

**REPORT FOR THE COMMERCE COMMISSION  
ON NEW ZEALAND BROADBAND QUALITY**

**Q2 2008**

**BY**



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## EXECUTIVE SUMMARY

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New Zealand's Broadband Index score rose 22% in the June quarter to 2920, 6% ahead of the UK's Q2 result, according to the second NZ Broadband Index report by Epitiro-IDC.

Service providers report that June continued to be a period of strong growth in user demand and traffic and ongoing investment in network access, local caching, international capacity and backhaul. In the June quarter, there was a consistent overall improvement in NZBBI index scores from the five largest ISPs, where outcomes improved on average by 19% to 31%.

The NZBBI is commissioned by the Commerce Commission as part of its objectives under the Telecommunications Act to monitor and report on performance of telecommunications markets in NZ. The Index measures twelve ISPs every fifteen minutes on a 24-hour basis across eleven sites in Auckland, Hamilton, Wellington, Christchurch and Dunedin. Broadband quality is evaluated on eight parameters – synchronization speed, time-to-connect, cached and non-cached HTTP download speeds, ping, email round trip time, DNS and packet loss. Collectively these metrics affect the user's experience of popular services, such as email, browsing, gaming and viewing video. This quarter captures data for standard ADSL services only: ADSL2+ performance will be included in the next NZBBI quarterly report. This report also separates the three broadband platforms used by TelstraClear, for greater clarity.

Key findings in the Q2 NZBBI report:

- KPV outcomes in Q2 are flat or showed only incremental change at an aggregated national level. Cached and non-cached HTTP rose 3% and 2% respectively, while DNS score nudged up just 1%. A marginal decline was seen in time-to-connect and packet loss.
- Q2 results for Telecom, Vodafone, Slingshot and Orcon show an average improvement of 38% in Auckland, 32% in Wellington and 41% in Christchurch. (Changes in reporting methodology on TelstraClear's DSL services means Q1 and Q2 DSL results are not strictly comparable.)
- Overall results for smaller 2<sup>nd</sup> tier ISPs are steady or show marginal change. However this is the first quarter email round trip data has been included for second tier ISPs, making quarter on quarter comparison difficult.
- A new service variability metric is included this quarter. It provides a snapshot view of daily peak and off-peak variability in ISP service on metrics that affect browsing. The outcome shows the higher speed services offered over networks such as cable also have the highest degree of daily variation. By contrast lower speed ISP services generally have less variation and a more consistent profile.

The Index score should be viewed as indicative rather than representative of New Zealand broadband quality across the country. The test environment covers just 11 sites nationally, and therefore cannot capture all the variables that impact a customer's broadband service from an exchange.

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## INTRODUCTION

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The New Zealand Broadband Index (NZBBI) is founded on Epitiro's ISP-I technology, which tests broadband Internet services from the end users' perspective. The data provides a robust and independent perspective of broadband quality in New Zealand.

This is the second NZBBI report in an ongoing series of quarterly surveys. The data is aggregated from a total of twelve ISPs measured across five cities at eleven sites located relatively close to various exchanges. At each site, data is captured on key performance variables (KPVs) that impact the user's experience when browsing local and international content, exchanging email, gaming online and accessing video or multimedia content. This quarter captures data for standard ADSL services only: ADSL2+ performance will be included in the next NZBBI quarterly report.

The outcomes should be viewed as indicative rather than representative of New Zealand broadband quality across the country. The test environment covers three sites in each of the main cities, and one site each in Hamilton and Dunedin. These sites, while controlled environments, exist outside the network they measure. They therefore capture many of the variables that impact a customer's broadband service from an exchange, such as the number of users served, quality of copper and distance. However, because the sites are controlled environments, the tests do not capture other premise-specific factors that affect the end user's experience such as home wiring, customer premises equipment and number of devices connected to a telephone jack. Epitiro will introduce a series of tests to evaluate the end-user home experience later in 2008-9.

In this quarter, a new measure of broadband traffic variability is being introduced. This shows the degree to which broadband performance can vary over the course of a day. This report includes:

- **New Zealand industry performance:** Compares NZ and UK broadband performance and provides national aggregated industry scores on key performance variables.
- **ISP outcomes by city:** Shows the outcomes for New Zealand's largest ISPs in each city for the sites where they are measured. Smaller or 'second tier' ISPs are aggregated into an 'Other' category.
- **Broadband traffic variability:** This shows the variability in ISP traffic and service performance over the course of a week, measured at a peak and off-peak time of day.

