

shown in Table 6.5: Download Data Throughput and Table 6.6: Upload Data Throughput respectively.

DESCRIPTION		Jazz	Telenor	Ufone	Zong
DOWNLOAD	ATTEMPTS	10423	10928	10551	10641
	SPEED (Mbps)	34.69	7.99	11.68	35.73
UPLOAD	ATTEMPTS	10423	10928	10551	10641
	SPEED (Mbps)	24.299	6.612	19.831	24.195

Table 6.4: Ookla Tests Statistics

OOKLA DOWNLOAD DATA THROUGHPUT ≥ 4Mbps								
City	Download Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	24.88	18.32	11.32	29.85	Second	Third	Fourth	First
D.I KHAN	22.69	<b>2.03</b>	6.79	23.461	Second	<b>Fourth</b>	Third	First
LAHORE	35.13	10.81	4.75	42.1	Second	Third	Fourth	First
MARDAN	31.14	4.75	7.29	19.64	First	Fourth	Third	Second
SAMUNDARI	31.2	12.31	10.65	30.14	First	Third	Fourth	Second
SHIKARPUR	25.97	12.02	12.34	22.92	First	Fourth	Third	Second
HYDERABAD	36.75	10.8	17.2	30.78	First	Fourth	Third	Second
JHELMUM	52.13	5.06	10.91	49.08	First	Fourth	Third	Second
KARACHI MALIR	28.96	13.32	13.79	30.76	Second	Fourth	Third	First
NAWABSHAH	20.58	9.79	14.46	34.71	Second	Fourth	Third	First
NUSHKI	N/A	8.36	<b>2.71</b>	26.67	N/A	Second	Third	First
QUETTA	50.08	10.01	16.6	31.8	First	Fourth	Third	Second
RAWALPINDI	37.6	<b>2.6</b>	9.2	25.2	First	<b>Fourth</b>	Third	Second
CHUNIAN	27.33	13.18	9.26	43.84	Second	Third	Fourth	First
SHARAQPUR	31.43	11.86	17.41	37.19	Second	Fourth	Third	First
KOTRI	30.08	11.2	14.77	26.17	First	Fourth	Third	Second

Table 6.5: Ookla Download Data Throughput

OOKLA UPLOAD DATA THROUGHPUT ≥ 1Mbps								
City	Upload Data Throughput [Mbps]				Operator Position			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	27.75	5.89	20.84	23.76	First	Fourth	Third	Second
D.I KHAN	21.171	3.734	18.67	17.833	First	Fourth	Second	Third
LAHORE	26.76	7.78	21.61	29.3	Second	Fourth	Third	First
MARDAN	23.57	4.64	14.4	16.37	First	Fourth	Third	Second
SAMUNDARI	25.5	8.26	21.68	28.62	Second	Fourth	Third	First
SHIKARPUR	23.47	5.29	24.47	22.28	Second	Fourth	First	Third
HYDERABAD	27.53	6.24	23.68	30.09	Second	Fourth	Third	First
JHELMUM	28.1	7	18.3	26.4	First	Fourth	Third	Second
KARACHI MALIR	23.28	7.76	20.95	28.14	Second	Fourth	Third	First
NAWABSHAH	19.14	5.22	20.96	34.78	Third	Fourth	Second	First
NUSHKI	N/A	2.72	9.95	12.8	N/A	Third	Second	First
QUETTA	20.94	6	16.7	24.6	Second	Fourth	Third	First
RAWALPINDI	21.4	5	18	21	First	Fourth	Third	Second
CHUNIAN	22.97	10.25	18.51	26.99	Second	Fourth	Third	First
SHARAQPUR	23.64	7.34	22.15	14.06	First	Fourth	Second	Third
KOTRI	26.14	4.76	19.26	23.12	First	Fourth	Third	Second

Table 6.6: Ookla Upload Data Throughput

## 7. MOBILE BROADBAND SERVICE – LATENCY

Latency is a vital indicator of Mobile Broadband Performance as user experience is highly dependent of it. During the survey, Network Latency was measured by calculating the ping between different websites and Ookla Speed Test servers. Latency Test Statistics are shown in Table 7.1: Latency Tests Statistics while the Results are shown in Table 7.2: Automode Latency and Table 7.3: Ookla Latency respectively.

