

Mobile Internet Connectivity Report (October - December, 2016)



**Telecom Division
Department of IT and Telecom**

Executive Summary

In compliance to the instruction of the Hon'ble Prime Minister to check and monitor the quality of Internet in the dzongkhags, the DITT/MoIC has prepared the second report for this fiscal year. This report is based on the quality of the mobile internet services.

Internet is found to be inconsistent in the dzongkhags. However, there has been an improvement in the participation of the Dzongkhags in the data collection for this study. Most of the Dzongkhags have started to input online. This has helped us in coming up with a much better report compared to the first one.

Introduction

There has been an increase in uptake of Internet especially with deployment of mobile GSM network and 3G. Mobile Penetration is currently recorded at 87%. Internet Penetration is recorded at 62% of population of which 94.3% are subscribed to 3G network. While mobile has a critical role in delivering universal access, 3G with adequate data rate has played a larger role in uptake of Internet by subscribers today.

3G was launched by Bhutan Telecom in 2008 and by Tashi InfoComm in 2013. Today almost all Dzongkhags are covered by 3G except for pocket areas where they revert to 2G and EDGE. Technically 3G download data rates are supposed to go from a minimum of 384 kbps in case of UMTS (Universal Mobile Telecommunications System) and WCDMA (Wideband Code Division Multiple Access) to 14 Mbps for HSPA (High Speed Packet Access) and 42 Mbps for HSPA+ to a maximum of 84 Mbps to 168 Mbps for HSPA+ Advanced which can deploy technologies such as MIMO and 64 QAM (Quadrature Amplitude Modulation) to obtain higher data rates. Data rates can vary though according to various factors such as power, network capacity, distance, obstruction etc that is typical of a wireless transmission.

Therefore, to check the data rates that are available to consumers on the ground in a realistic manner, a study has been conducted. Data collected during the study and findings are reported below.

Objective of the study

To study the quality of Internet connectivity in Bhutan, specifically Mobile Internet as the technology has served to expand uptake of Internet in the country.

Methodology

A dashboard was prepared for monitoring/measuring the quality of telecom services based on different parameters listed as follows:

- Internet speed using the OpenSignal app.
- Call blocking rate
- Call dropping rate
- Voice Quality
- SMS received/sent failure rate
- Signal coverage
- Switchover

This dashboard is being shared with the Dzongkhag ICT Officers. The ICT officers were given instructions on the usage of the dashboard via email, letter and telephone after which they were asked to carry out and record measurements on above parameters from time to time on a monthly basis starting July, 2016. This data collection is an ongoing process and will be refined from time to time.

Based on inputs provided by the Dzongkhag ICT Officers, data has been analysed and compiled in this report for Mobile Internet Connectivity.

Key Findings

Based on the data submitted by the Dzongkhags (Chukha, Dagana, Haa, Mongar, Pemagatshel, Samdrup Jongkhar, Thimphu, Trashy Yangtse, Tsirang and Wangdue Phodrang), average mobile Internet speed (upload speed and download speed) of each dzongkhag has been compiled in Table 1 below.

Dzongkhag	Mobile Internet speed (Avg.)	
	Download (Mbps)	Upload(Mbps)
Chukha	1.316	0.399
Dagana	1.75	1.5
Haa	2.095	0.332
Mongar	7.218	0.582
Pemagatshel	1.434	3.5

Samdrup Jongkhar	2.469	0.195
Thimphu	4.095	0.339
Trashi Yangtse	0.903	0.059
Tsirang	3.198	0.577
Wangdue Phodrang	0.779	0.439

