

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

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

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

Table 4.3: Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds

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

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

Table 4.4: Non-Compliance of SMS End-To-End Delivery Time ≤ 12 Seconds

MOBILE BROADBAND SERVICE

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

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

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

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

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

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

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

MOBILE NETWORK COVERAGE

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

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

Table 6.1: Signal Strength and Broadband Speed

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

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

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

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

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

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

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

SURVEY MAPS & GRAPHICAL RESULTS

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