

# **THIRD PARTY QUALITY OF SERVICE** **SURVEY - LAHORE**

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FIRST QUARTER 2021

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

# 3<sup>RD</sup> PARTY QUALITY OF SERVICE SURVEY OF LAHORE

## 1. INTRODUCTION

1.1. In order to measure the performance and service quality of 2G (GSM), 3G (UMTS/HSPA+ etc.) and 4G (LTE), of Cellular Mobile Operators (CMOs), Pakistan Telecommunication Authority (PTA) carried out an independent Quality of Service (QoS) Survey of Lahore through a 3<sup>rd</sup> Party Service Provider from 15<sup>th</sup> ~ 28<sup>th</sup> February 2021 and 3<sup>rd</sup> ~ 8<sup>th</sup> March 2021.

## 2. DRIVE TEST DETAILS

2.1. In the QoS survey at Lahore, different markets and hotspot areas during the 20 days of tests from 0800 to 2100 hours on daily basis by deploying urban mobility riders. The details are as under:

### a. Markets & Hotspots Areas

DESCRIPTION	DETAILS
Markets	Azam Cloth Market, Chuna Mandi, Mochi Gate, Landa Bazar, Badami Bagh, Rang Mahal, Shah Alam Market, Electronics Market, Shah Alam, Bilal Ganj Baghban Pura, Sarafa Bazaar, Abid Market, Akbari Mandi, Brandreth Road, Hall Road and Kashmiri Road
Hotspots Areas	Brandreth Road, High Court and Surroundings, Johar Town, Shah Alam Market, Bahria Town, Bedian Road, Paragon City and DHA

### b. Testing Scenario

DRIVETEST	VOICE	DATA	COVERAGE
Device	Xiaomi Mi A3, Sony Xperia XZ2, OnePlus 3T	Xiaomi Mi A3, Sony Xperia XZ2 H8216	Xiaomi Mi A3, Sony Xperia XZ2, OnePlus 3T
Test Scenario	120 Seconds Call Duration 30 Seconds Wait between Calls	Data 4G (Auto Mode) HTTP Fixed File Transfer Download: 10Mb & 100Mb Upload: 10Mb	4G: RSRP, RSRQ & SINR 3G: RSCP & Ec/No 2G: RX Lev Sub & RxQual
Dates	15 <sup>th</sup> ~ 28 <sup>th</sup> Feb 21	3 <sup>rd</sup> ~ 8 <sup>th</sup> Mar 21	On all testing days
Coverage	Total 100Million Samples (2G & 3G & 4G)		

### c. Sampling

TEST TYPES	TOTAL SAMPLES	TOTAL TESTING HOURS
Voice Calls	7781	500
Data Sessions	36367	700
Coverage 4G	25Million	1200

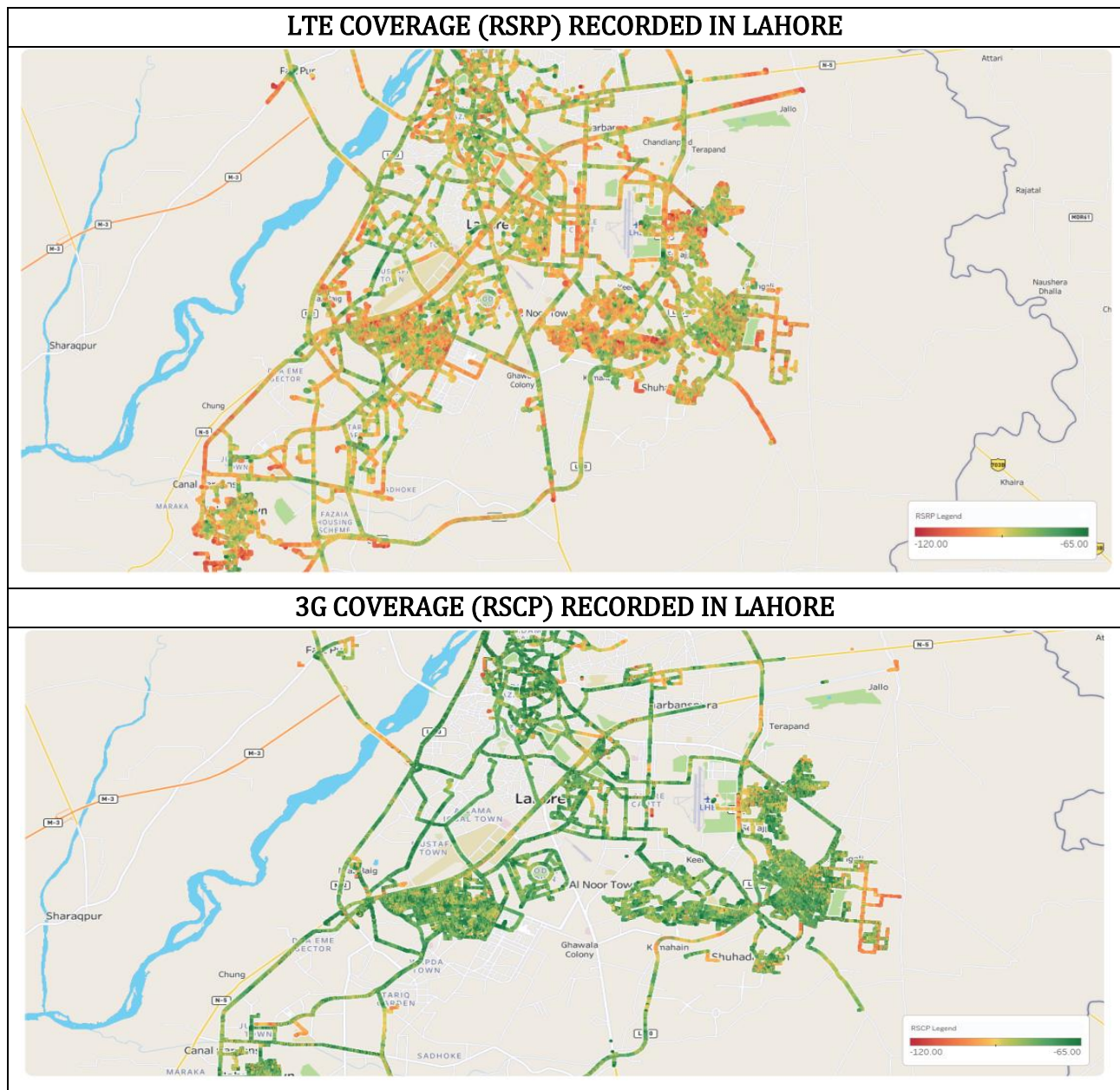
### d. Operator Wise Samples

OPERATOR	VOICE CALLS	DATA SESSIONS
Jazz	1363	9523
Telenor	2312	8726

OPERATOR	VOICE CALLS	DATA SESSIONS
Ufone	1244	7129
ZonG	2862	10989
<b>Total</b>	<b>7781</b>	<b>36367</b>

