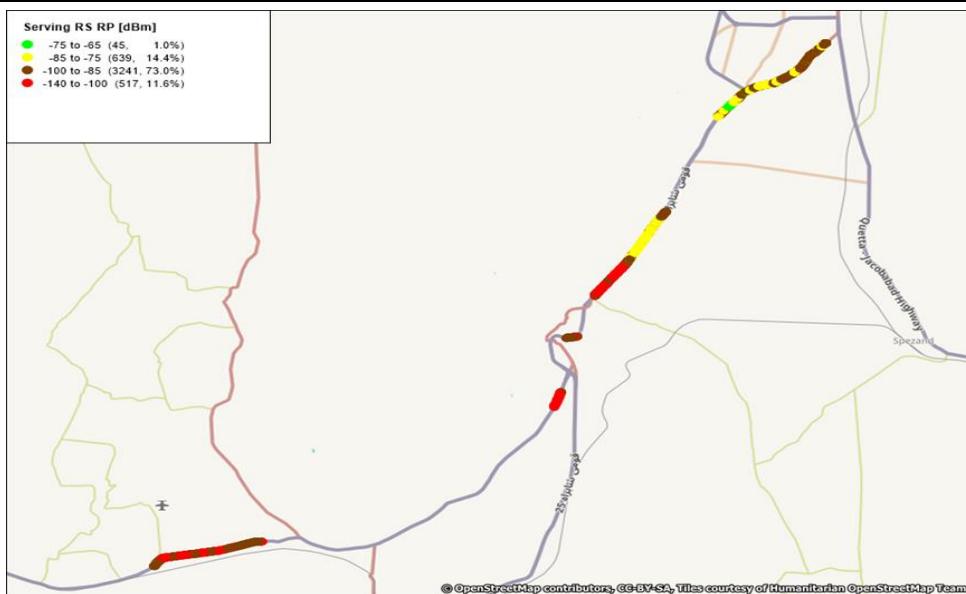
JAZZ 4G NETWORK COVERAGE – QUETTA TO NOSHKI



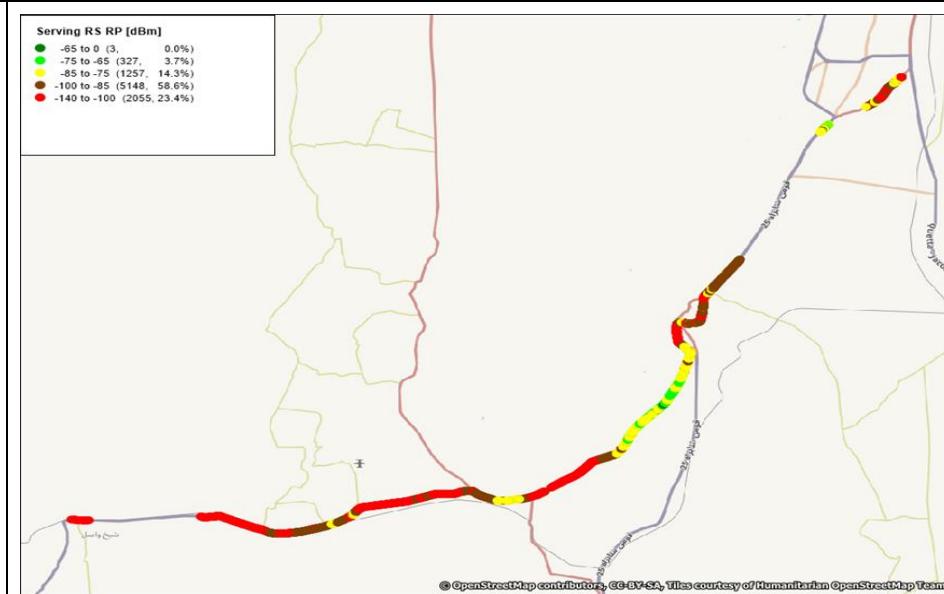
TELENOR 4G NETWORK COVERAGE – QUETTA TO NOSHKI



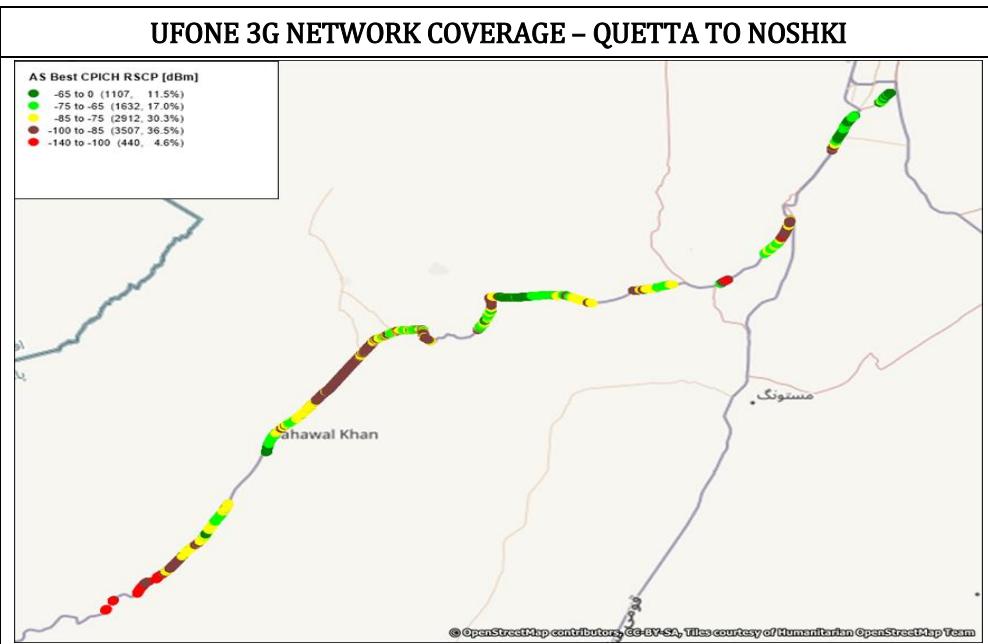
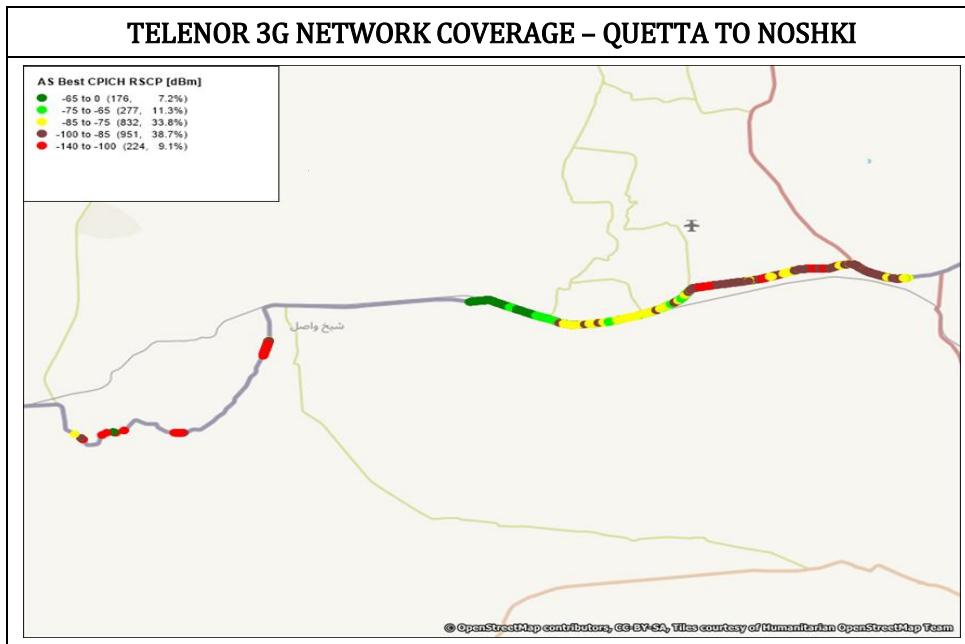
UFONE 4G NETWORK COVERAGE – QUETTA TO NOSHKI