DESCRIPTION		Jazz	Telenor	Ufone	Zong
<b>Automode</b>	ATTEMPTS	6162	5927	6168	6180
	LATENCY (ms)	110.53	77.11	69.96	84.13
<b>Ookla</b>	ATTEMPTS	10423	10928	10551	10641
	LATENCY (ms)	34.5	42.7	36.9	21.6

Table 7.1: Latency Tests Statistics

LATENCY IN AUTOMODE TESTING								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	<b>78</b>	67	52.64	73.49	<b>No</b>	Yes	Yes	Yes
D.I KHAN	<b>109</b>	<b>79</b>	<b>105</b>	<b>83</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
LAHORE	60	50	55	43	Yes	Yes	Yes	Yes
MARDAN	<b>77</b>	57	<b>76</b>	<b>106</b>	<b>No</b>	Yes	<b>No</b>	<b>No</b>
SAMUNDARI	<b>120</b>	75	<b>93.28</b>	74	<b>No</b>	Yes	<b>No</b>	Yes
SHIKARPUR	50	<b>82</b>	45	49	Yes	<b>No</b>	Yes	Yes
HYDERABAD	70	70	60	70	Yes	Yes	Yes	Yes
JHELMUM	<b>95</b>	69	<b>77</b>	<b>152</b>	<b>No</b>	Yes	<b>No</b>	<b>No</b>
KARACHI MALIR	<b>85</b>	<b>78</b>	60	73	<b>No</b>	<b>No</b>	Yes	Yes
NAWABSHAH	<b>109</b>	<b>79</b>	59	<b>78</b>	<b>No</b>	<b>No</b>	Yes	<b>No</b>
NUSHKI	N/A	<b>243</b>	<b>106</b>	<b>474</b>	N/A	<b>No</b>	<b>No</b>	<b>No</b>
QUETTA	<b>88</b>	<b>119</b>	<b>107</b>	<b>101</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
RAWALPINDI	62	57	58	<b>121</b>	Yes	Yes	Yes	<b>No</b>
CHUNIAN	<b>127</b>	<b>120</b>	70	38	<b>No</b>	<b>No</b>	Yes	Yes
SHARAQPUR	<b>115</b>	46	62	41	<b>No</b>	Yes	Yes	Yes
KOTRI	<b>95</b>	<b>85</b>	72	<b>103</b>	<b>No</b>	<b>No</b>	Yes	<b>No</b>

Table 7.2: Automode Latency

LATENCY IN OOKLA TESTING								
City	Latency [milliseconds]				Compliant (Yes/No)			
	Jazz	Telenor	Ufone	ZonG	Jazz	Telenor	Ufone	ZonG
BAHWALNAGAR	34	65	49	29	Yes	Yes	Yes	Yes
D.I KHAN	52	<b>80</b>	59.82	26.18	Yes	<b>No</b>	Yes	Yes
LAHORE	27	19	31.46	15	Yes	Yes	Yes	Yes
MARDAN	28.05	31	39.59	26.28	Yes	Yes	Yes	Yes
SAMUNDARI	29.8	33	53.09	22.54	Yes	Yes	Yes	Yes
SHIKARPUR	25.6	44.2	29.4	30.8	Yes	Yes	Yes	Yes
HYDERABAD	24.91	27.77	28.25	22.56	Yes	Yes	Yes	Yes
JHELMUM	28	29.59	32.58	19.94	Yes	Yes	Yes	Yes
KARACHI MALIR	26.69	28.32	19.51	20.44	Yes	Yes	Yes	Yes
NAWABSHAH	31.5	32	27.01	23.78	Yes	Yes	Yes	Yes
NUSHKI	N/A	<b>225</b>	39.57	74.9	N/A	<b>No</b>	Yes	Yes