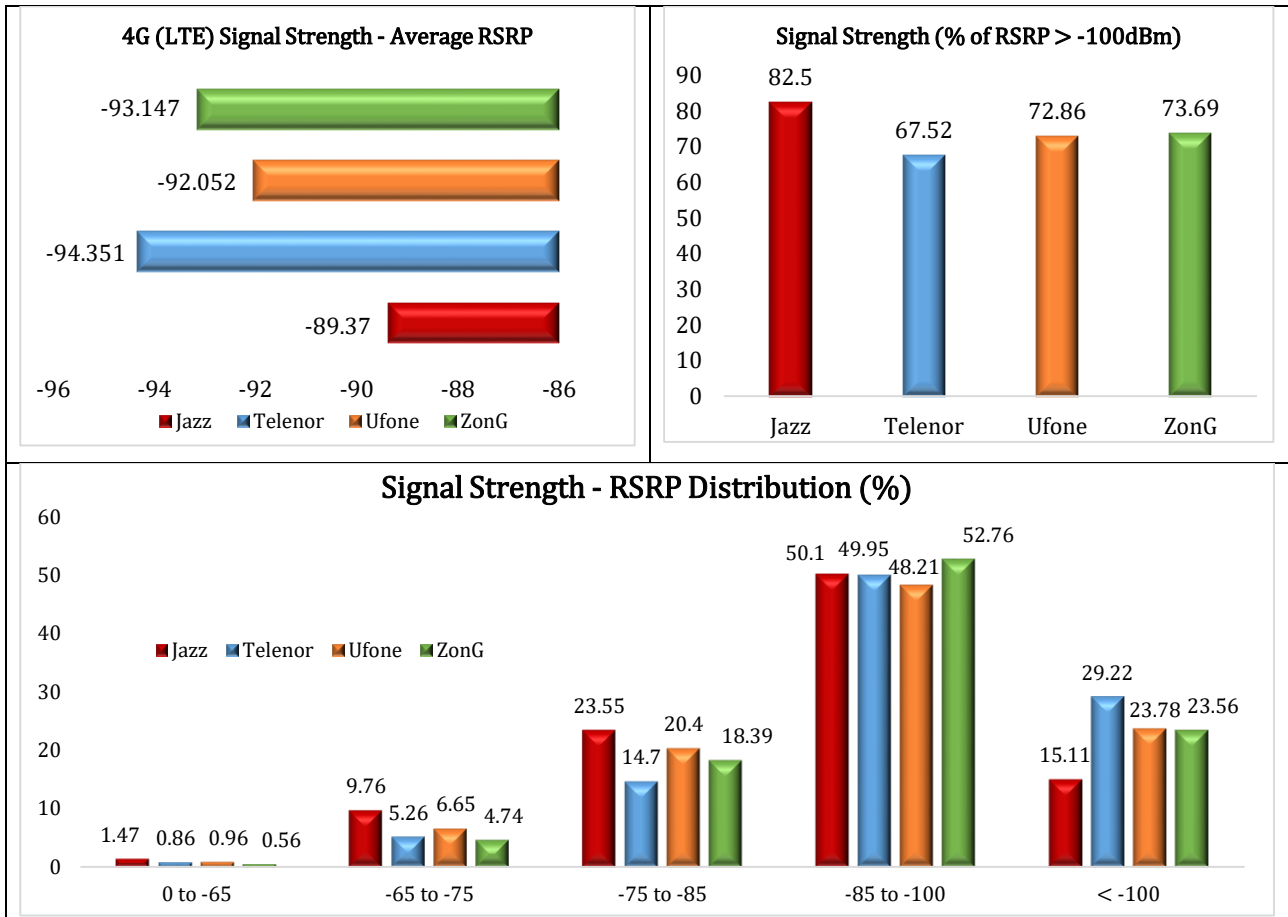
### 3. COVERAGE

3.1. **4G, 3G & 2G Coverage.** During the survey period, the mobile handsets were kept in auto detect mode i.e. preferably on 4G and fallback to 3G or 2G depending upon the availability of the network in particular area, therefore, majority of the time the handsets remained on 4G network. While traversing the routes, the level of signal strength received on mobile handsets have been recorded. The 4G Reference Signal Receive Power (RSRP) and 3G Received Signal Code Power (RSCP) i.e. recorded samples of signal strength of all Cellular Mobile Operator (CMOs) is shown as below:

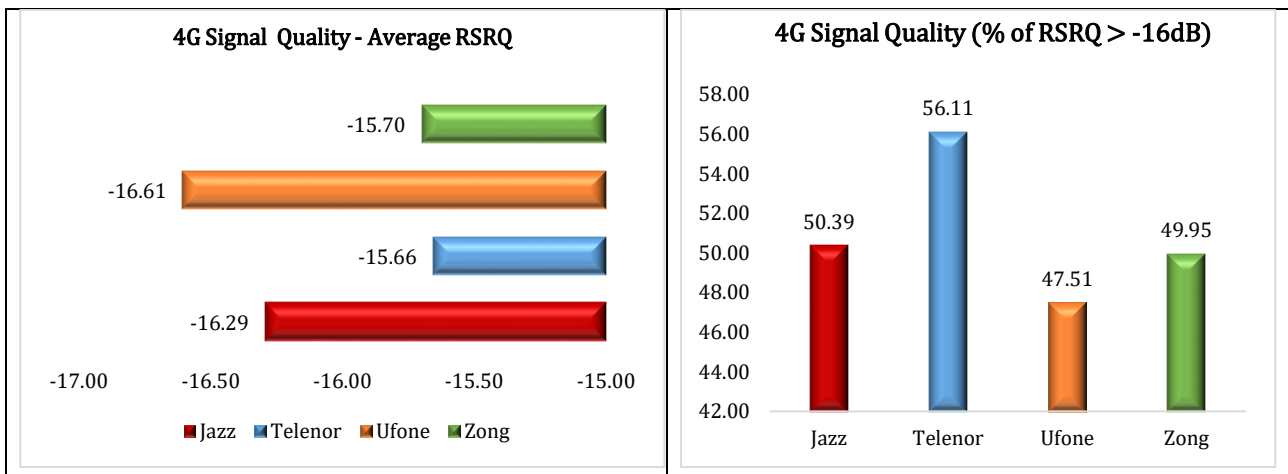


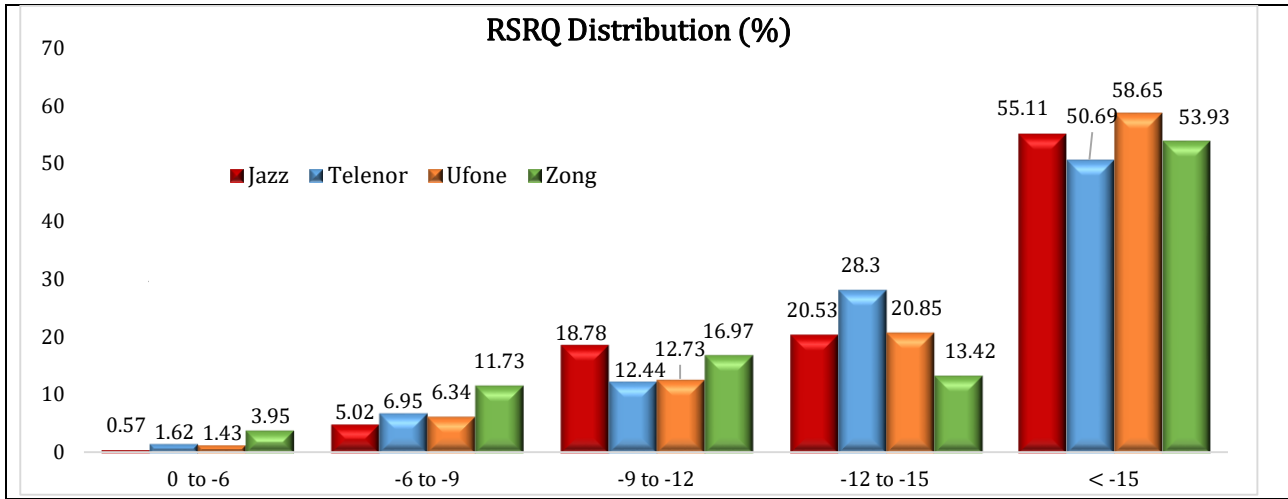


3.3. **4G Signal Strength.** RSRP is the average power of Resource Elements (RE) that carry cell specific Reference Signals (RS) over the entire bandwidth, so RSRP is only measured in the symbols carrying RS. As per license the signal strength should be **greater than -100dBm with 90% confidence level**. Following graphs show overall average value of RSRP alongwith its confidence level and percentage distribution in different ranges (i.e. bins from greater than -65dBm to less than -100dBm). **None of the CMOs have achieved the 90% confidence level** in Lahore.