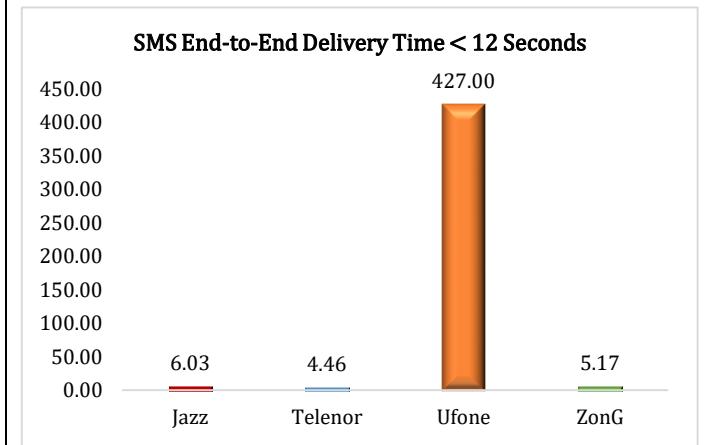
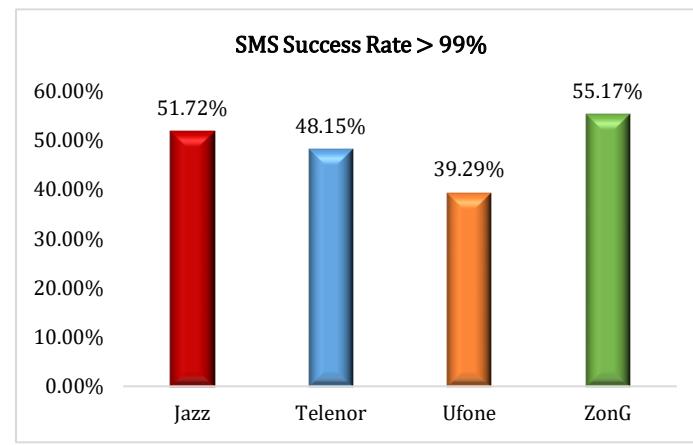
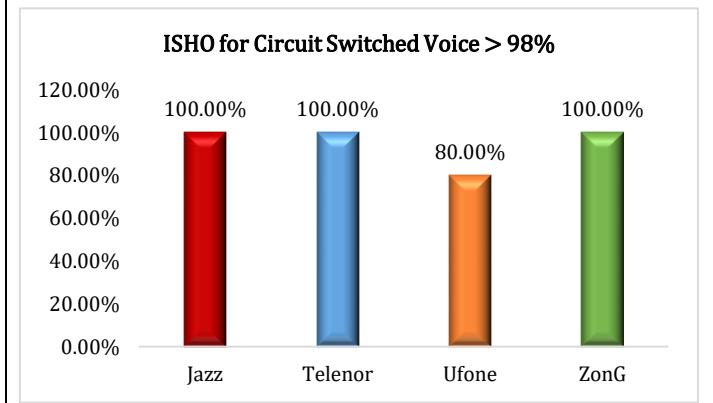
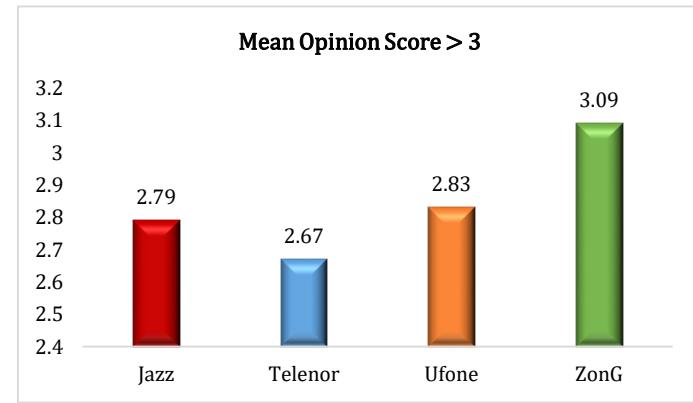
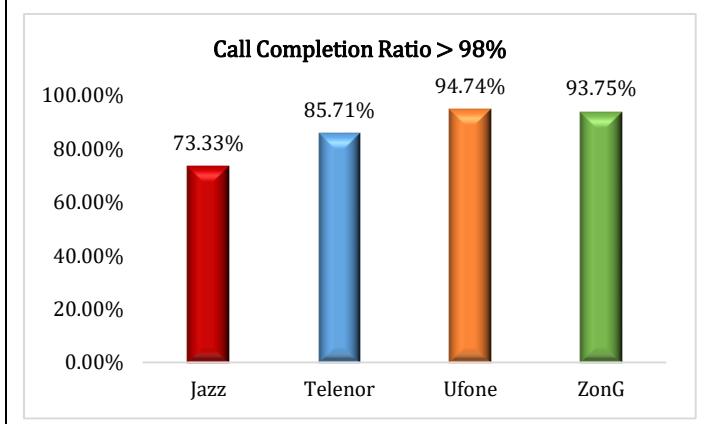
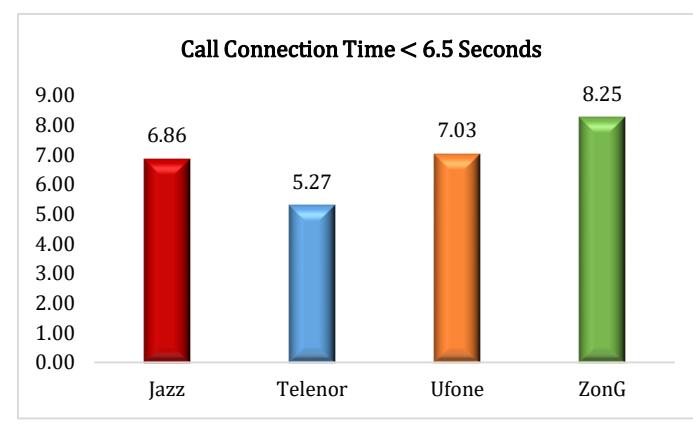
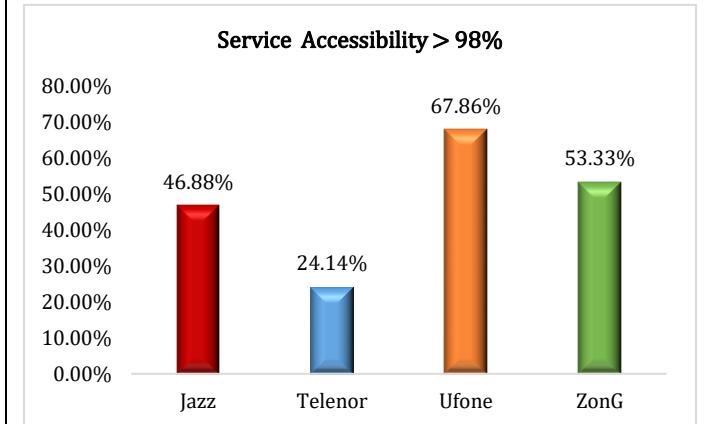
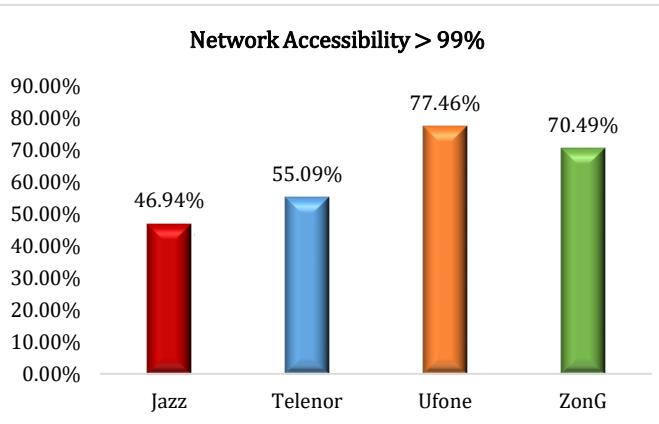
ZONG 4G NETWORK COVERAGE – QUETTA TO NOSHKI