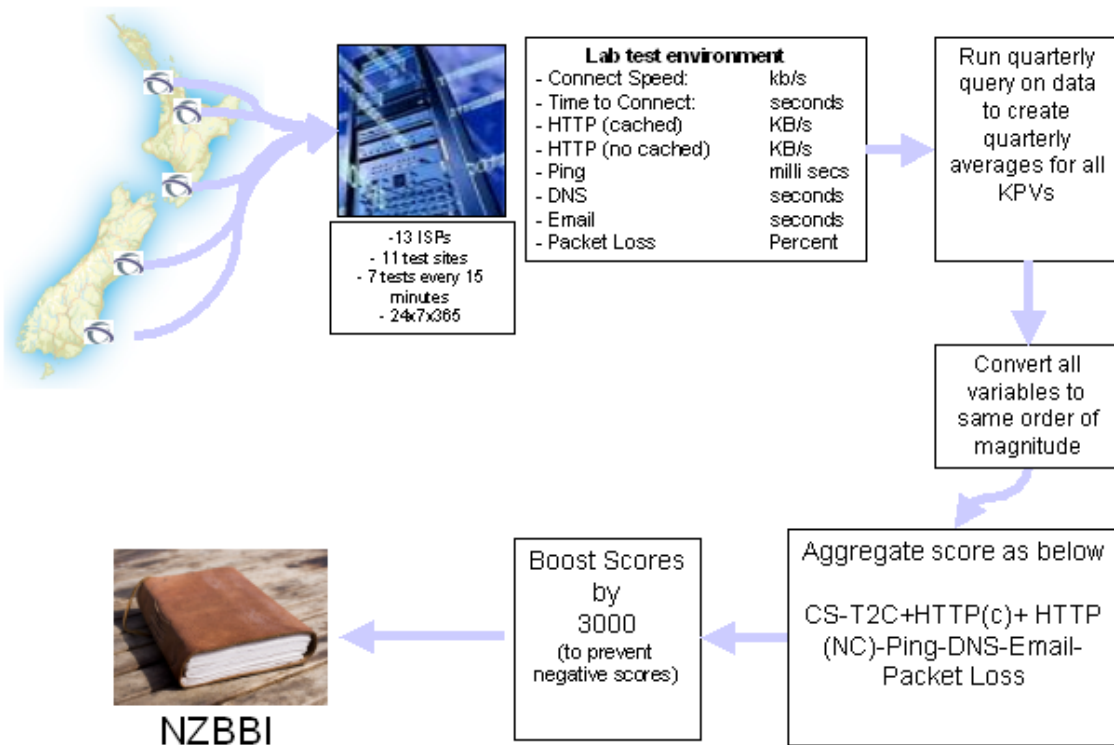
## METHODOLOGY

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The methodology used in creating the New Zealand Broadband Index (NZBBI) has been tested and evaluated through a process of industry consultation and independent review.

The NZBBI does not report absolute results. Instead the raw data is aggregated and then weighted to provide a consistent indexed score for comparison, as described below. The quarterly raw data comprises literally tens of thousands of tests, which are conducted at 15-minute intervals on a continuous 24-hour cycle on all broadband services measured.

## The Index Process



### Report collation methodology

There are three principle steps in the formulation of this report:

- Data Gathering:** The data is collected and managed via Epitiro's ISP-I service. The ISP-I platform consists of a centralised database and reporting system along with geographically diverse deployment of ISP-I-configured PCs or 'Satellites' that are responsible for collecting data on the performance of the monitored network services. Testing is maintained 24x7, with each ISP's service tested every 15 minutes. Tests are performed using PCs that are of a specification typical of those available for home use, which run the ISP-I software. A consistent specification is maintained across the ISP-I network. All satellites are installed with Microsoft Windows XP Professional SP2, with the Windows Firewall enabled. In order to test each ISP's services, Epitiro has subscribed to the premium broadband service available from each ISP at each of its physical testing sites. Epitiro's ISP-I Satellite software runs on Windows and employs Microsoft's .NET framework to control the connectivity and execute tests as and when required. The ISP-I Satellite integrates very closely with the Windows Operating System, which means it uses exactly the same underlying mechanisms as an end user connecting to the Internet and to the services made available via their ISP. More detail on how the ISP-I Satellite software performs its tests is given below.
- Data Processing:** This stage of the process is managed by Epitiro, and involves the indexation of the raw data. Indexation occurs for two reasons:
  - To allow the data to be aggregated and manipulated. Because the tests involve a variety of measures including milliseconds, kilobits

per second and percentages, the results exist in a myriad of orders of magnitude. To allow greater flexibility in analysing the data, all of the values are converted into a score of the same order of magnitude.

