

# REPORT ON NEW ZEALAND BROADBAND QUALITY

---

JULY - DECEMBER 2010

Published July 2011



COMMERCE COMMISSION

**Notice of Disclaimer:**

This report was prepared by the Commission or on the Commission's behalf, and is made available under section 9A of the Telecommunications Act 2001 (the "Act").

Epitiro provides the Commission with data services only, and took no part in the preparation of this report. The statements, analyses, and conclusions contained in this report do not represent conclusions of the Commission under the Act. In addition, the classification and categorisation of information and markets contained in this report do not constitute a proposal, decision, or view regarding the current or future definition of markets under the Commerce Act 1986, the Act, or other applicable legislation.

The information contained in this report has not been subject to independent verification or validation. While measures have been taken to gather and produce accurate information, the Commerce Commission makes no representations with respect to the accuracy or completeness of the information contained in this report, and will not be liable to any person or entity or third party whether in contract, tort, equity or otherwise, whether by itself or by any employee, agent, contractor, or representative, for any reliance, inaccuracy, error, omission, inadequacy, incompleteness, in full or in part, or for any loss or damage which may directly or indirectly arise out of or in connection with this report.

## **BROADBAND PERFORMANCE: KEY FINDINGS FOR PERIOD JULY TO DECEMBER 2010**

- Minimum, average and maximum web browsing speeds achievable on DSL have all increased, with maximum speed increasing from 5.5Mbps to 6.5Mbps.
- TelstraClear's cable service provided the best browsing performance (in the areas where it is available), but was closely followed by service providers using unbundled copper lines.
- Access line speeds above 7Mbps for both cable and DSL services had little effect on the measured web browsing speed.
- Average web browsing speed diminishes with increasing distance from infrastructure in Auckland; average speed at the test site in Dunedin is below 3Mbps, compared to speeds of 4Mbps to 5Mbps at comparable sites further north. This is due to network time delays which affect the performance of the internet protocols that support web browsing.
- Use of local storage (caching) for international content continues to provide a significant international browsing performance boost. Average international web browsing speed to the Commission's test site falls from around 2Mbps to 0.5Mbps when the test site content is not locally cached.
- There was a marked reduction in network availability over the six month period, with all tested ISPs falling below the Commission's benchmark at times. The Commission uses a browsing availability benchmark of 99.9% (which corresponds to an allowable 43.2 minutes per month when the test web page cannot be downloaded). In comparison, the availability of the public telephone network is usually specified to be between 99.99% and 99.999% (which corresponds to service being unavailable for between 26 seconds and 4.3 minutes per month).

# OVERVIEW OF BROADBAND PERFORMANCE

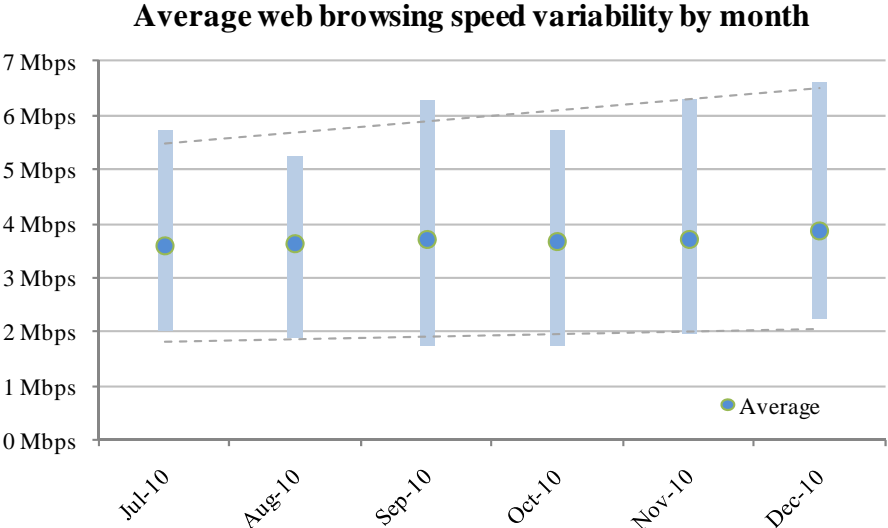
## Introduction

The Commerce Commission’s Report on NZ Broadband Quality is part of a continuing series measuring broadband performance in New Zealand. This is the final edition of the report using the current performance measurement systems, and has been simplified to improve readability and to align with planned reporting for 2011. The Commission’s measurement methods will be updated and enhanced for 2011, including measurement of large file download speeds (throughput) and measures that test service capability to support video streaming and voice over IP (VoIP).