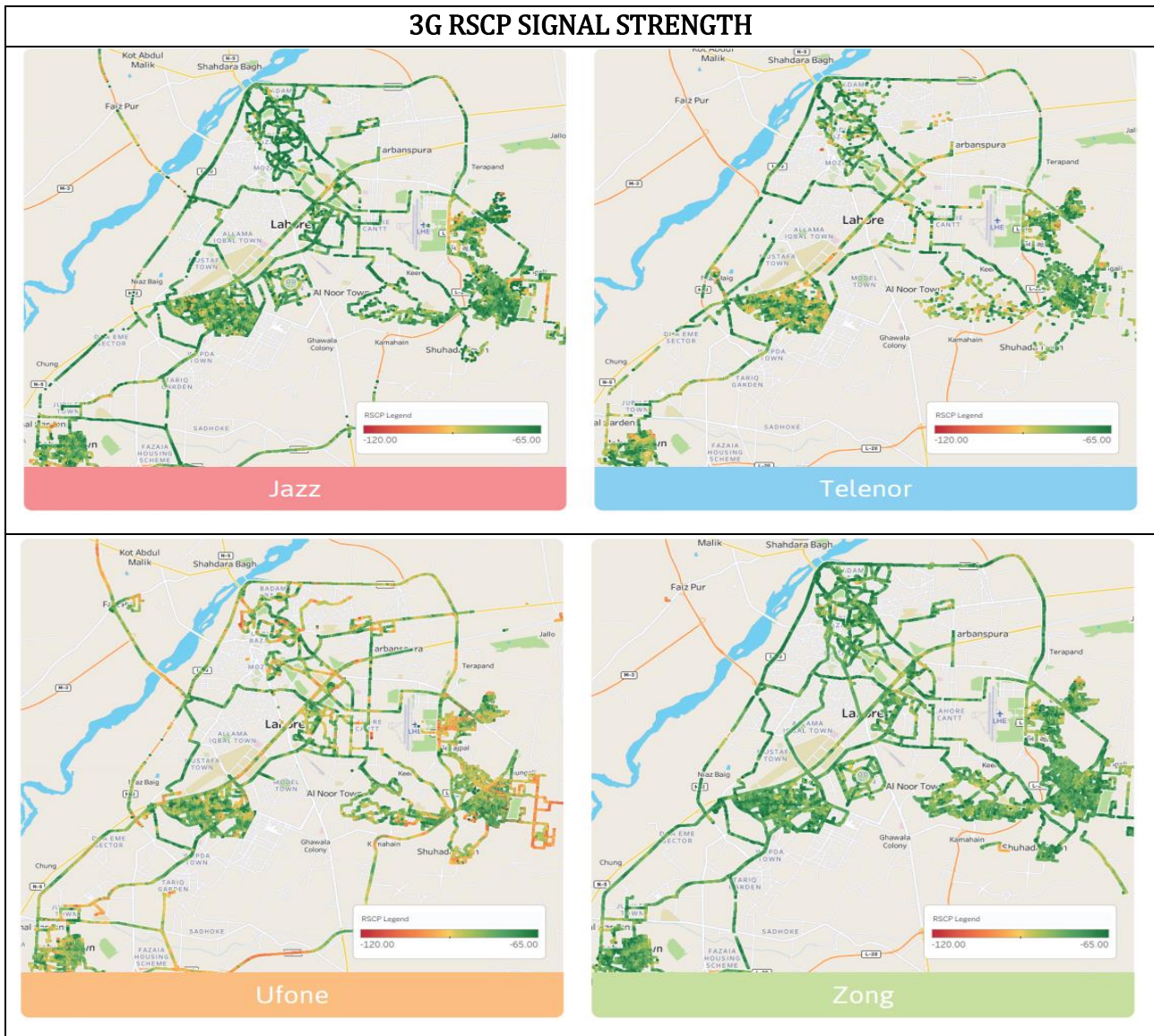


3.4. **4G Signal Quality.** The received signal quality is measured in 4G network through Reference Signal Receive Quality (RSRQ). Following graphs show overall average value of RSRQ, percentage confidence level of RSRQ > -16dB and its percentage distribution.