- Depending on the variable, a high result will, in some cases, be an indicator of good performance and in others suggest a worse performance. For example, a high synchronisation speed performance is positive, whereas high packet loss is negative. In order to make the report easier to read and to create consistency, indexed numbers have been re-weighted using statistical techniques. As a result, a high index score always indicates a positive performance in this report.
- **Data analysis and report preparation:** The period of analysis is selected in the ISP-I system and in this case represents three months of data. The system averages the results of every test conducted for every ISP across this period. Over time a database of quarterly processed and indexed results will develop for analysis and comparison in quarterly reports.

### ***Key Performance Variables tested***

There are eight key performance variables (KPV's) analysed in this report, with two additional parameters assessing consistency of service performance and traffic management. The KPV's are defined as follows:

**Synchronisation speed:** Synchronisation speed is one measure of the speed of broadband service supplied to a customer. Line connect speed is the synchronisation speed reported by the modem after connection to the ISP has been initiated. It represents an upper limit on the customer experience; sustained data rates are often slower than the synchronisation speed. When connecting to a service via a modem (this includes dial-up, ADSL, fixed wireless and mobile / HSDPA / GPRS broadband connections), the ISP-I Satellite software employs the Windows RAS APIs to initiate the connection. This is the same underlying mechanism that an end user would be using when they manually initiate a connection to their ISP. In the case of connections that use the Satellite's ethernet connection, such as cable or router connections, the Satellite software is able to confirm existence of an active connection, but does not capture any timings, synchronisation speeds or specific failures as the connection itself is managed by the cable modem or router.

**Time to Connect:** "Time to Connect" measures the average time it takes for an ISP to recognize a broadband modem and connect it to the network after it is turned on. The Satellite captures accurate timings for events that occur during the initialisation and setup of the connection (e.g. user authentication and IP address allocation), as well as the synchronisation speed itself as reported by the modem. Additionally, where a connection failure occurs, the ISP-I Satellite records the specific RAS error code returned by Windows Dialup Networking. This variable will not be tracked from Q4, because Epitiro is upgrading all sites to ADSL2+ for the Q3 report to reflect changes in the market. This variable cannot be captured from ADSL2+ modems.

**Cached HTTP:** Web pages are stored on servers that are often located in foreign countries. To improve retrieval speed and reduce international transit costs, content fetched by users may be locally cached on NZ-based servers. The cached HTTP download speed test indicates how quickly an ISP can distribute

content over the New Zealand portion of their network by testing how fast specific web pages are downloaded. The HTTP test makes a request to the specified URL and records the time taken and the amount of data downloaded, from which the speed of the download is derived. Depending on the configuration of the test, the satellite is also able to download the embedded content, such as images on a web page, in any HTML that results from the HTTP request. Any additional content downloaded is reflected in the captured timings and size of data downloaded. Epitiro has selected a basket of the websites most frequently accessed by local users.

**Non-cached HTTP:** The HTTP test can be configured to run in one of two modes of operation: cached and non-cached. When the test downloads from the specified URL in “cached” mode, the speed of the download can be impacted by any caching mechanisms used by the network provider/ISP connected to the PC satellite. The non-cached HTTP download speed test ensures that the web page request bypasses any caches present in the network, and so goes all the way back to the original website, making use of international bandwidth where necessary. This download speed test therefore provides an estimate of the user experience in downloading web pages from foreign locations. Short times equate to a better experience. The “non-cached” mode appends a random query parameter to the end of the URL, which will result in the request bypassing any caches present in the network. The web server specified in the URL, as opposed to any cache, will therefore service the request. If a failure occurs then the HTTP status code is recorded. This can be used as an indicator as to whether the error resulted from the network or from a problem with the web server hosting the URL. Epitiro has selected a basket of popular URLs located in the various regions of the world – the US, Asia and Europe particularly – to test the quality of each ISP’s international connectivity.

**Ping performance:** A ‘ping’ is the time taken for a device on the Internet to send a request to a remote server and for that server to respond with an acknowledgement. The ping time test is a measure of how quickly the ISP’s network can respond to a request, so it is also known as a measure of latency. Shorter ping times are better. The Ping test measures network latency by sending an ICMP echo request to the specified server. The time recorded by the ISP-I Satellite is the total round trip time (in milliseconds) from the request to the echo response being received from the server. The ping test is conducted on the same basket of URLs used in the HTTP tests.