## Web browsing

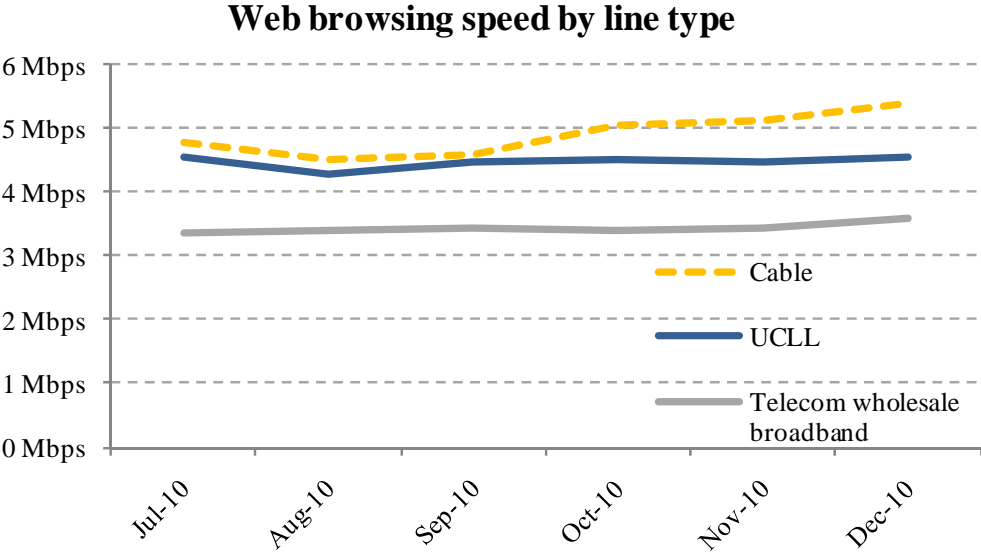
Web browsing performance in New Zealand is measured by recording the speed at which a standard website home-page can be accessed at each of the Commission’s test locations. As the measurement system uses ‘top of the range’ broadband service packages from all service providers, the web browsing performance reported here is likely to be close to the best achievable by end-users in New Zealand.

The measurements for the six months from July to December 2010 show that the average speed of web browsing in New Zealand has improved slightly, with the average upper speed at our test sites increasing by nearly 1Mbps. The graph below provides a view of performance at the test sites and shows the upper and lower speeds attained.



There is a wide variation in browsing performance depending on the access service (TelstraClear cable, unbundled copper loop (UCLL) or Telecom wholesale service) being used.

The graph below illustrates the effect of access service type on browsing speed.

