Quarterly Report on the Mobile Quality of Services (QoS)

འབྲུག་བརྡ་དོན་བརྒྱུད་འབྲེལ་དང་བརྒྱུད་ལམ་དབང་འཛིན།

Bhutan InfoComm and Media Authority
Royal Government of Bhutan

(April 2021- June 2021)

Table of Contents

1. Locations Monitored

Sl. No	Locations
1.	Wangdue (Town)
2.	Punakha (Town)
3.	Dechencholing (Thimphu)
4.	Taba (Thimphu)

2. Drive Test Results

A. Wangdue Town

(i) Mobile Voice Services

3G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<120ms)
BTL	0.00	3.69	12.70
TICL	0.00	3.51	8.00

4G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<60ms)
BTL	0.00	3.30	14.80
TICL	0.00	3.30	14.12

(ii) Mobile Data Services

Date Throughputs (Mbps)

Operators	Network	File Transfer Protocol (≥ 1.5 Mbps)		HyperText Transfer Protocol (≥ 1.5 Mbps)	
		Upload	Download	Upload	Download
BTL	3G	8.64	8.63	8.89	10.10
TICL		5.78	8.48	65.93	8.89

Operators	Network	File Transfer Protocol (≥ 6.0 Mbps)		HyperText Transfer Protocol (≥ 6.0 Mbps)	
		Upload	Download	Upload	Download
BTL	4G	11.56	36.12	14.04	33.37
TICL		10.38	40.22	10.60	41.37

B. Punakha Town

(i) Mobile Voice Services

3G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<120ms)
BTL	0.00	3.41	15.70
TICL	0.00	3.41	15.70

4G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<60ms)
BTL	0.00	3.32	16.10
TICL	0.00	3.20	14.80

(ii) Mobile Data Services

Data Throughputs (Mbps)

Operators	Network	File Transfer Protocol (≥ 1.5 Mbps)		HyperText Transfer Protocol (≥ 1.5 Mbps)	
		Upload	Download	Upload	Download
BTL	3G	8.95	8.78	8.02	18.96
TICL		5.39	10.92	6.91	15.93

Operators	Network	File Transfer Protocol (≥ 6 Mbps)		HyperText Transfer Protocol (≥ 6 Mbps)	
		Upload	Download	Upload	Download
BTL	4G	13.76	35.32	15.04	34.38
TICL		10.48	41.22	11.40	42.87

C. Dechencholing (Thimphu)

(i) Mobile Voice Services

3G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<60ms)
BTL	0.00	3.30	16.10
TICL	0.00	3.32	14.80

4G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<120ms)
BTL	0.00	3.12	11.09
TICL	0.00	3.45	8.99

(ii) Mobile Data Services

Data Throughputs (Mbps)

Operators	Network	File Transfer Protocol (≥ 1.5 Mbps)		HyperText Transfer Protocol (≥ 1.5 Mbps)	
		Upload	Download	Upload	Download
BTL	3G	14.09	3.31	8.02	18.96
TICL		8.37	3.32	6.91	15.93

Operators	Network	File Transfer Protocol (≥ 6 Mbps)		HyperText Transfer Protocol (≥ 6 Mbps)	
		Upload	Download	Upload	Download
BTL	4G	13.27	33.92	14.09	30.10
TICL		7.77	29.42	8.37	33.37

D. Taba (Thimphu)

(i) Mobile Voice Services

3G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<60ms)
BTL	0.00	3.11	14.56
TICL	0.00	3.16	13.22

4G

Operator	Call Drop Rate (<2%)	Mean Opinion Score	Latency (<60ms)
BTL	0.00	3.11	14.56
TICL	0.00	3.16	13.22

(ii) Mobile Data Services

Data Throughputs (Mbps)

Operators	Network	File Transfer Protocol (≥ 1.5 Mbps)		HyperText Transfer Protocol (≥ 1.5 Mbps)	
		Upload	Download	Upload	Download
BTL	3G	8.17	4.56	6.99	4.50
TICL		8.68	4.89	6.81	4.89

Operators	Network	File Transfer Protocol (≥ 6 Mbps)		HyperText Transfer Protocol (≥ 6 Mbps)	
		Upload	Download	Upload	Download
BTL	4G	11.09	31.16	14.77	35.78
TICL		18.00	32.11	14.98	37.32

Terminologies

1. ***Operator***: Refers to the respective mobile service providers

2. ***Call Drop Rate***: Refers to the fraction of the telephone calls which, due to technical reasons, were cut off before the speaking parties had finished their conversation and before one of them had hung up (dropped calls).

   CDR *= (Number of Call drops/ Total number of attempted calls) x 100*

3. ***Call Completion Rate***: Refers to the ratio of successfully completed calls to the total number of attempted calls.

   CCR *= Number of successful calls / total number of attempted calls*

4. ***Data Throughput Rate***: Refers to the actual amount of data transmitted or transferred in a period of time. It is used for measuring the speeds of data uploads or downloads.

5. ***File Transfer Protocol (FTP)***: Is a standard network protocol used for the transfer of computer files between a client and server on a computer network.

6. ***Hypertext Transfer Protocol (HTP)***: Is an application protocol for distributed, collaborative, and hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web.

7. ***Mean Opinion Score (MOS)***: Is a numerical measure of quality of human speech at the destination end of the circuit and will determine the voice quality of user experience (QoE) while talking over the phone.

   To measure the quality of experience (QoE). It is expressed as a single number in the range from 1 to 5, where the value of 1 corresponds to the lowest quality experienced by the end-users and 5 as the excellent quality experienced as shown below:

   5: Excellent
   4: Good
   3: Fair
   2: Poor
   1: Bad

8. ***Peak Hours*:** Is a time period determined by Service provider where traffic or number of call attempts is the maximum. The peak hours for Bhutan Telecom limited (BTL) is 3 PM to 10 PM while a peak hour for Tashi InfoComm Limited (TICL) is from 6PM to 12 AM.

9. ***Off – Peak Hours*:** Is a time period determined by Service provided where the traffic or call attempts is moderate. The Off- peak hours of BTL is from 6 AM to 3 PM and Off-peak hours for TICL is from 6 AM to 6 PM.

10. ***Latency*:** Is a measure of delay. In a network, **latency** measures the time it takes for some data to get to its destination across the network. It is usually measured as a round trip delay - the time taken for information to get to its destination and back again.

11. ***Mbps*:** stands for "megabits per second." It is a measure of internet bandwidth. In simple terms, bandwidth is the download rate of your internet connection. It is the maximum speed at which you can download data from the internet onto to your computer or mobile device