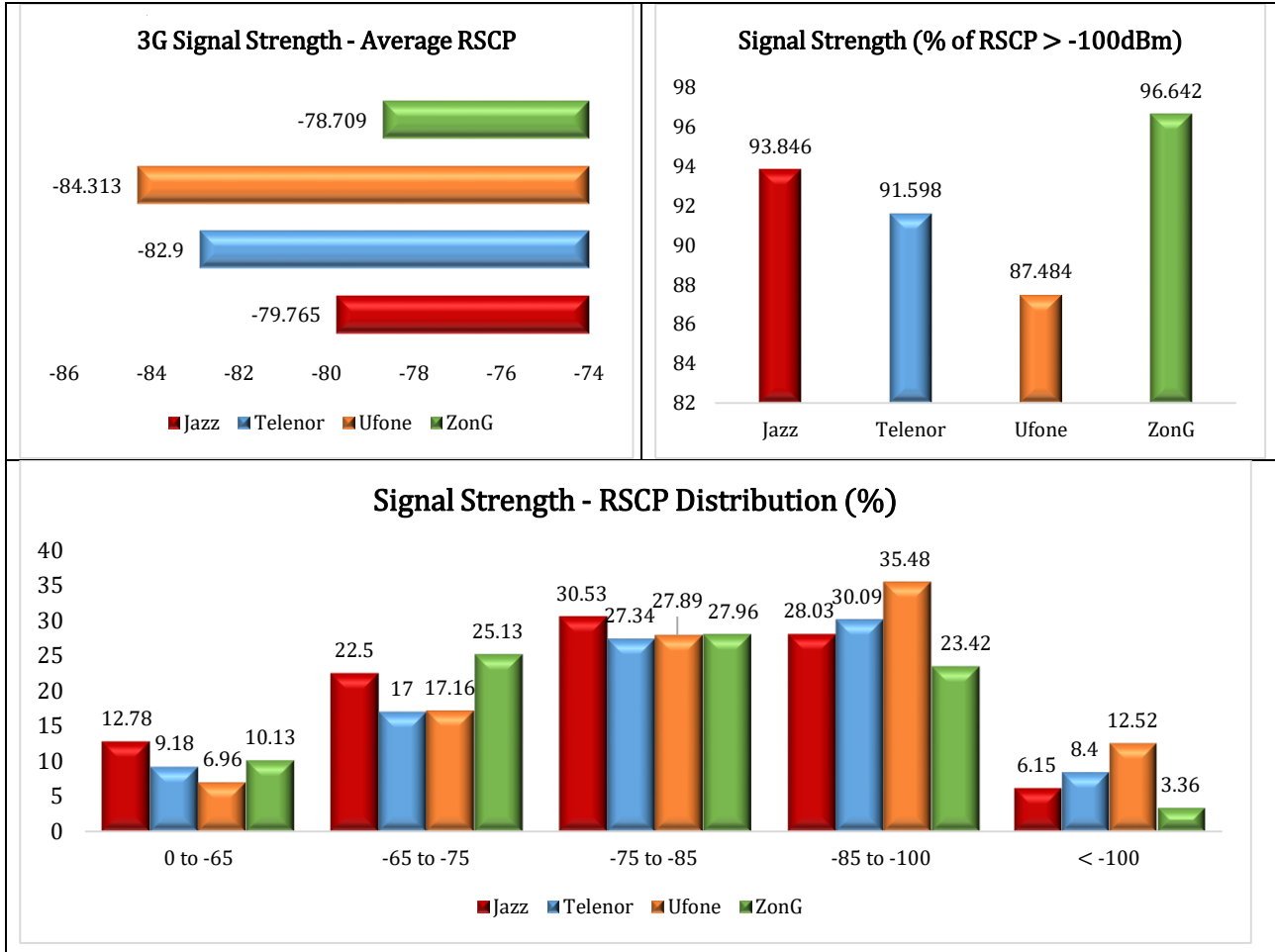




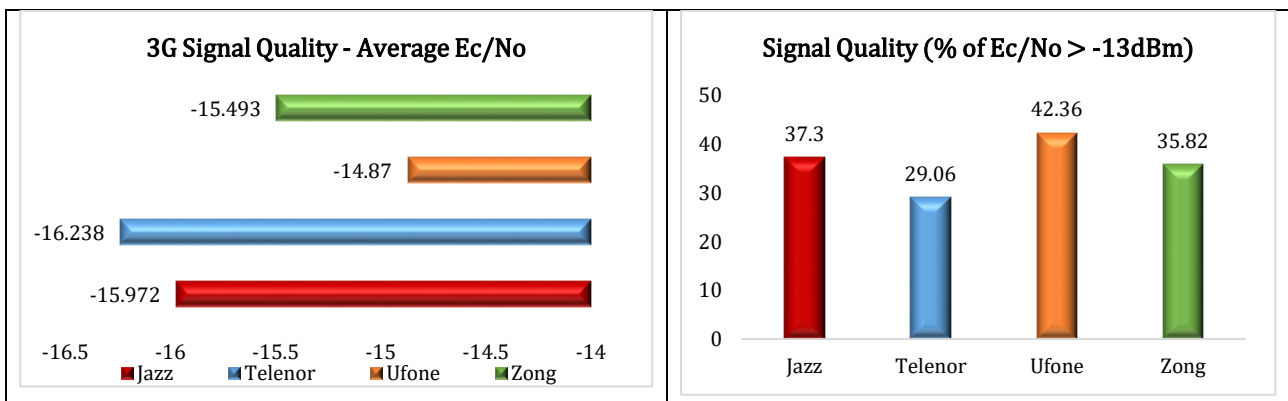
3.5. **3G Coverage.** The pictorial view of signal strength of 3G networks of CMOs i.e. Jazz, Telenor, Ufone and ZonG is shown below:

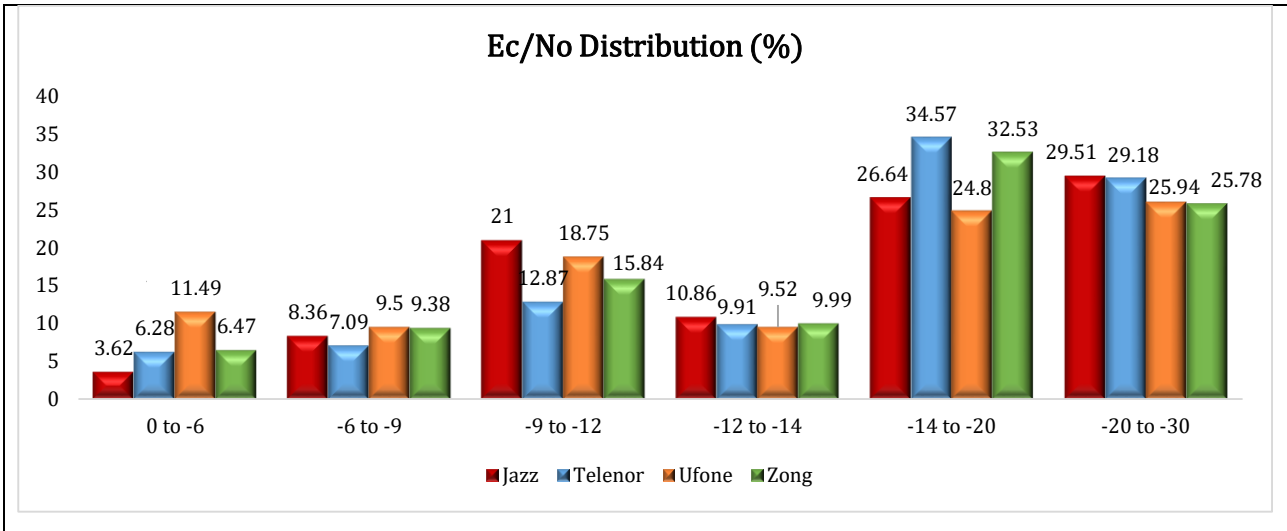


3.6. **3G Signal Strength.** RSCP is the power measured by a mobile handset on a particular 3G physical communication channel. As per license the signal strength should be **greater than -100dBm with 90% confidence level**. Following graphs show overall average value of RSCP alongwith its confidence level and percentage distribution in different ranges (i.e. bins from greater than -65dBm to less than -100dBm). **Except Ufone, other CMOs have achieved the 90% confidence level** in Lahore.

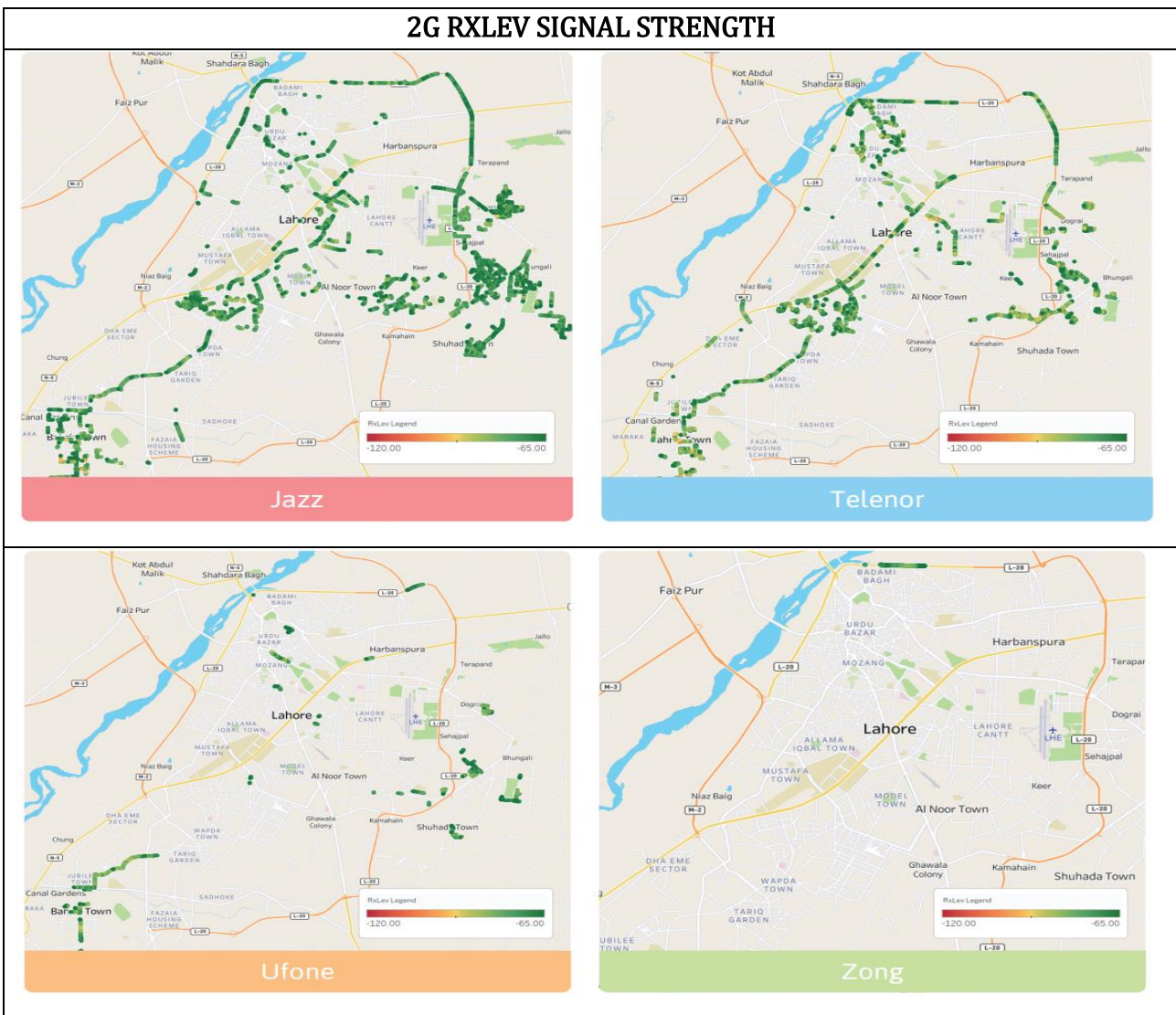


3.7. **3G Signal Quality.** The received signal quality is measured in 3G network through Received Energy per Chip (Ec) divided by the Total Noise Power Density (No) in the band. Following graphs show overall average value of Ec/No, percentage confidence level of Ec/No > -13dB and its percentage distribution.