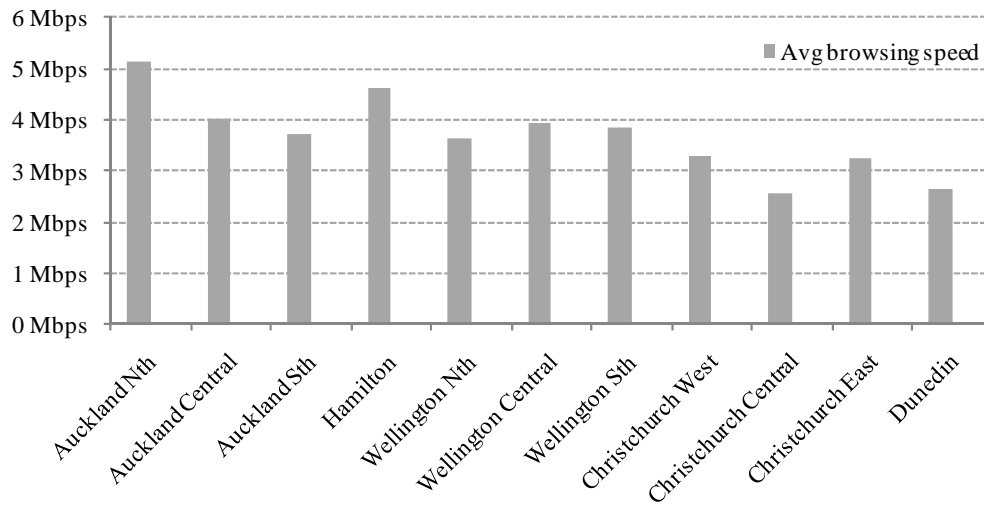


Over the six month period, TelstraClear’s cable service consistently provided the best performance, but was, at times, closely matched by service providers using Telecom’s unbundled copper local loop service connected to their own internet service equipment. The worst performer was the wholesale Telecom broadband service. As part of its design, the Telecom wholesale service includes speed limitations which affect average browsing speed. The speed/line type relationship illustrated above is consistent over all test locations.

TelstraClear cable service has very limited coverage (areas of the Wellington region and Christchurch), UCLL is widely available (at 106 exchanges as at the 31 March 2011, serving around 65% of total lines) and Telecom wholesale broadband service is available nation-wide.

Another factor causing variability of browsing speed by site is the distance between the customer site and key internet servers and infrastructure in Auckland. This effect is illustrated in the graph below, which indicates service performance limitations in the lower South Island.

### Average web browsing speed by geographic location



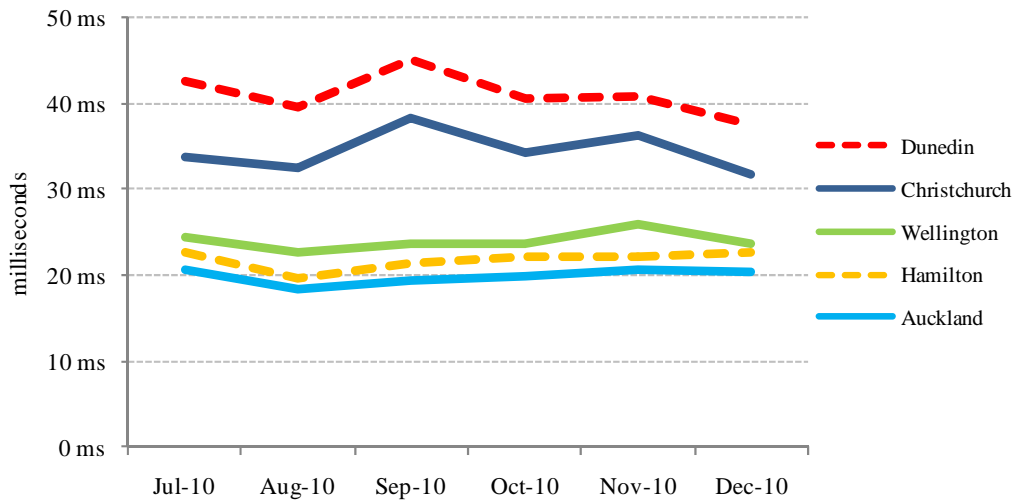
The geographic speed difference is primarily due to time delays caused by network equipment and long transmission routes between the South Island and key internet infrastructure, which is typically situated in Auckland. Time delays affect the performance of internet protocols, particularly Transport Control Protocol (TCP) and Domain Name Server (DNS) look-up, both of which are required to support web browsing.

### Domain Name Server (DNS) response times

The process of looking up a domain name (such as 'comcom.govt.nz') to find its physical address on the internet is a key component of web browsing. Many of these 'look-ups' may be required to download a single web page. The time taken to perform DNS look-up is therefore an important factor in web browsing performance.

In New Zealand, DNS infrastructure is typically located in Auckland, with DNS look-up requests routed to these devices. The graph below indicates the response times attained by city, and demonstrates that the further the test site is away from Auckland the slower the DNS response. It is notable that DNS response times for both Dunedin and Christchurch have improved over the six month test period, due to ongoing network improvements.