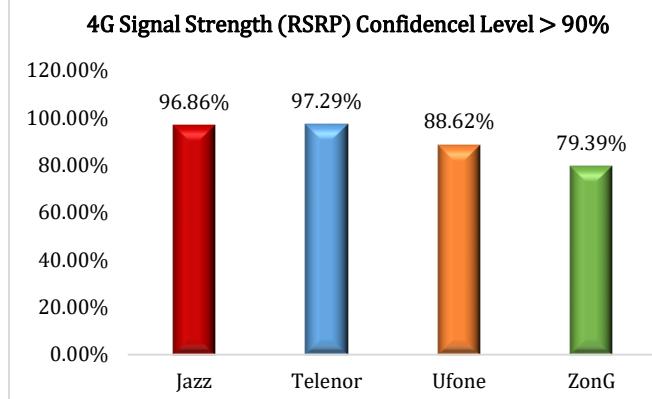
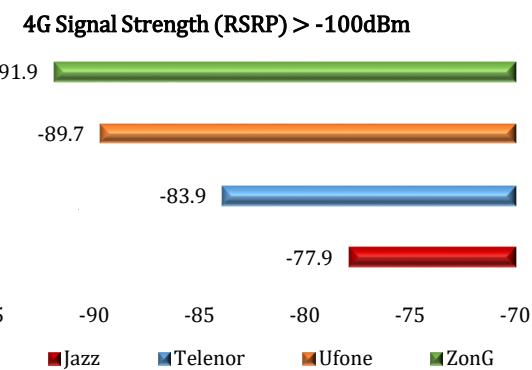
## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)



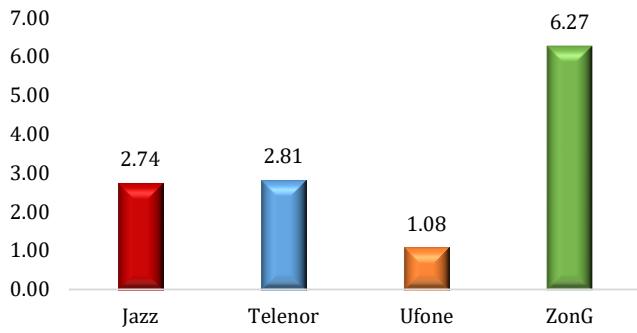
## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO NOSHKI



## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO NOSHKI

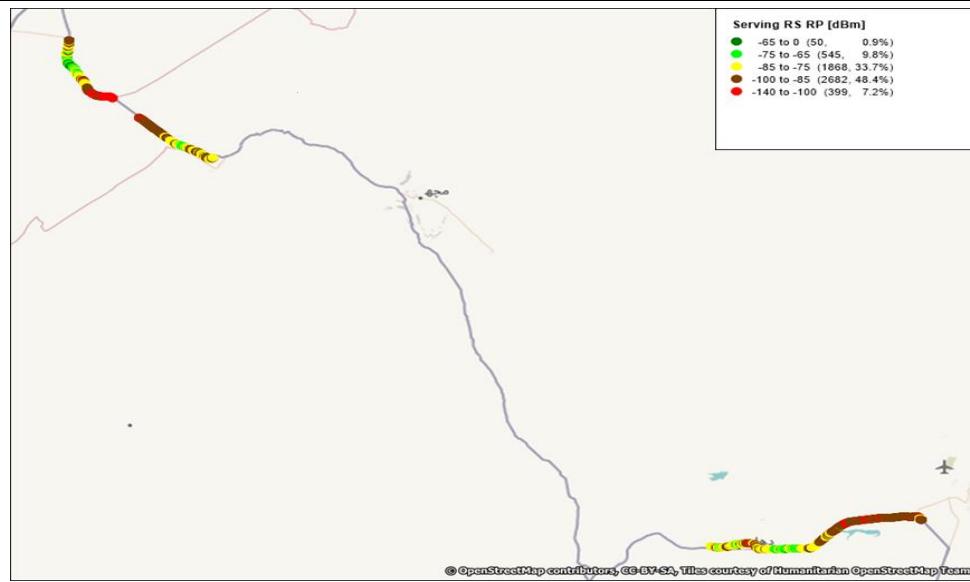


**User Data Throughput (4G) > 2Mbps**

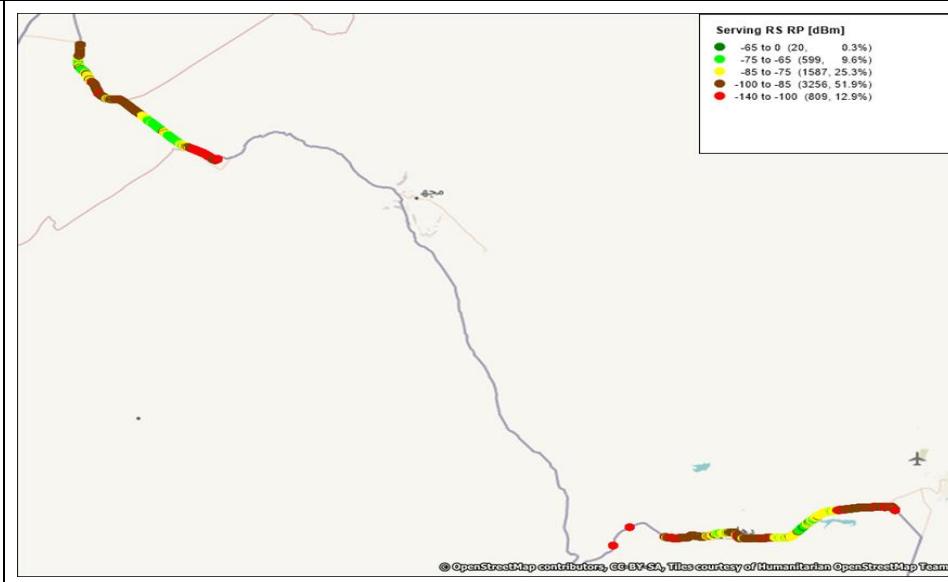


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

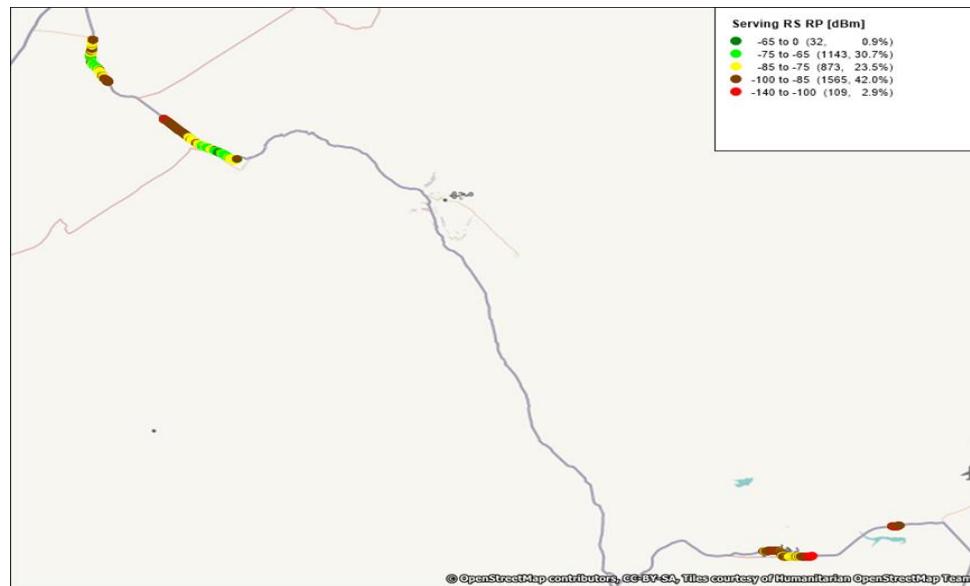
JAZZ 4G NETWORK COVERAGE – QUETTA TO SIBBI



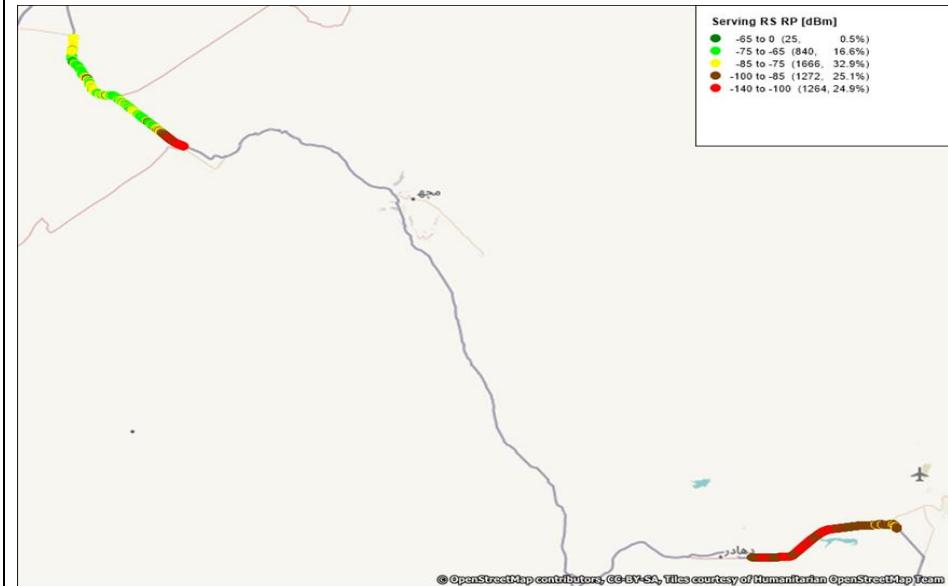
TELENOR 4G NETWORK COVERAGE – QUETTA TO SIBBI