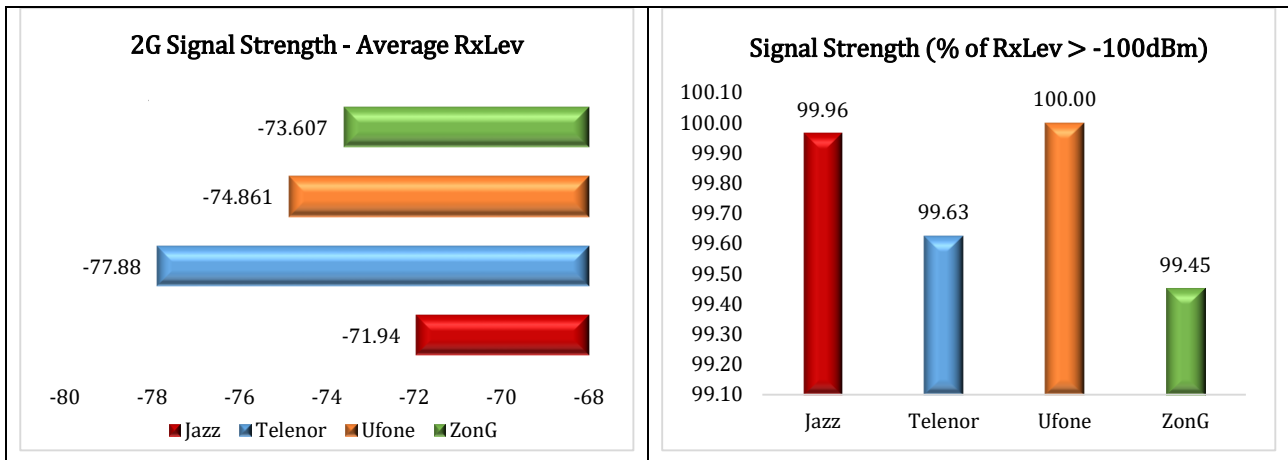


3.8. **2G Coverage.** The pictorial view of signal strength of 3G networks of CMOs i.e. Jazz, Telenor, Ufone and ZonG is shown below and it must be noted that in case of ZonG the fallback to 2G network is minimum:

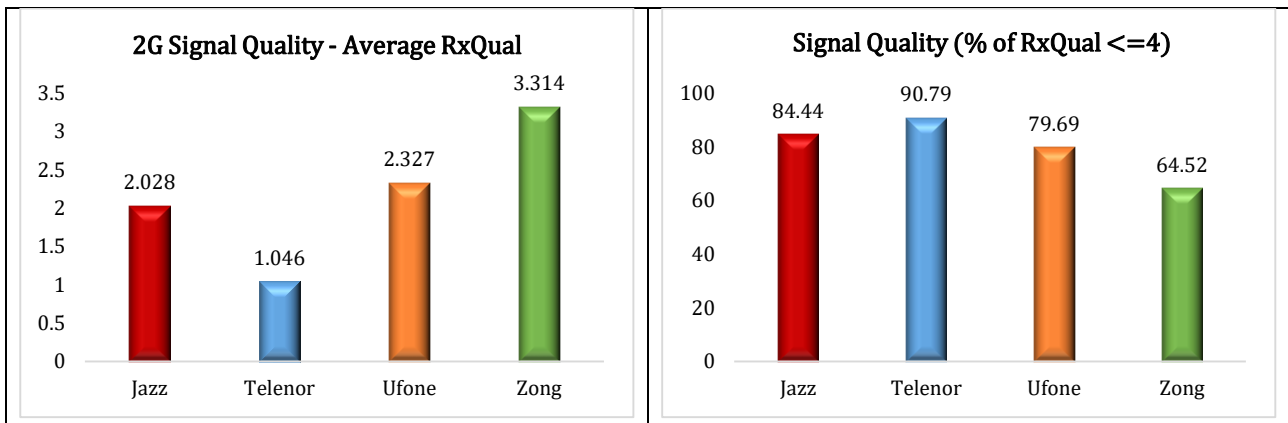




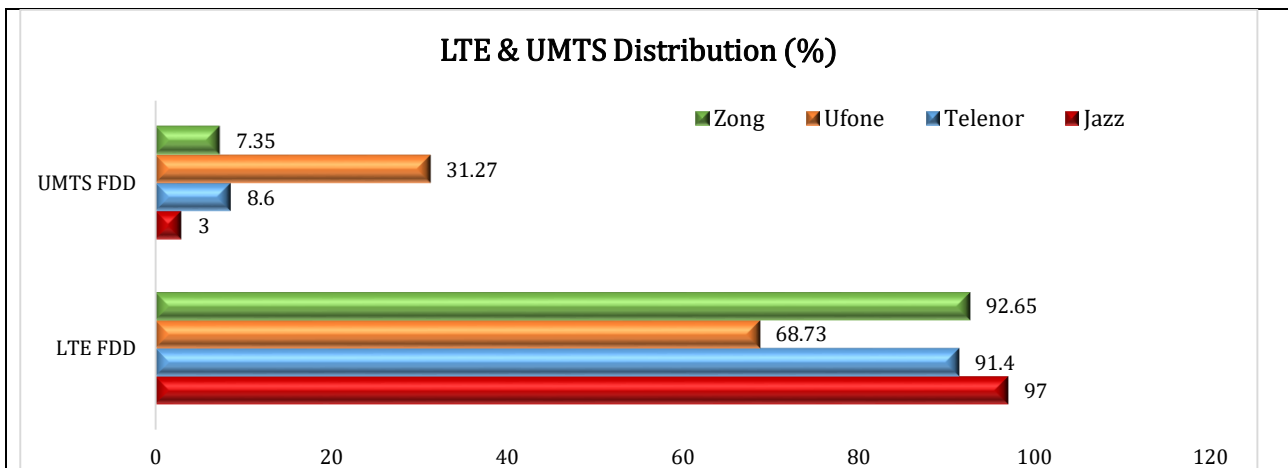
3.9. **2G Signal Strength.** RxLev denotes the signal strength of 2G network and it corresponds to the power level measured by the mobile handset to the average received signal strength in the downlink. Following graphs show overall average value of Rxlev alongwith its confidence level in Lahore.



