

# Interactive Gaming Quality differs per broadband provider

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*Recently TNO Information and Communication Technology has developed a test protocol for assessing the quality as experienced by users of so-called First Person Shooter games. In December 2006 TNO completed a benchmark with the developed test protocol. The test protocol has been used to assess the Interactive Gaming quality for unloaded access networks and for the situation where during game play a heavy download takes place. The tests were conducted using connections from six different broadband providers. Our benchmark has shown that when competing applications are active, such as heavy downloads, significant differences occur between the performance of the broadband providers and that gaming quality can become unacceptably low. The benchmark also shows that when broadband connections are not loaded there is hardly any difference between broadband providers..*

## **Introduction**

Interactive Games are an increasingly popular consumer application which use a broadband connections. . Several parties have predicted that within a few years 25% of all network traffic will be due to Interactive Gaming. In addition to that, more and more initiatives are being launched to use Interactive Games for serious purposes such as education, training and counseling.

Recently TNO Information and Communication Technology has developed a test protocol for assessing the quality as experienced by users of so-called First Person Shooter games. An important part of the test protocol is the assessment of the network quality in terms of average Round Trip Time (= Ping) and variation of this Round Trip Time (= jitter). Subsequently this network quality is mapped to user experienced quality, expressed in a so-called Mean Opinion Score (MOS). The MOS value expresses how customers experience the quality of the delivered service. To this end, a 5-point scale is used, following ITU-T P.800: 5 = excellent, 4 = good, 3 = fair, 2 = poor, 1 = bad.

By combining the Interactive Gaming test protocol with existing measurement methods for voice and video quality, TNO is able to assess the total experienced quality of Triple Play services.

## **The benchmark**

In December 2006 TNO has conducted a benchmark with the developed test protocol. The test protocol has been used to assess the Interactive Gaming quality for unloaded access networks and for the situation where during game play a heavy download takes place. The tests were conducted using connections from six different broadband providers.

For the benchmark we have used six different internet connections, namely 5 broadband connections from commercial providers, i.e. 3 ADSL providers (KPN, XS4ALL and IPACT) and 2 cable providers (UPC and Casema), and 1 fibre connection at a university (provided via SURFNET). In order to get an impression of the actual bitrates we have conducted three measurements on the uplink and downlink speed, by using <http://www.speedtest.nl>. For the 5 consumer connections the average uplink speed varied between 320 to 880 kbit/s while

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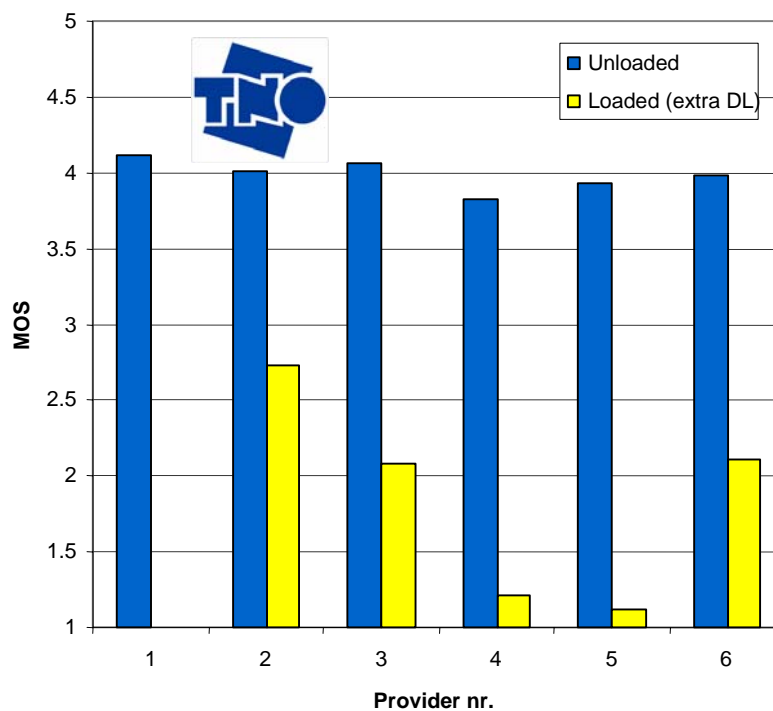
the downlink speed varied between 1680 and 3820 kbit/s. The SURFNET speed was on average 13 Mbit/s uplink and 65 Mbit/s downlink.

For the 5 consumer connections we have conducted 6 measurements: 3 without additional access traffic and 3 while downloading a file of 3GB. For the university connection we only conducted 3 measurements without additional traffic.

The figure below depicts, anonymously, the MOS values for the different providers. Blue bars denote the MOS averaged over 3 measurements without additional access traffic. Yellow bars denote the MOS averaged over 3 measurements during a heavy download.

The figure shows that there is hardly any difference between the providers in case there is no additional access traffic.

In case of an unloaded access network the average Ping for the different providers varies between 7 and 20 ms, the jitter between 17 and 78 ms while the packet loss is less than 0.01% for all connections.



During a heavy download differences between broadband providers become apparent. In this case Ping varies between 105 and 320 ms, jitter between 85 and 326 ms and the packet loss takes values between 0.01% and 0.3%. For this scenario the MOS varies between 2.7 (fair) and 1 (bad).

### Conclusions

By using the test protocol developed by TNO the Interactive Gaming quality as experienced by users can be measured objectively.

The benchmark shows that there is hardly any difference for Interactive Gaming quality between the providers when there is no additional access traffic. The MOS value for this case is 4 (good).

Our benchmark has further shown that when additional applications are running at the home network, like VoIP, streaming audio/video, peer-to-peer applications (torrents) and TCP

downloads, the Interactive Gaming quality can become unacceptably low. Significant differences can occur between different broadband providers if the access network is heavily loaded.

By combining the Interactive Gaming test protocol with existing measurement methods for voice and video quality, TNO is able to assess the total experienced quality of Triple Play services.