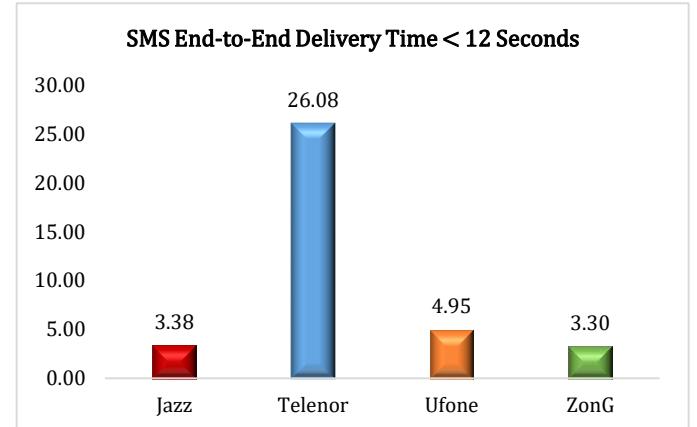
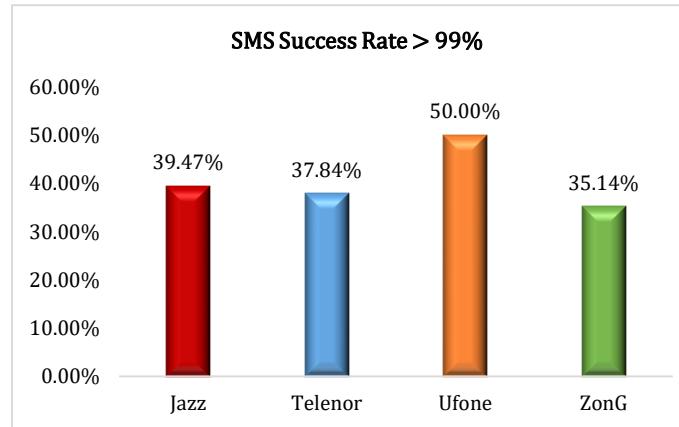
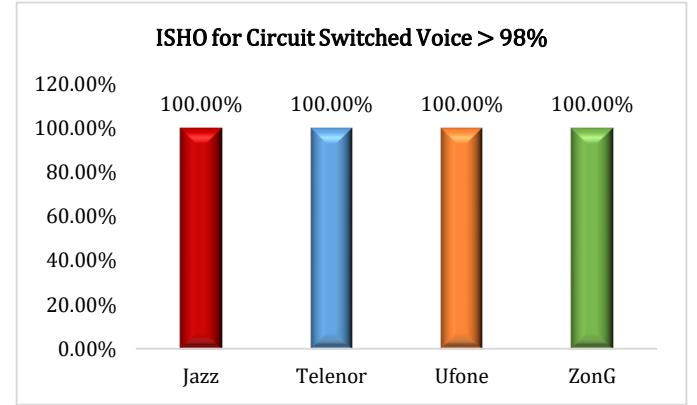
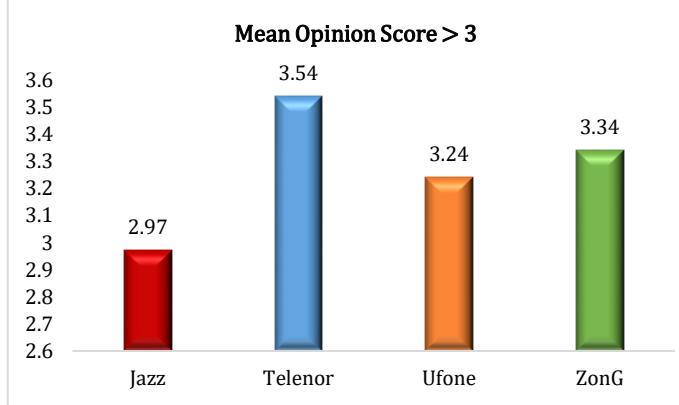
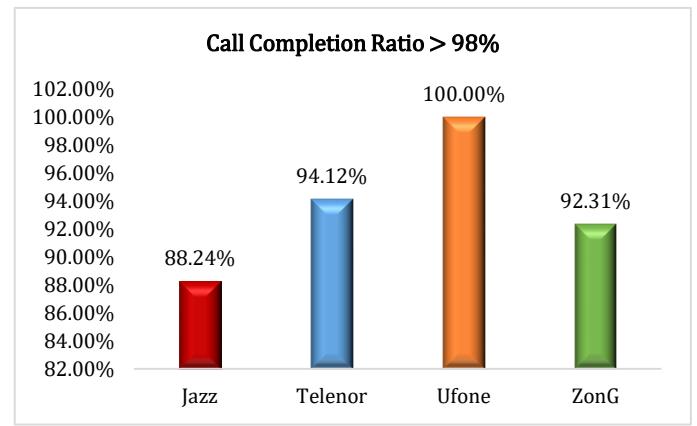
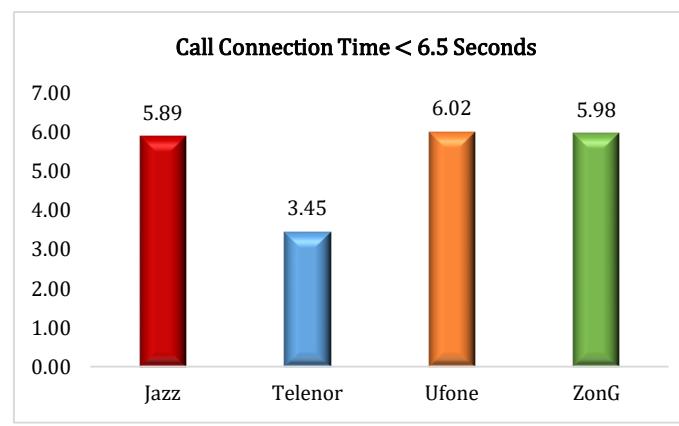
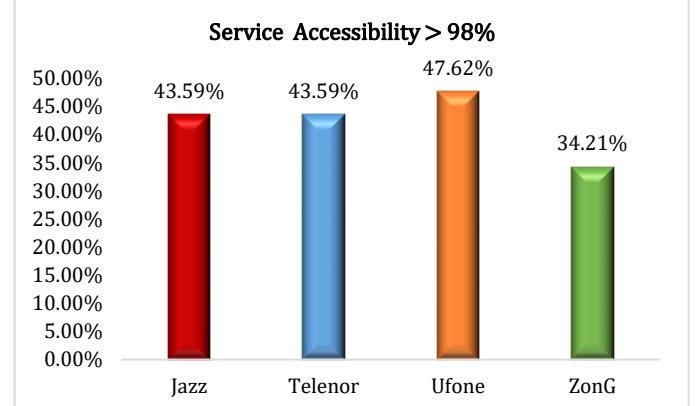
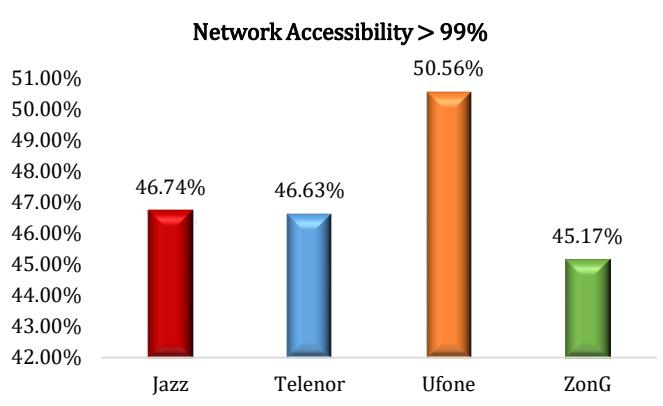
UFONE 4G NETWORK COVERAGE – QUETTA TO SIBBI