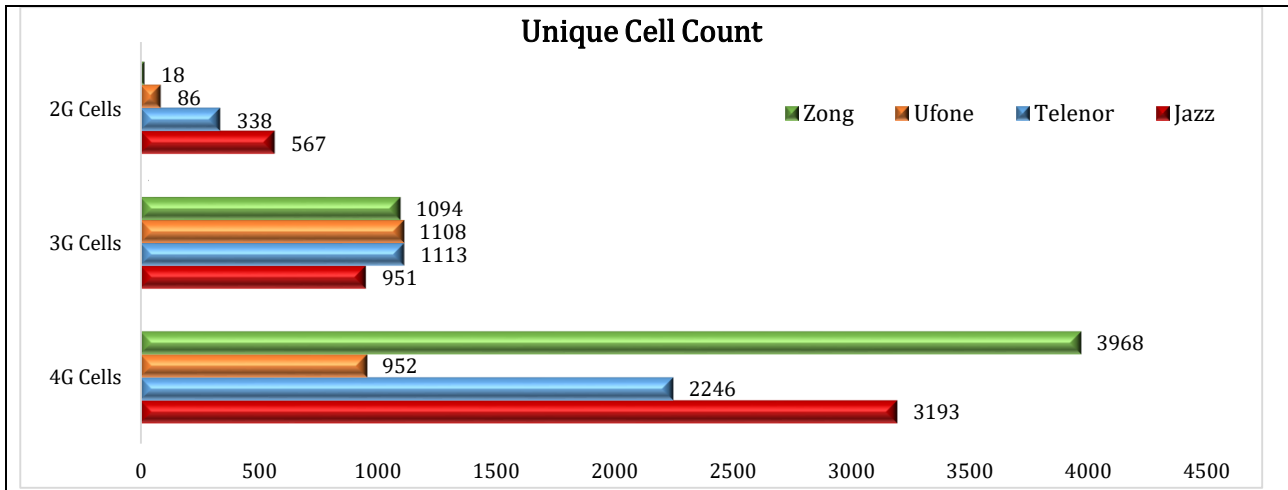
3.10. **2G Signal Quality.** The received signal quality is measured in 2G network through Received Quality (RXQUAL). Following graphs show overall average value of RxQual, percentage confidence level of RxQual <= 4.



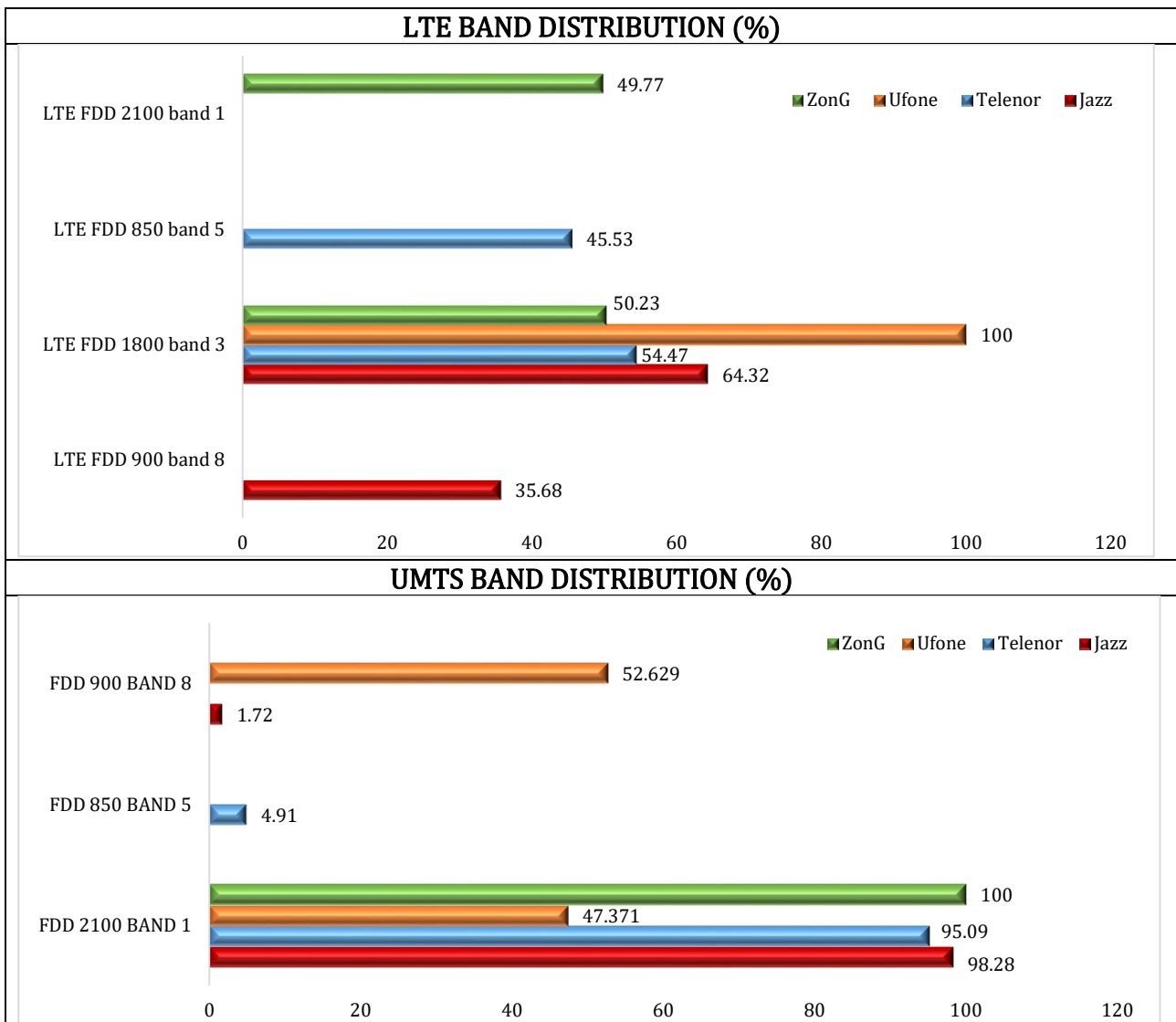
3.10. **Network Utilization.** Majority of the time, during the survey the mobile handsets remained on 4G networks. The 4G and 3G networks utilization recorded which is shown as below:

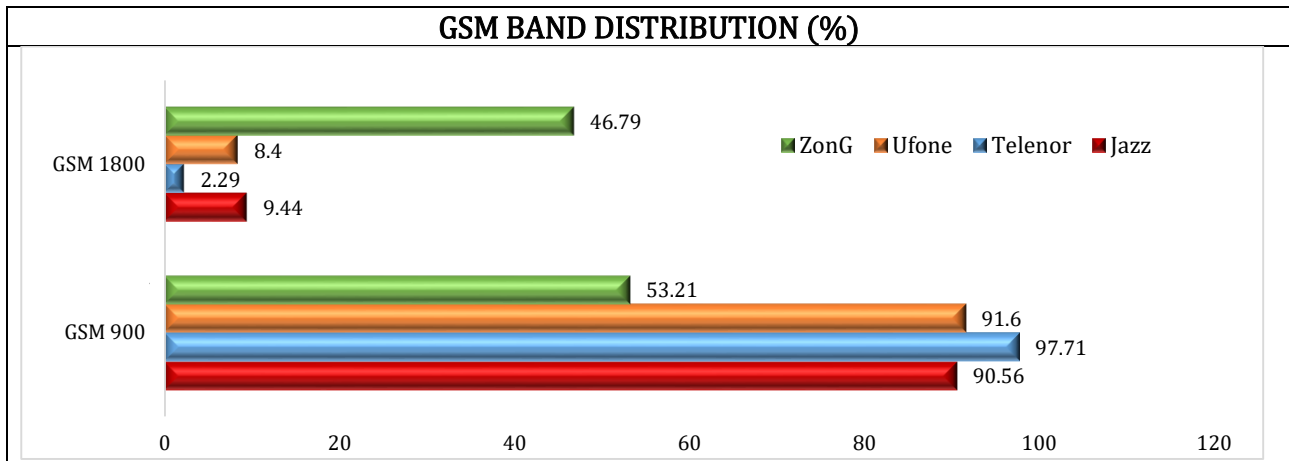


3.11. **Unique Cell Count.** During the survey, the number of unique cells encountered while using 4G, 3G and 2G network have been recorded which is shown as below:



3.12. **Spectrum Bands Utilization.** During the survey, the spectrum bands utilization while using 4G, 3G and 2G network have been recorded which is shown as below:



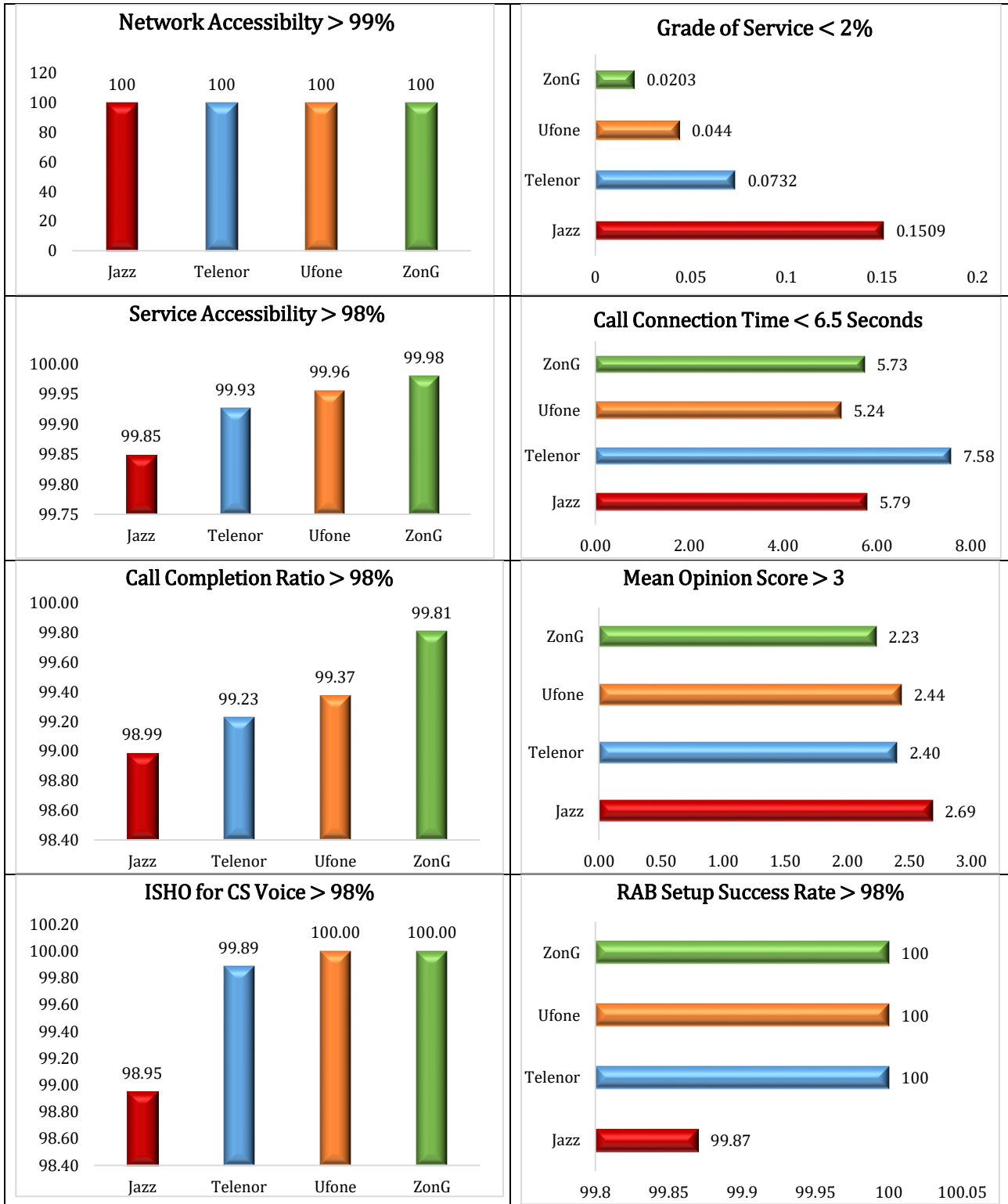


#### 4. VOICE SERVICE

4.1. A total of Seven Thousand Seven Hundred & Eighty One (7781) Calls of Two (02) minutes duration have been made. Following QoS Key Performance Indicators of Voice Services have been measured:

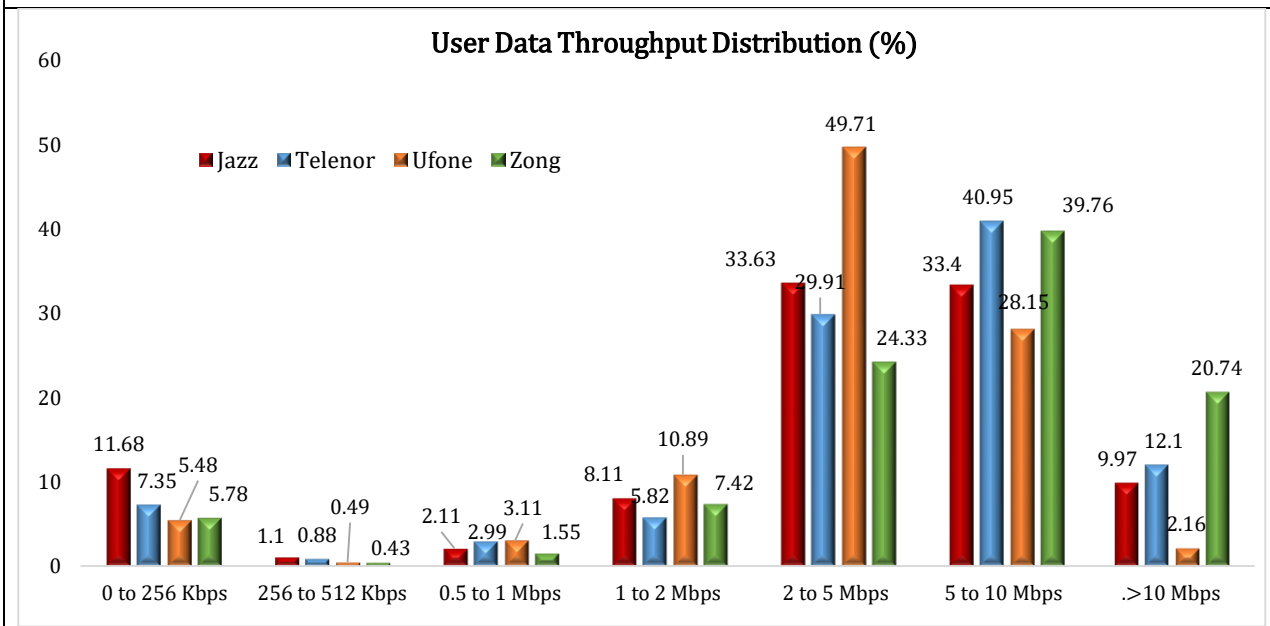
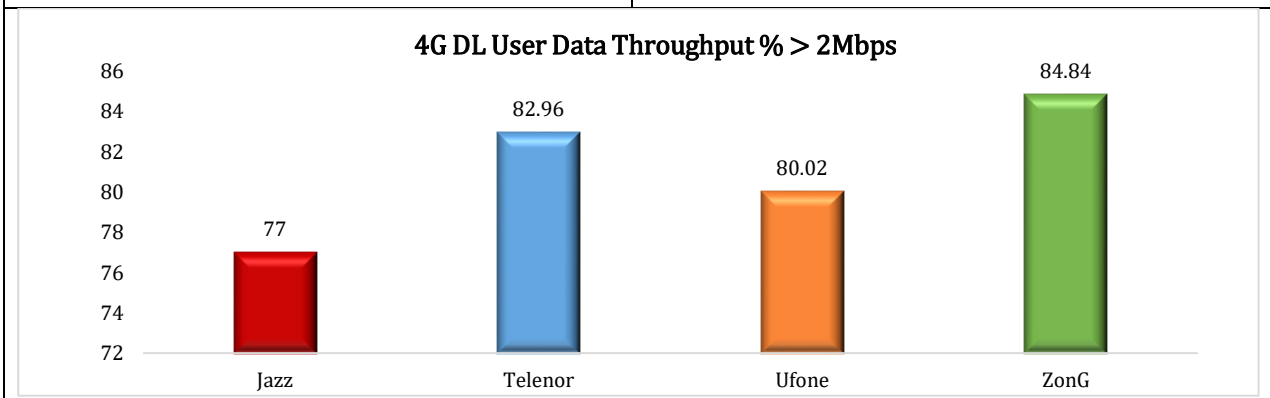
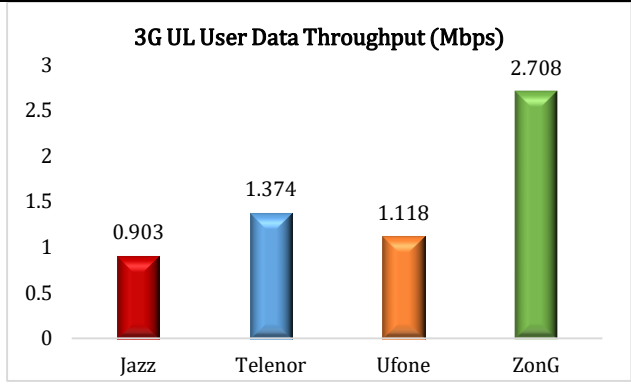
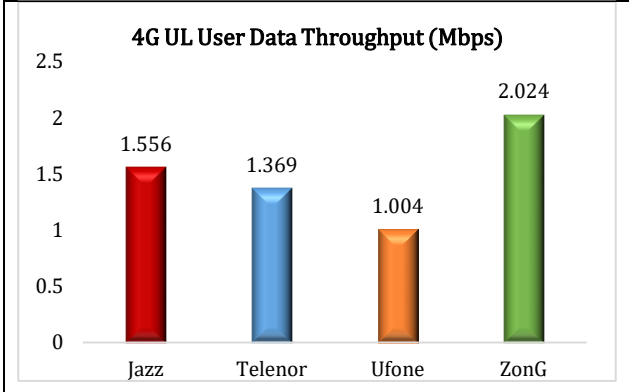
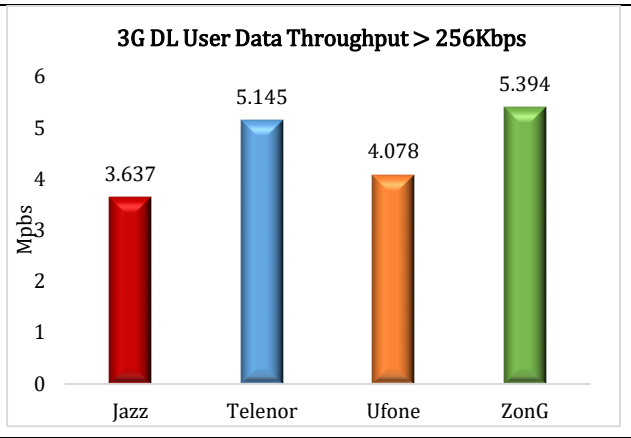
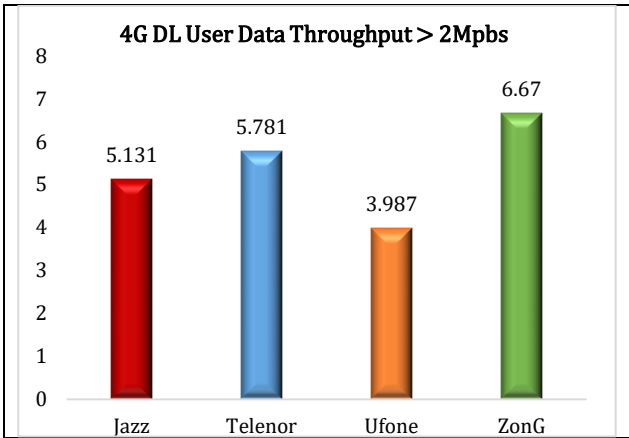
S. #.	KPI Name	Definition
1.	Network Accessibility	<i>Network Accessibility is the percentage of time network is available during the drive-test campaign. Threshold Value &gt; 99%</i>
2.	Grade of Service	<i>Grade of Service is the probability that the end-user cannot access the mobile service when requested. In simple words it is the network blocking. Threshold Value &lt; 2%</i>
3.	Service Accessibility	<i>Service Accessibility is the probability that the end user can access the desired service. Threshold Value &gt; 98%</i>
4.	Call Connection Time	<i>Call Connection Time is the time between sending the complete call initiation information by the caller and in return receipt of call setup notification. Threshold Value &lt; 6.5 Seconds</i>
5.	Mean Opinion Score	<i>Mean Opinion Score is the quality of voice call. Threshold Value &gt; 3</i>
6.	Call Completion Ratio	<i>Call Completion Ratio is the probability that a service once obtained, will continue to be provided under given condition for a given time duration or until terminated deliberately by either Caller or Called Party. Threshold Value &gt; 98%</i>
7.	ISHO for CS Voice	<i>Inter System Handover is the measurement of successful handover from 3G to 2G for Circuit Switched Voice. Threshold Value &gt; 98%</i>
8.	RAB Setup Success Rate	<i>The probability that RAB will be assigned to mobile user for any service when requested. Threshold Value &gt; 98%</i>

4.2. Voice KPIs Results. Except Mean Opinion Score (MOS) and Call Connection Time by Telenor, CMOs have met the license threshold values of Voice QoS KPIs. The results obtained by the CMOs is shown in the graphs.

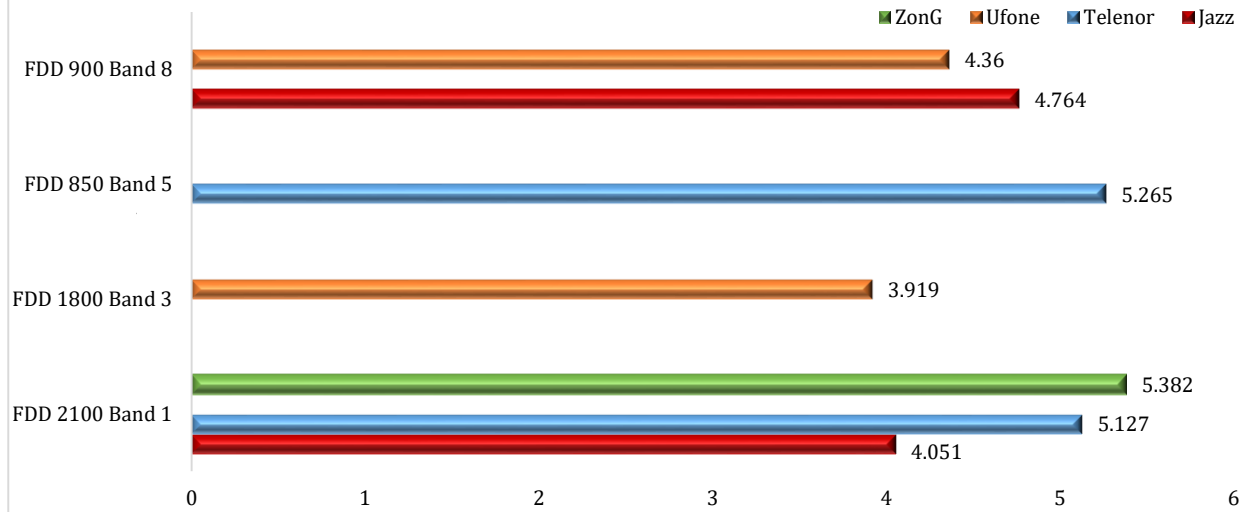


## 5. DATA SERVICE

5.1. A total of Thirty Six Thousand Three Hundred and Sixty Seven (36,367) data tests have been performed during this survey. The QoS KPIs of User Data Throughput in Uplink and Downlink alongwith its percentage distribution have been measured. The QoS KPIs survey results are shown in the graphs. **CMOs have met the licensed threshold values of the QoS KPIs.**



### 4G DL Bandwise User Data Throughput (Mbps)



### 3G DL Bandwise User Data Throughput (Mbps)