**DNS:** A DNS server fulfills a function similar to a telephone directory. A DNS server takes an address readable by humans (e.g www.comcom.govt.nz) and converts the address to an IP address, or a specific set of numbers which identifies a particular website. In technical terms, the DNS test records the time taken (in milliseconds) to resolve a domain name to a corresponding IP address. The DNS servers used for the query are those primary and secondary servers dynamically assigned by the service provider when the network connection is initiated. Alternatively a specific DNS server can be configured for use during DNS tests. The ISP-I Satellite delegates responsibility for DNS resolution to the underlying operating system, thus using the same DNS resolution mechanism employed when a user enters a URL into a web browser. More details of the specific DNS resolution algorithm used by Microsoft Windows can be found in the Windows XP Resource Kit (Configuring IP Addressing and Name Resolution). Satellites ensure that the DNS query is performed on the DNS servers, and not

returned from any local cache, by disabling the Windows DNS Client Service responsible for caching the results of DNS requests.

**Email round trip:** The email roundtrip test measures the time that it takes for an email to be sent over the Internet using the ISP's mail servers. If these servers are busy then they may take a longer time to send a message: a shorter time therefore provides a better experience. In technical terms, email testing within ISP-I consists of SMTP tests that run from the Satellite and POP3 tests that are run centrally to retrieve the emails from the POP3 mailboxes. The SMTP test executed by the Satellite can be configured to send an email using the service provider's SMTP server to one or more recipients. Each email sent can be uniquely identified by an ID transmitted in one of the email's headers. The Satellite records the time taken to send the email using the SMTP server, and also any SMTP error codes that result during the course of the conversation with the server. The POP3 component of the ISP-I platform's email testing is performed from centrally-managed servers that are configured to poll the mailboxes of each POP3 account once every minute. Whenever an email is retrieved that was sent from an ISP-I Satellite, the time of retrieval is recorded. Any errors that occur while attempting to connect to a POP3 server are also recorded.

**Packet loss performance:** The packet loss test records the average package loss percentage experienced during individual tests and an overall packet loss test. The packet loss test is not an individual test in the same sense as the other tests that the ISP-I Satellite is capable of executing. Instead, the Satellite records TCP packet loss during all the individual tests executed, as well as an overall packet loss measure over the course of entire network connection during which the tests were being run. Thus, as well as measuring the packet loss present in a network, ISP-I is able to indicate whether packet loss is occurring for a particular protocol or service. The ISP-I Satellite measures packet loss by utilising the Performance Counters for TCP available within Windows. Packet loss is recorded as the percentage of TCP segments transmitted from the Satellite machine that contain retransmitted bytes.

### ***Other factors influencing broadband service experience***

The service an ISP delivers to a consumer is not only affected by a number of network-related issues, as measured above; there are a number of factors within the home or business environment that can also play a significant role in repressing broadband service performance. Epitiro's testing has revealed these factors to include:

- Satellite television services, when the decoder is plugged into a telephone jack without an ADSL filter;
- Faxes attached to the telephone jack, even if they are not operating and have a ADSL filter;
- PC hardware specification;
- PC operating system configuration;
- Extent of applications and malware running in the background on a user's PC;
- Telephone line wiring quality;

- Number of cable pairs bundled together (when serving multiple tenancies, for example blocks of flats), and the number of those running broadband services.

This study does not address these factors. However future NZBBI reports will include information on service performance from NZ households, and will also examine the effect of some of these factors. The methodology of this report assumes that these effects average out more or less equally across all ISPs, and therefore do not favour or penalise any specific ISP.

## ***Changes in reporting methodology in this report***

### **Packet Loss Test Issues in Q2**

The mis-configuration of one of the packet loss tests led to Epitiro removing a period of the data relating to these tests.

### **Email Roundtrip Test Issues in Q2**

The period of data relating to the capture of email data does not cover the whole quarter. This is a result of Epitiro systems initially not being compatible with Telecom's transition to the Yahoo mail platform, which rendered the email tests ineffective. A re-configuration of the email test was required to recapture this information, and this was exacerbated by a temporary hardware failure. Thus, in order to ensure all ISPs were measured in exactly the same way, Epitiro has selected a period of the quarter when all ISPs, including Telecom, could be measured. This period was April 1<sup>st</sup> to May 23<sup>rd</sup>.