ZONG 4G NETWORK COVERAGE – QUETTA TO SIBBI

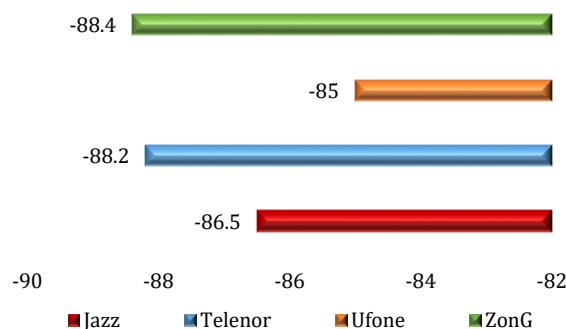


## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO SIBBI

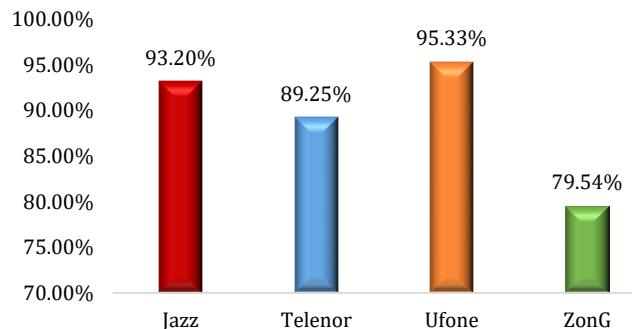


## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO SIBBI

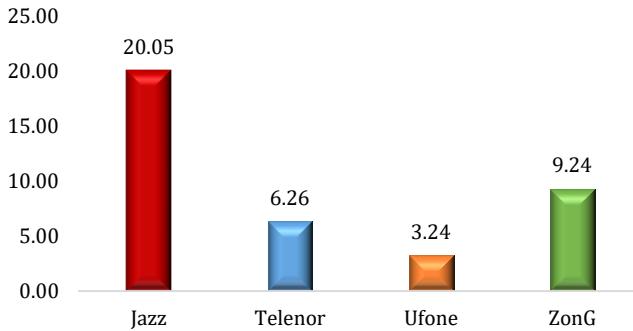
4G Signal Strength (RSRP) > -100dBm



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

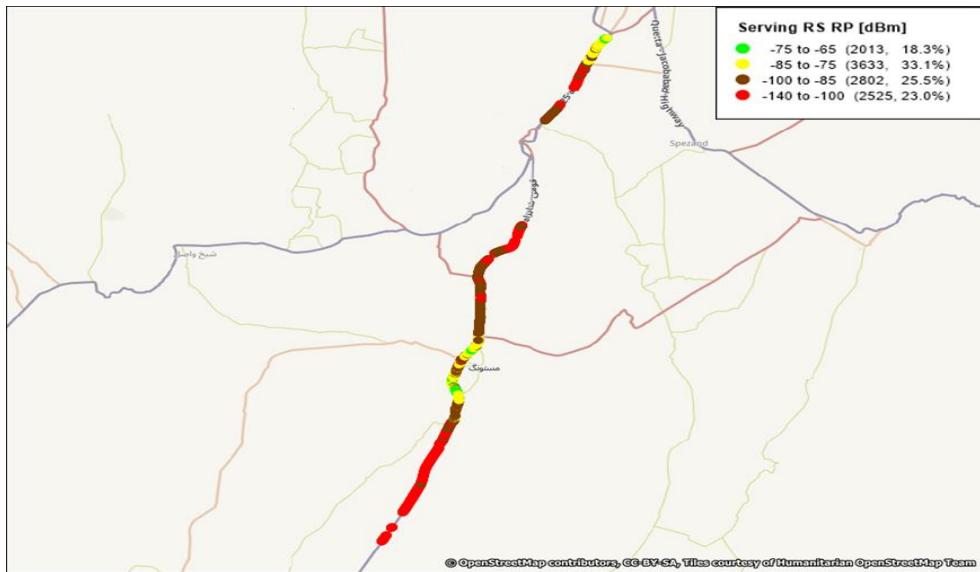


User Data Throughput (4G) > 2Mbps

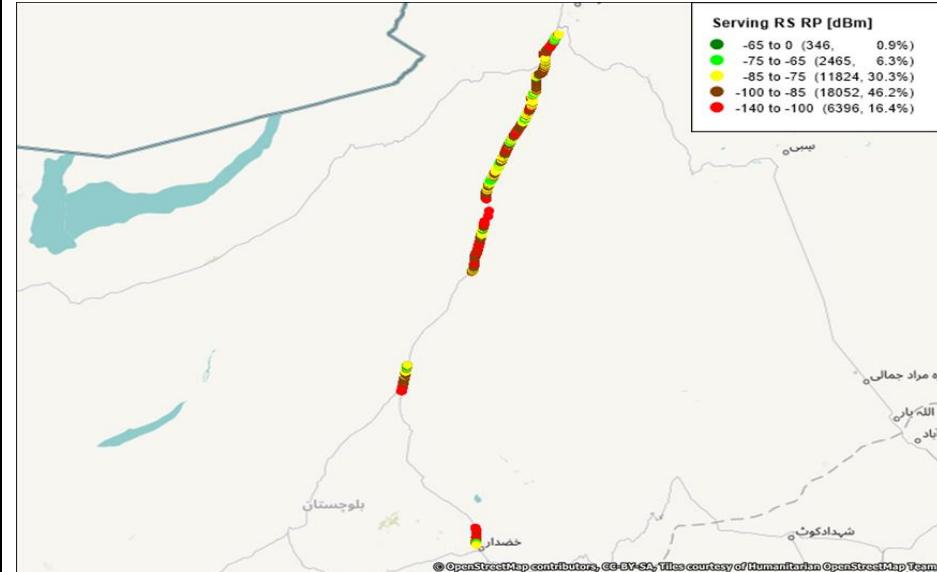


## 4G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSRP)

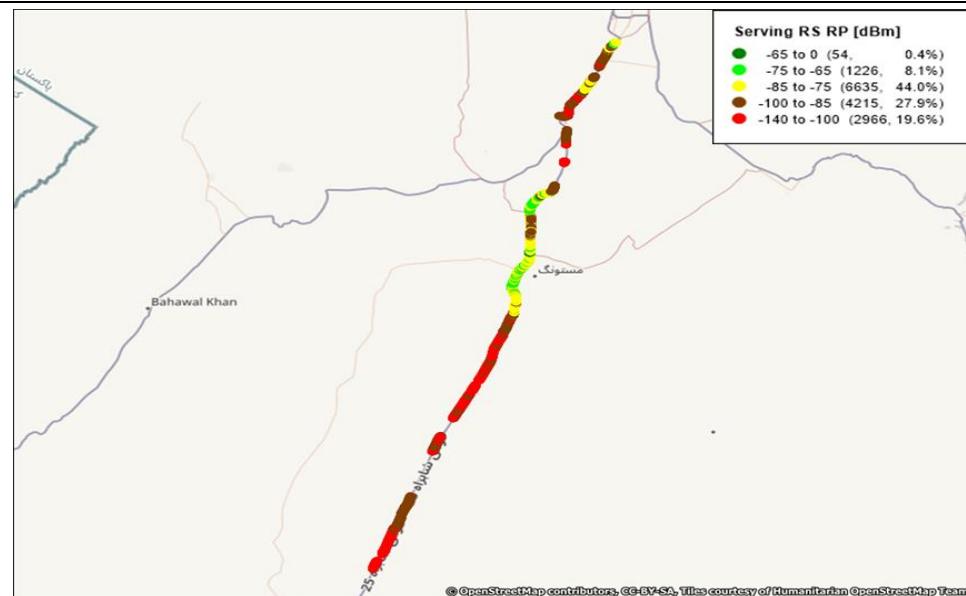
JAZZ 4G NETWORK COVERAGE – QUETTA TO KHUZDAR