Table 1: Average upload and download speed in Mbps per Dzongkhag

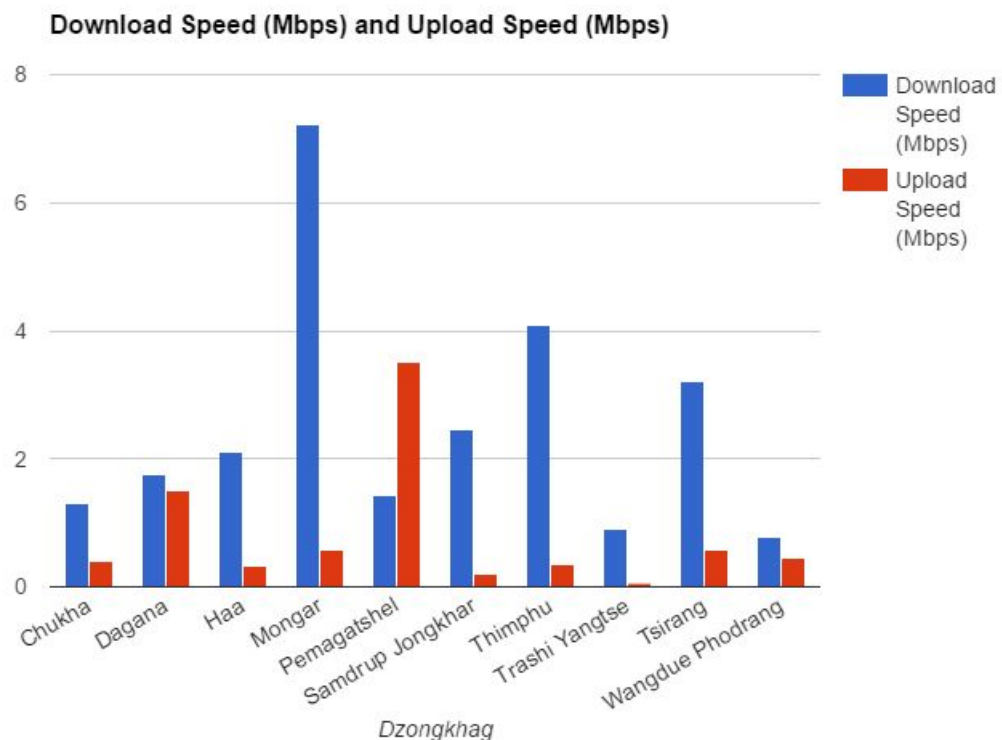


Figure 1: Average Upload and Download Mobile Internet Speed per Dzongkhag

The following observations were made from the above graph:

1. A maximum average upload speed of 3.5 Mbps has been observed in Pemagatshel and a minimum average upload speed of 0.059 Mbps has been observed in Trashi Yangtse.
2. A maximum average download speed of 7.218 Mbps has been observed in Mongar and a minimum average download speed of 0.779 Mbps has been observed in Wangdue Phodrang.

3. The download speed is noted to be higher than the upload speed in the following dzongkhags:
 - a. Chukha
 - b. Dagana
 - c. Haa
 - d. Mongar
 - e. Samdrup Jongkhar
 - f. Thimphu
 - g. Trashigang
 - h. Tsirang
 - i. Wangdue Phodrang
4. In Pemagatshel dzongkhag, the upload speed has been noted to be higher than the download speed. A higher demand of download services rather than the upload services could be the reason for this.
5. It has been observed that the speed of both upload and download is noticed to be rather fluctuating and inconsistent. This could either be due to the short data collection period for this study or flaw in mobile network of the operator.

Conclusion

From this report, it has been observed that the download speed is higher than the upload speed in most of the dzongkhags, as would be preferred by the end users. However, there is inconsistency in the data rates observed, i.e Internet speed is fluctuating. This could be due to network issue in itself or due to some events like higher access at certain times.

Constraints

This study has been limited by following constraints:

- The measurement of mobile Internet speed has been done in an inconsistent manner.
- Most fields such as the call block rate, call drop rate, voice quality, SMS sent and received failure, switchover and signal coverage were left unfilled by Dzongkhag ICTOs. However, the Internet speed tests has been done on a frequent basis.
- The following Dzongkhags have no data input for this quarter:
 - Bumthang
 - Gasa
 - Lhuntse
 - Paro
 - Trongsa

- Punakha
- Sarpang
- Samtse
- Trashigang
- Zhemgang

Annex

I. Internet Speed recorded Dzongkhag-wise for the months of October, November and December

D/khag	Internet speed		Voice Quality	Switch over	SMS sent/received failure	Call dropping rate	Call Block rate	Signal Coverage
	Download (Mbps)	Upload (Mbps)						
Chukha	1.02 1.92 1.01	0.407 0.475 0.316	Good within dzongkhag and very poor in gewogs.	-	-	-	-	coverage is good within dzongkhag but very poor between Watsa and Tanalum, Gedu and Sorchen. Fair at gewogs.(Metakha and Dungna have only Tcell connection)
Haa	1.38 2.81	0.4 0.264	Good	3	0	0	0	Sangbaykha and Gakiling Geogs have no 3G and 2G/GPRS is erratic
Mongar	7.18 6.36 8.08 5.38 8.11 8.2	0.16 0.09 0.48 0.23 1.97 0.56	Good	-	-	-	-	Weak in shadow areas

Dagana	1.45 2.05	1.45 1.55	-	-	-	-	-	-
Samdrup Jongkhar	2.82 0.827 2 4.23	0.354 0 0 0.425	-	-	-	-	-	-
Tsirang	2.95 1.95 2.95 1.48 7.46 2.4	0.289 0.523 0.289 0.339 0.923 1.1	Good	-	-	-	-	-
Thimphu	1.07 0.968 4.11 5.62 2.23 5.14 2.17 1.66 2.6 4.12 5.91 6.24 7.39 2.1 6.95 4.57 5.86 4.24 6.17 6.14 5.56 6.68 1.99 0.968 2.9 7.2 0	0.091 0.218 0.486 1.27 0.496 0.493 0.217 0.129 0.272 0.449 0.191 0 0 0.165 0 0.55 0.499 0 0.981 0.707 0.182 0.669 0.407 0.012 0.67 0 0.001	Good	-	0	0	0	Good
Pemagatsh el	2.3 1.5	4.5 3.8	-	-	-	-	2	-

	0.501	2.2						
Trashi Yangtse	0.332 0.74 0.35 0.104 4.66 0.102 0.036	0.359 0.017 0.013 0.003 0.023 0.002 0	Good	-	-	0	0	-
Wangdue Phodrang	0.841 0.717	0.855 0.024	-	-	-	-	-	-