### **ISP Service Variability**

Given the contended nature of broadband services, it is useful to try to quantify the undulating nature of these services, specifically around performance over peak and off-peak periods, as this "natural" fluctuation can impact upon customer experience.

The best variable for measuring this variability is http download speeds. For the purposes of this graph, cached and non-cached download speeds were taken for the month of June and averaged. This data is represented in kB/sec.

Epitiro has therefore provided data for a single month (June), for peak and off-peak times each day, represented as averages for all of those days in a month. For example, in Figure 9, Monday at 0500 represents the average of four tests taken for each Monday in June at that time. This was then repeated for each day in a seven-day week. Four tests were conducted daily, at the following times; 0500, 1100, 1700 and 2300. Because of space restrictions on the page, Figure 9 labels only two of these times – 0500 and 1700 – but the other points are also present.

### **Reporting of unbundling and ADSL2+**

In this Q2 report, outcomes are based on the premium broadband service offered over standard ADSL connections. It does not include the performance of high-speed ADSL2+ broadband connections, which can offer theoretical speeds of up to 24Mbps, and standard speeds of 8Mbps to 15Mbps depending upon the distance of the premise from the exchange. Telecom has reported that 56% of broadband lines are now ADSL2+ capable. However the service received by users will depend upon whether they have an ADSL2+ capable modem, the

nature of their broadband plan, distance from the exchange and in-home wiring and CPE issues as described above. ADSL2+ services will be measured and reported on in the next NZBBI quarterly report

#### **Changes to reporting of TelstraClear (TCL) results**

Epitiro has separated, for clarity, reporting on TelstraClear's two broadband platforms, cable and DSL. This report further breaks out TelstraClear's DSL networks by reporting on its 'On-Net' DSL performance and its 'Off-Net' DSL services.

It is important to understand the nature and architecture of TelstraClear's network, as this has a significant impact on its broadband performance.

- **Cable:** TelstraClear owns and operates a hybrid coaxial cable network in Wellington, Kapiti and Christchurch.
- **TCL DSL 'On-Net':** TelstraClear has its own very limited DSL copper network over which it sells broadband services. The network has only partial coverage in metropolitan areas and is a premium service only. Because TCL owns the copper loop and the DSLAM equipment, it can control speed and provisioning. As the TelstraClear loop length is short – typically less than 1000 metres – TelstraClear can offer relatively high synchronisation speeds. The company has some DSL wholesale resellers, but these are very small and are not included in this index. TCL's On-Net performance is also affected by the two different types of equipment it uses: PPPoA On-Net, which is ATM-based, and PPPoE On Net, which is Ethernet-based. A very small proportion of TCL's customers access this service.
- **TCL DSL 'Off-Net':** TCL's 'Off-Net' services are those wholesaled from Telecom, and comprise the majority of TCL's broadband services outside of Wellington, Kapiti and Christchurch where it owns and operates cable networks.

#### **Woosh**

The NZBBI does not measure Woosh's fixed wireless performance, but does include Woosh's DSL service. This is because the wireless offering is targeted at users who place a premium on mobility rather than high-speed access, such as university students, or those in transitory occupations who favour a service available in most locations. Due to limitations in the technical capability of its TDD-CDMA platform it is therefore not directly attempting to compete with DSL providers with its wireless service.

#### **Reporting on 'Other' ISPs**

A total of twelve ISPs were measured, but a number were only measured in one site or one city. In order to create consistency, Epitiro-IDC's analysis of key performance variables (KPV's) only specifies the top six service providers measured across all cities and sites, while the second and third-tier ISPs have been aggregated into an 'others' category. The report does, however, note individual performances where appropriate in the text.

Epitiro is no longer measuring Kiwi Online following its acquisition by Orcon.

Results for all twelve ISPs have nevertheless been reported in each city they have been measured in. The second tier ISPs and sites measured include:

- WorldxChange (11 sites)
- MaxNet (2 sites)
- Inspire (3 sites)
- Compass (2 sites)
- Actrix (1 site)
- Snap (1 site)
- Woosh DSL (4 sites)

All data in this report is gathered, processed and indexed by Epitiro. IDC New Zealand has been commissioned by Epitiro and the Commerce Commission to review the methodology and provide independent analysis of the presented data and findings. Epitiro's ISP clients currently include Telecom, Slingshot and Orcon.

## NEW ZEALAND INDUSTRY PERFORMANCE

### ***Broadband overview for Q2 08***

The New Zealand telecommunications industry is continuing to experience strong broadband subscriber growth, increasing competition and new investment and service launches.