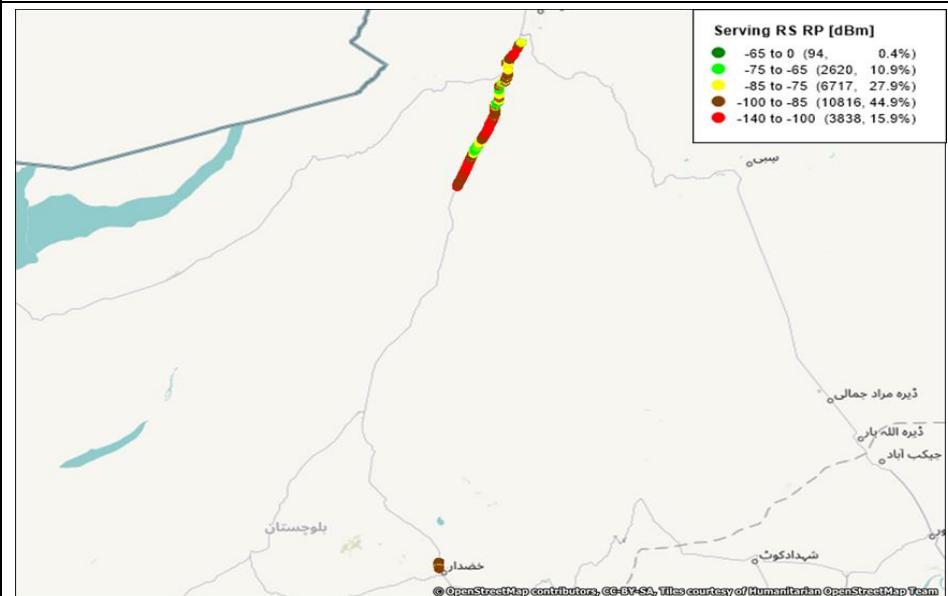
TELENOR 4G NETWORK COVERAGE – QUETTA TO KHUZDAR



UFONE 4G NETWORK COVERAGE – QUETTA TO KHUZDAR

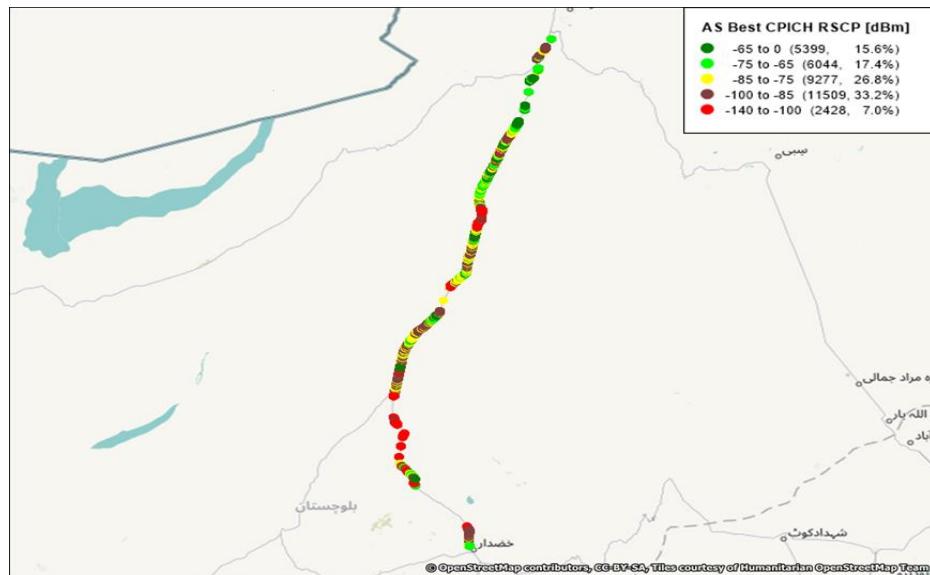


ZONG 4G NETWORK COVERAGE – QUETTA TO KHUZDAR

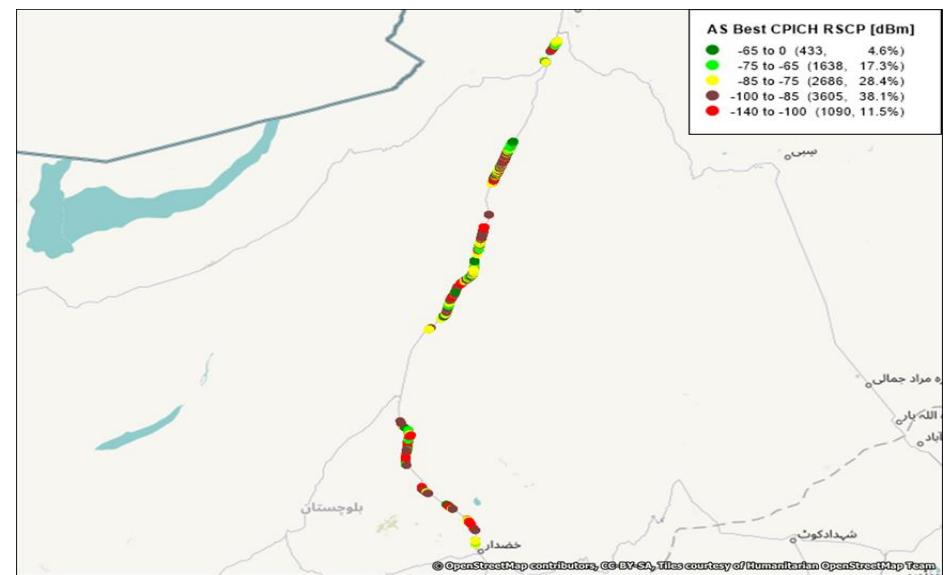


## 3G MOBILE COVERAGE ON MOTORWAYS / HIGHWAYS / ROADS – SIGNAL STRENGTH (RSCP)

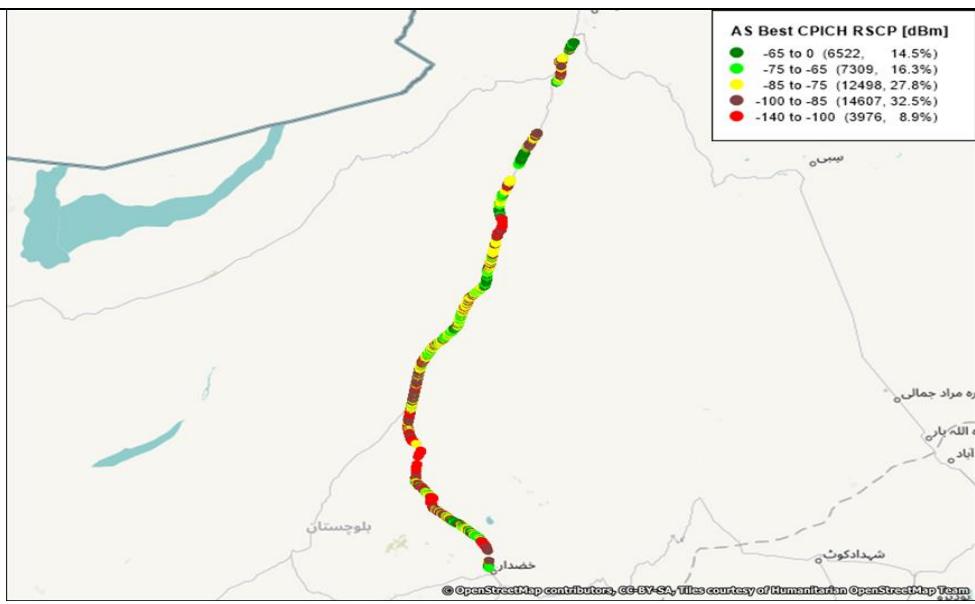
TELENOR 3G NETWORK COVERAGE – QUETTA TO KHUZDAR



