METHODOLOGY: FIXED BROADBAND QUALITY OF SERVICE (QOS) TESTING

METRICS[1]

Different applications make different demands on the Internet connection. For example, browsing a photo gallery requires high download speed while a networked game requires low round trip delay. Hence, the methodology defines a comprehensive set of six performance metrics that should be measured in each experiment.

Download speed (kbps)	The maximum rate at which data can be received from the Internet. This is measured by downloading a large file over about 1 minute, in order to average out temporary fluctuations in speed. It is an indicator of the basic browsing experience.
Upload speed (kbps)	This metric defines the speed at which the subscriber can send data to the Internet. It plays a significant role in responsiveness of real-time applications like VOIP.
Round-Trip Time (ms)	Time taken for a packet to reach the destination and return. This is significant in systems that require two-way interactive communication such as online commerce and gaming.
Jitter (ms)	Jitter is the variation of end-to-end delay from one packet to the next within the same packet stream/connection/flow. Jitter is more relevant for real-time traffic like VOIP.
Packet Loss (%)	The fraction of packets which do not reach the destination. This can result in noticeable performance degradation with streaming traffic such as video where retransmission is not done.
Availability (%)	This measures the number of times we are able to access the Broadband services. If *T* attempts are made to connect to the Internet, and if *F* attempts fail, then Availability = (1 – F/T) x 100%

LEVELS OF TESTING

In order to be able to identify the bottleneck, the testing is carried out on three levels:
- ISP Level – To / from a server within the subscriber's ISP
- National Level – To / from a server in the subscriber's country but hosted by a different ISP
- Global Level – To / from an international server located outside the subscriber's country.

In all cases, the server chosen should be a widely-used one so that it is representative and is likely to have high-bandwidth network connections.

PACKAGES TO BE TESTED

Packages with an advertised download speed of 512 kbps offered by the **two ISPs with the highest market shares** in terms of number of subscribers will be subject to QoSE tests.

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[1] Gonsalves, T.A & Bharadwaj, A. Comparison of AT-Tester with Other Popular Testers for Quality of Service Experience (QoSE) of an Internet Connection. http://lirneasia.net/wp-content/uploads/2009/09/AT-TesterComparison.pdf

- In the event that 512 kbps packages are not on offer by the ISPs with the highest market share then the package closest to 512 kbps will be tested
- In the event that packages from the ISP with the highest market share cannot be obtained, then the ISP with the third highest market share shall be selected (and so on)

TEST TECHNIQUES

In order to account for effects such as network congestion during peak times, that may affect the performance of a broadband network the following test technique shall be adopted.

- Tests are carried out at the following times: 0800, 1100, 1500, 1800, 2000 and 2300 on two randomly selected weekdays and on one day over the weekend.
- The result for each time slot is recorded by running the test three times and obtaining the average reading for each time slot.
- Testing is carried out on two broadband packages from two different ISPs in each test site.

Note: LIRNE*asia* tries to tests packages that are identical or at least similar in terms of advertised speeds and underlying technology. However, this is impossible to achieve as countries offer a variety of packages (e.g. the lowest advertised speeds for Thai packages is 5Mbps). The results can be used for country and regional comparisons, but LIRNE*asia* focuses on advertised versus delivered speeds.

REPORTING

The test results will be returned to ranmalee@lirneasia.net in the format provided.

CITIES

Tests are carried out in the following cities:

- Colombo, Sri Lanka
- Chennai, India
- Bengaluru, India
- Mumbai, India
- New Delhi, India
- Dhaka, Bangladesh
- Thimphu, Bhutan
- Bangkok, Thailand
- Chiang Mai, Thailand
- Jakarta, Indonesia
- Manila, Philippines

ABOUT THE TEST TOOL[2]

The client software referred to as the AT-Tester is pre-installed in the user PC for measuring the QoSE metrics periodically. Results can be viewed locally and uploaded to the www.broadbandasia.info server. The tool is written in VBScript. The tests are done using ping, download of files from selected servers, and upload of files to the www.broadbandasia.info server. The AT-Tester allows the subscriber to test against 3 different servers: global, national and ISP. Widely-used servers are selected for each country and ISP. This allows the subscriber to assess the QoSE for services hosted in different parts of the Internet cloud.

• The client application supports registration, scheduling of tests, manual running of tests, viewing and uploading of results
• During registration, the subscriber selects his/her location, ISP and tariff package
• Tests can be run manually, or can be run by the scheduler at selected times
• Results are stored on the PC and can be viewed locally

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[2] Gonsalves, T.A & Bharadwaj, A. Comparison of AT-Tester with Other Popular Testers for Quality of Service Experience (QoSE) of an Internet Connection. http://lirneasia.net/wp-content/uploads/2009/09/AT-TesterComparison.pdf