In June 2008, the Commerce Commission reported total broadband connections (excluding mobile data cards) of 853,000, with DSL comprising 763,000 or 89.4% as shown in Table 1. This represents year-on-year growth of 25% or 169,520 connections.

**TABLE 1**

Total Broadband Connections

	30-Jun-08	%	30-Dec-07	%	30-Jun-07	%
DSL	763,000	89.40%	674,000	89%	605,000	88.50%
Cable	50,418	5.90%	48,087	6.40%	47,900	6.90%
Fixed Wireless	39,602	4.60%	35,045	4.60%	31,600	4.60%
<b>Total</b>	<b>853,020</b>	<b>100%</b>	<b>757,132</b>	<b>100%</b>	<b>683,500</b>	<b>100%</b>

Source: Commerce Commission, Telecom

The majority of broadband connections are provided over Telecom's network using DSL technology. For the June quarter, Telecom reported that it had experienced combined wholesale and retail broadband line growth of 45,000 lines, up 6.3% on March 2008. Wholesale connections grew by 20,000, or 8.6% in the

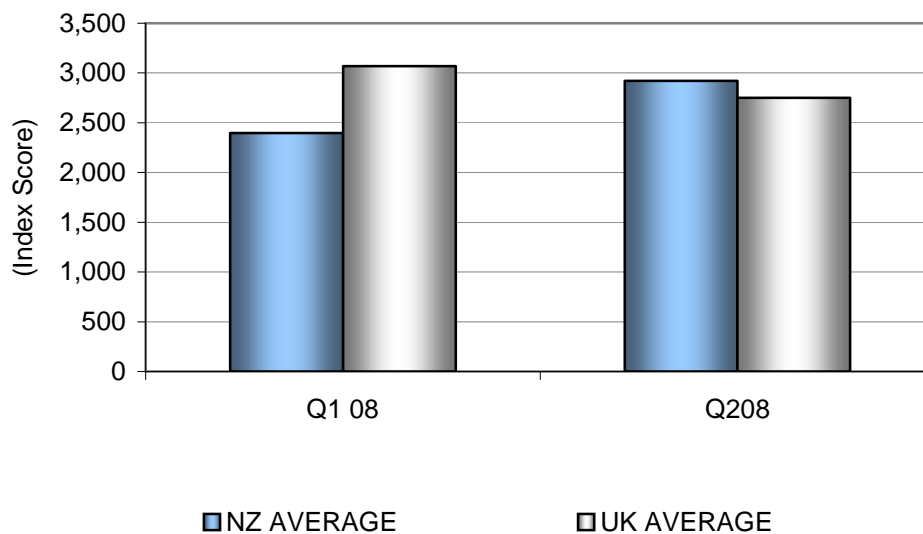
quarter to 202,000, and now comprises a third of Telecom's broadband connections.

**New Zealand's national broadband outcomes**

New Zealand's national broadband index score overtook that of the UK in the June quarter. The New Zealand index rose 22% in the June quarter to 2920, while the overall UK performance declined 10% to 2749. As a consequence, New Zealand broadband index score was 6% higher than that of the UK this quarter.

**FIGURE 1**

New Zealand and UK quarterly average performance



Source: Epitiro, June 2008

The UK has seen very strong growth in unbundled lines, from 3.7 million in December 2007 to over 4.5 million by August 2008, with almost all consumers having a choice of two to four broadband service providers. The market is highly competitive, with BT holding just over 26% retail market share, followed by Virgin Broadband with 22% broadband share. However, while ISPs may offer up to 10Mbps, the reported average speeds are reported as 3Mbps to 4Mbps, and this varies according to where users live. UK service providers report that growth in competition has fragmented the market, leading to a wide variability in service performance.

