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Mobile Broadband Quality of Service Experience (QoSE)

Bangladesh, Cambodia, India, Nepal & Pakistan | 2017 - 2018 |

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# Summary

LIRNEasia has been conducting nationally representative surveys in Cambodia, Bangladesh, India, Nepal and Pakistan, 2017-2018, as part as a larger project in collaboration with Research ICT Africa and DIRSI who ran the same surveys in Africa and Latin America, respectively (see: <http://afteraccess.net/> for further details). The focus of the surveys is on access and use of the Internet in the global South. In Asia, apart from the quantitative survey, LIRNEasia also arranged for mobile broadband diagnostics to be carried out in all surveyed locations. Quality of service experienced by the end user being was cited as a barrier for use of the Internet, thereby making the study of QoSE pertinent.

Mobile broadband has become ubiquitous and is being accessed sometimes even unknowingly by consumers. Apps such as Facebook, Whatsapp and Viber, among others, provide essential services that have replaced traditional voice and SMS and therefore Internet access via mobile surpasses fixed broadband. With fierce competition in these markets, prices are also being driven down making it more accessible to all social strata. However, price alone does not foster continued use of the Internet.

The [Netradar](http://www.nettitutka.fi/en) mobile app gathers a host of broadband measures for analysis of the health of the mobile broadband network based on peoples’ daily usage patterns and network experiences. This report primarily focuses on throughput in terms of Download speed and Upload speed (measured in Mbps) and latency which is the time taken for a packet to reach the destination server and return to the client (measured in ms). The app also captured instances where network errors were detected thereby making the network unavailable at times. An update that was made to the app by the creators at Aalto University, Finland, optimized use by having measurements run in the background and drastically reducing the battery and data consumption by the app. Along with this update, data previously collected on network errors were no longer collected; however, the app is now able to measure constrained and unconstrained throughput instead. Constrained download or upload speeds are the maximum that the app was able to achieve, i.e. instances where the speed was limited to the network load. There are many reasons for receiving constrained speeds, some of which are because of connectivity to lower generation technologies, traffic shaping, network congestion and so on. At the point of this study, the app did not have the ability to record the type of error or deduce what the potential causes may be; however, the finding of instances where the connectivity could not reach optimal performance is in itself a valuable finding.

This report compares average results per country and also presents measurements at country level for which locations are known.[[1]](#footnote-1) Poor latency that impacts QoSE even in instances where download speeds were high and the disparity in quality and network availability in urban vs rural settings are examples of the key observations made through this study.

LIRNEasia has been benchmarking broadband quality of service experience in cities across South Asia and South East Asia since 2008. Please refer to our past work [here](http://lirneasia.net/projects/ict-indicators/#reports).

# 1 Download Speeds (All countries, All technologies)

Chart 1: Average download speed (Mbps) – Bangladesh, India, Cambodia, Nepal, Pakistan

Note: BD midnight – 2 a.m. and 11 p.m. has less than 10 readings per time slot

# 2 Download Speeds (All countries, 3G vs 4G)

Chart 2: Average download speed (Mbps), 3G vs 4G – Bangladesh, India, Cambodia, Nepal, Pakistan

Notes:

|  |  |
| --- | --- |
| BD: midnight – 2 a.m. and 11 p.m. has less than 10 readings per time slot | PK: Midnight - 6 a.m. less than 10 readings per time slot |
| KH: 8-9 p.m. less than 10 readings per time slot | NP: 1 - 2 a.m., 7 a.m., 6 p.m. - 11 p.m. less than 10 readings per time slot |
| NP: 9-10 p.m. less than 10 readings per time slot |  |

# 3 Upload Speeds (All countries, All technologies)

Chart 3: Average upload speed (Mbps) – Bangladesh, India, Cambodia, Nepal, Pakistan

Notes: BD: Midnight - 2 a.m., 11 p.m. less than 10 readings per time slot

KH: 3 a.m., 3p.m. - 10 p.m. less than 10 readings per time slot

NP: 6p.m. - 11 p.m. less than 10 readings per time slot

# 4 Upload Speeds (All countries, 3G vs 4G)

Chart 4: Average upload speed (Mbps), 3G vs 4G – Bangladesh, India, Cambodia, Nepal, Pakistan

Notes:

|  |  |
| --- | --- |
| BD: Midnight - 2 a.m., 11 p.m. less than 10 readings per time slot | KH: All time slots except for 10 a.m., 1-2 p.m. and 11 p.m. - less than 10 readings per time slot |
| KH: All time slots - less than 10 readings per time slot | PK: All time slots - less than 10 readings per time slot |
| NP: All time slots - less than 10 readings per time slot | NP: All time slots - less than 10 readings per time slot |

# 5 Latency (All countries, All technologies)

Chart 5: Average latency (ms) – Bangladesh, India, Cambodia, Nepal, Pakistan

Notes: BD: Midnight - 2 a.m., 11 p.m. less than 10 readings per time slot

NP: 8-9 p.m. - less than 10 readings per time slot

# 6 Latency (All countries, 3G vs 4G)

Chart 6: Average latency (ms), 3G vs 4G – Bangladesh, India, Cambodia, Nepal, Pakistan

Notes:

|  |  |
| --- | --- |
| BD: Midnight - 2 a.m., 11 p.m. less than 10 readings per time slot | PK: Midnight-6 a.m. less than 10 readings per time slot |
| KH: 4 p.m., 8-9 p.m. less than 10 readings per time slot | KH: 7 p.m. - less than 10 readings per time slot |
| NP: 8-9 p.m. - less than 10 readings per time slot | NP: 1-2 a.m., 6 p.m. - 11 p.m. less than 10 readings per time slot |

# 7 Urban vs Rural Measurements

The Netradar app picked up latitude and longitude coordinates in all instances where GPS settings were available via the mobile devices. The sampling frames used by the field work teams were mapped with GPS coordinates and were marked as being either urban or rural based on the national statistic offices in the countries surveyed. Therefore this data was used to form the basis in which we conducted our analysis of measurements for urban locations vs. rural. A distance matrix was generated to identify the distance in meters between the points in the broadband measurements data set and the sampling frame for each country. We then averaged all measurements within a 1000m radius demarcation to known urban and rural locations to derive the average download speed, upload speed and latency per location of the points in the sampling frame.

Chart 7: Average download speed (Mbps), Urban vs Rural – Bangladesh, India, Cambodia, Nepal, Pakistan

Chart 8: Average upload speed (Mbps), Urban vs Rural – Bangladesh, India, Cambodia, Nepal, Pakistan

Chart 9: Average latency (ms), Urban vs Rural – Bangladesh, India, Cambodia, Nepal, Pakistan

**TBD: Note on constrained networks and errors observed**

**TBD: Country level charts (By MNO in each country)**

1. In order for the app to record GPS coordinates, the mobile device used for these measures ought to enable location settings. Unfortunately this could not have been mandated and therefore there are instances where specific locations within the country are not known. [↑](#footnote-ref-1)