### DNS response time by city over time



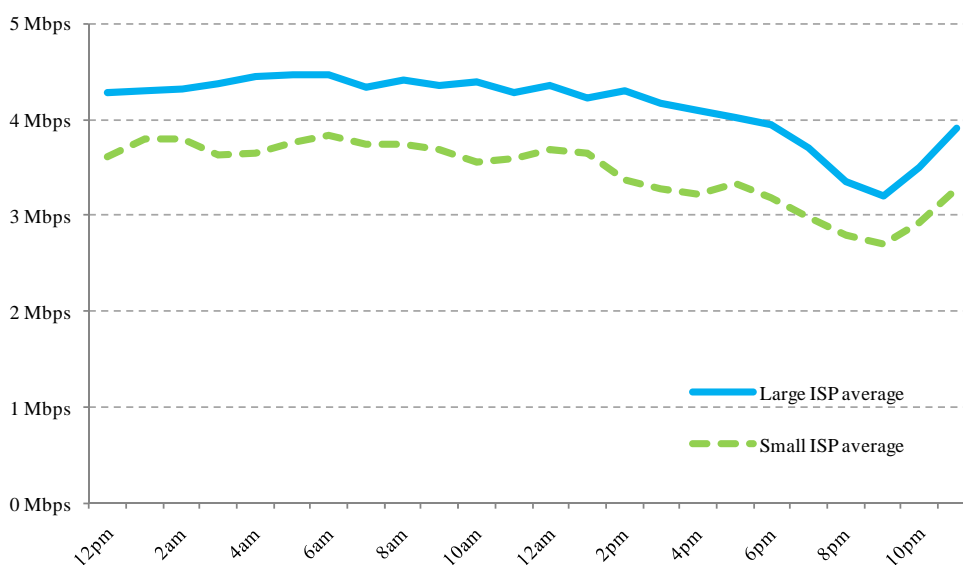
### International browsing

Web browsing to international sites is considerably slower than to local New Zealand sites, with average speeds of between 1Mbps and 2Mbps (compared to over 3.5Mbps for local sites). The international browsing speed is highly dependent on local storage of popular content (caching). Without caching, international browsing speed to the test website falls to around 0.5Mbps.

### Service speed variability

Consistency of browsing performance is an important feature of a user's overall broadband experience. Typically the greatest variation in service speed occurs around the peak internet usage time of 9pm, when the internet load is greatest. The average variability for a test week (not including weekend) is illustrated for large and small service providers in the graph below. It should again be noted that the test sites use high performance service packages and speed variability in some locations may be greater than indicated by this result.

**Average ISP variability by time of the day**



It is notable that service providers using UCLL lines show less variability than services delivered by cable or bitstream services.

### **Internet robustness and browsing availability**

Browsing availability is measured as the percentage of time (over a test period) that a test website page can be successfully accessed. This measure is intended to determine whether internet connections are reliable and improving over time. The Commission uses a browsing availability benchmark of 99.9% which corresponds to an allowable 43.2 minutes per month when the web page cannot be downloaded. In comparison, the availability of the public telephone network is usually specified to be between 99.99% and 99.999% (which corresponds to service being unavailable for between 26 seconds and 4.3 minutes per month).

The results for this period are shown below and indicate that browsing availability has fallen over the six month period with all ISPs failing at least once to achieve the benchmark.

	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
Orcon	99.95%	99.96%	99.94%	99.89%	99.92%	99.26%
Slingshot	99.95%	99.95%	99.92%	99.87%	99.94%	99.02%
TelstraClear	99.95%	99.88%	99.81%	99.85%	99.69%	99.96%
Telecom	99.94%	99.96%	99.93%	99.90%	99.61%	99.96%
Vodafone	99.95%	99.89%	99.95%	99.90%	99.91%	99.95%
Other	99.79%	99.86%	99.93%	99.89%	99.89%	99.96%

The best recorded performance in the period was less than 20 minutes down-time during the month, while the worst monthly performance was a total of just over 7 hours down-time.