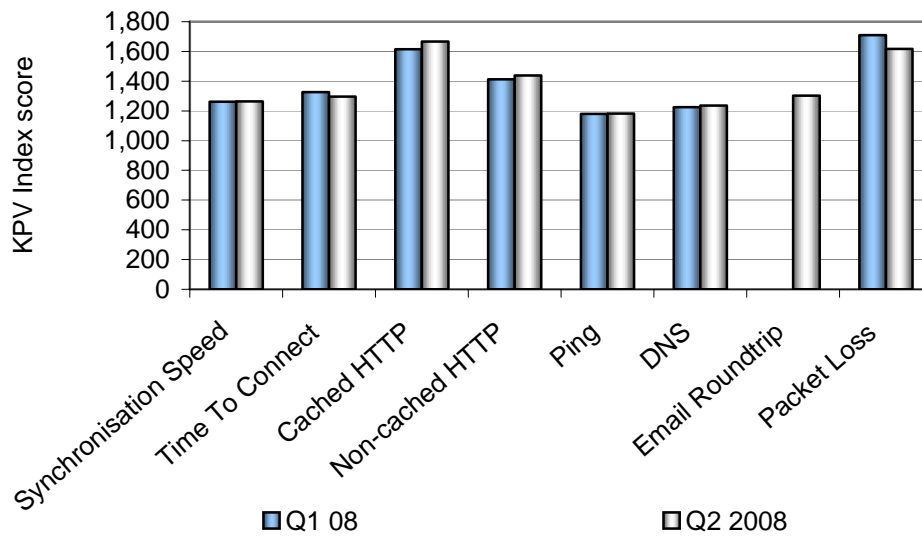
**National Key Performance Variables**

The NZBBI measures every ISP on eight metrics known as 'key performance variables' (KPVs). The tests are run every 15 minutes on a 24/7 basis over the quarter. The KPV's, individually and in combination, provide insight into the customer's broadband browsing, gaming and email experience.

It is important to note that these KPV scores cannot be compared one to another. For example, the packet loss score cannot be compared to email roundtrip or non-cached HTTP – they each measure entirely different metrics. The value lies in assessing the quarterly changes within each KPV.

**FIGURE 2**

Key Performance Variables, June 2008



Source: Epitiro, June 2008

KPV outcomes in Q2 were either flat or showed marginal change. Cached and non-cached HTTP rose 3% and 2% respectively, while DNS score nudged up just 1%. The only parameters to decline were Time to Connect and Packet Loss.

Technical problems and the establishment of new sites means only the five main ISPs could be measured for email roundtrip in the March quarter. Because Q1 and Q2 email results are not therefore strictly comparable, only the Q2 data has been published.

**Industry Raw data**

The table below is a quarterly snapshot of the actual raw data generated from Epitiro’s testing infrastructure.

**TABLE 2**

NZ industry raw data averages

	Synchroni- sation speed	Time to connect	Cached HTTP	Non-cached HTTP	Ping	DNS	Email	Packet Loss
	<i>kb/s</i>	<i>seconds</i>	<i>KB/s</i>	<i>KB/s</i>	<i>seconds</i>	<i>m/secs</i>	<i>minutes</i>	<i>%</i>
TCL Off-Net PPPoA	7,018.4	1.568	45.526	33.052	0.217	176.400	0.738	0.154
TCL On-Net PPPoE	3,833.1	3.245	90.333	62.993	0.158	91.000	1.489	0.687
Telecom	6,511.4	1.548	41.666	34.450	0.221	70.600	1.074	0.418

**TABLE 2**

NZ industry raw data averages

	Synchroni sation speed	Time to connect	Cached HTTP	Non-cached HTTP	Ping	DNS	Email	Packet Loss
TelstraClear Cable Modem	-	1.643	99.350	66.425	0.171	91.000	1.200	0.295
Orcon	6,546.5	2.129	60.996	49.006	0.193	37.600	2.564	0.436
Vodafone	6,364.2	2.020	44.192	36.770	0.196	86.800	0.726	0.364
Slingshot	6,561.3	2.437	54.892	41.792	0.198	68.000	0.758	0.354
Other	5,806.6	2.191	38.030	31.631	0.231	107.405	NA	0.129

Source: EpiTiro 2008

## ISP PERFORMANCE BY CITY

### Summary

The main trend evident in this quarter's report is the consistent improvement in the overall performance of the top five service providers, particularly in Auckland, Wellington and Christchurch. There was an average improvement of between 19% and 31% in the June quarter for the Top 5 ISPs in the main centres. The overall outcome for smaller second tier ISPs is flat or only incremental change. This is the first quarter email round trip data has been included for second tier ISPs, making quarter on quarter comparison difficult.

The ongoing investment in ADSL2+ technology is driving considerable investment in the core network and capacity, including backhaul, caching and international transit. . There are indications this is beginning to impact upon ISP results.

Service providers are reporting that competition and improvement in broadband access, including the rollout of unbundled high-speed ADSL2+ technology, is leading to increased demand and traffic. This is highlighting bottlenecks and putting pressure on other points in the network. In particular, the rapid growth in international streaming media, including YouTube, and user-generated content, is driving investment in local caching, international capacity and backhaul in order to manage cost and performance.