ZONG 3G NETWORK COVERAGE – QUETTA TO KHUZDAR

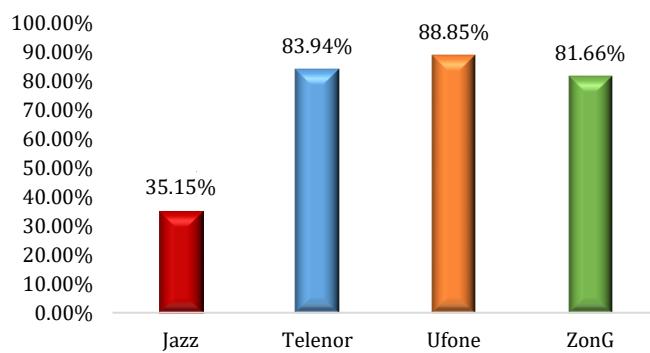


UFONE 3G NETWORK COVERAGE – QUETTA TO KHUZDAR

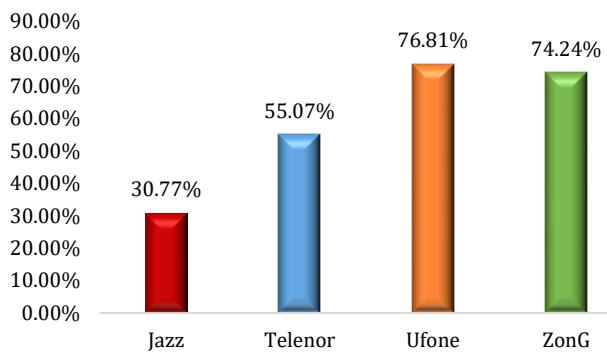


## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO KHUZDAR

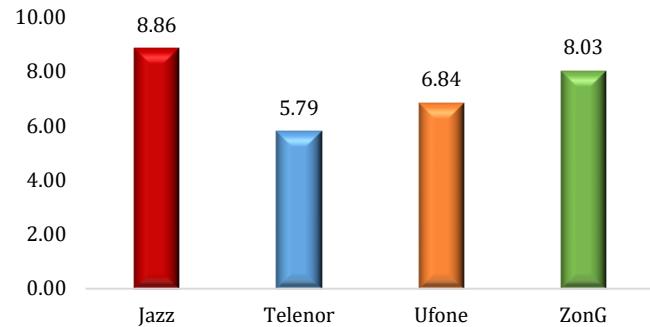
**Network Accessibility > 99%**



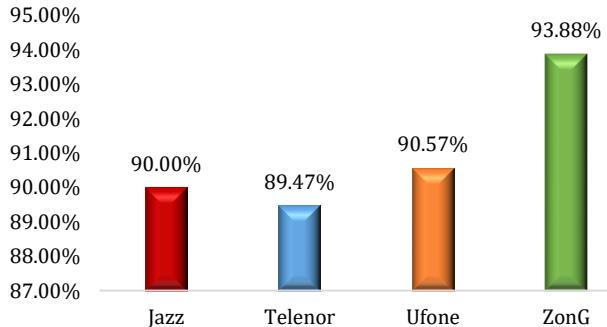
**Service Accessibility > 98%**



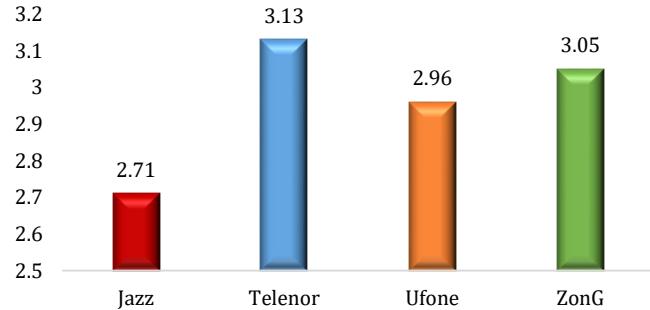
**Call Connection Time < 6.5 Seconds**



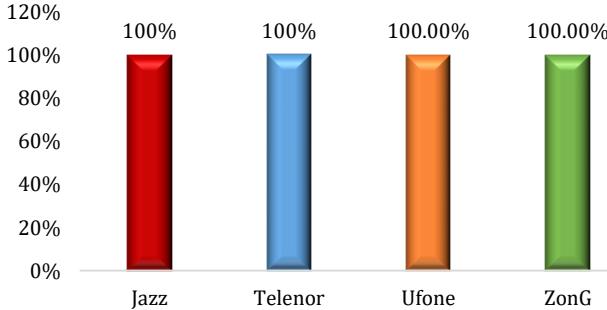
**Call Completion Ratio > 98%**



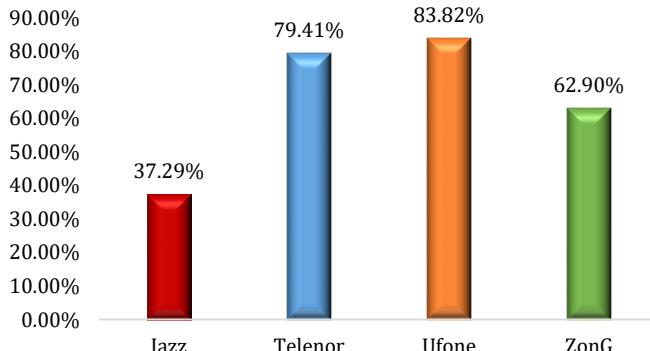
**Mean Opinion Score > 3**



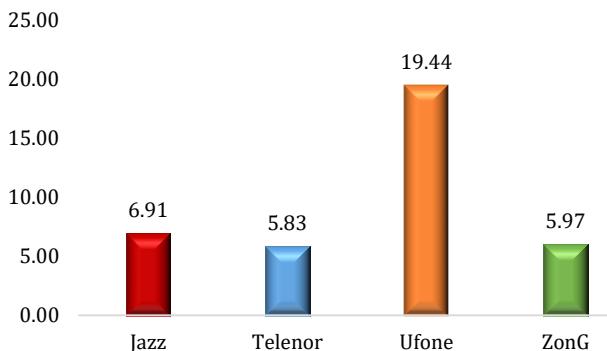
**ISHO for Circuit Switched Voice > 98%**



**SMS Success Rate > 99%**



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



## QUALITY OF SERVICE SURVEY RESULTS – QUETTA TO KHUZDAR