This is causing what some service providers describe as 'growing pains', including publicized outages, challenges in customer service provisioning and technical faults. This mixture of growth and volatility is more evident when results are split out to a more granular ISP or city level, although the outcomes smooth out at a national aggregated national level.

### Progress in unbundling and ADSL2+ deployment

- Telecom reports that the majority of exchanges in Auckland, Christchurch, Dunedin, Hamilton and Wellington have been upgraded to

ADSL2+, connecting over 400,000 homes since March 2007. The company says 56% of all broadband lines are now ADSL2+ enabled, although users will not experience this without an ADSL2+ modem. The company is also investing in local caching and its DNS capability.

- Vodafone announced in June its \$50 million investment in unbundling 40 exchanges in Auckland by year-end and a further 20 exchanges in other centres. It will offer a much faster DSL technology – VDSL2 – to 20% of the market at launch, with theoretical speeds of 50Mbps download and 20Mbps forecast for users within 1km of the exchange. The remaining 80% of broadband ports will be ADSL2+. Vodafone says customers will experience average speeds of 10Mbps, depending on the length of the copper and fibre backhaul.
- Orcon continued to install its own DSLAM equipment into Auckland Telecom exchanges during this quarter. The company is reporting demand three times higher than anticipated and a seven to eightfold increase in monthly data usage. It says it has to continually improve its international capacity and over-provision the network to deal with this growth.
- TelstraClear is continuing to upgrade its cable network in Wellington and Christchurch, and has also announced that it will unbundle between 60 and 80 Telecom exchanges nationally. No further details are available at this time.
- Slingshot has announced an agreement to wholesale unbundled local loop services from Vodafone, which will come into effect from November. Slingshot is implementing a significant network upgrade programme, including building a second Auckland data centre to increase capacity and provide back up in the event of an outage, upgrading its broadband remote access servers (B-RAS), investing in its DNS services and increasing international capacity by 20% to 30%.
- Slingshot has also taken the unprecedented step of opening access of its new Akamai caching solution to third party ISPs at no extra charge. This will allow smaller ISPs to access to the Akamai global content delivery and caching systems at no extra cost, which may improve 2<sup>nd</sup> tier caching performance in the future.

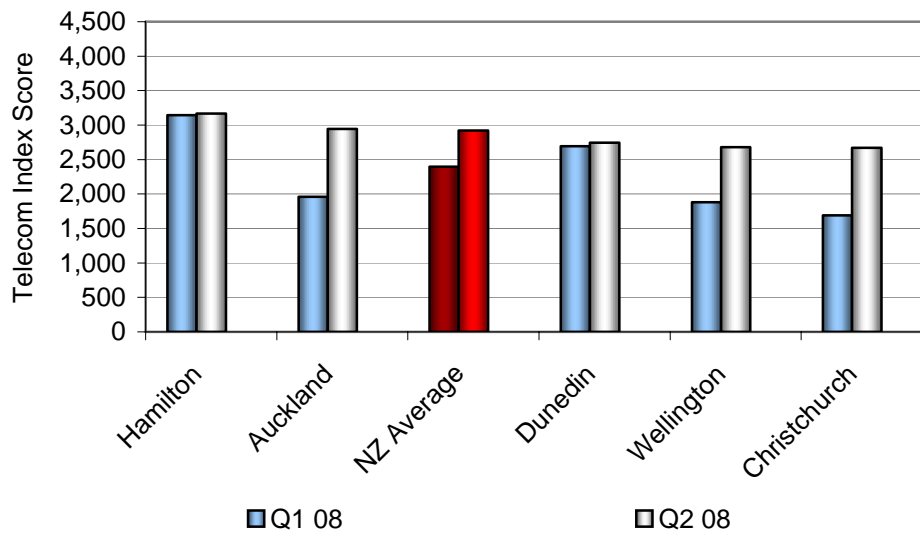
While the total number of Unbundled Local Loop (ULL) subscribers is regarded as commercially sensitive, the Commerce Commission has reported that its understands several thousand lines had been unbundled by June 30.

### ***Telecom's Quarterly Performance***

In the June quarter, Telecom's index rating has improved by 50% in Auckland to 2943, 43% in Wellington to 2680 and 58% in Christchurch to 2669, with more incremental improvement in Hamilton and Dunedin.

**FIGURE 3**

Telecom's performance by city centre



Source: Epitiro, June 2008

The net result is a more consistent performance across the five centres with the 86% range in city scores shown in the first quarter's results narrowing to a 19% range. Telecom's Hamilton and Auckland results are above the NZ average of 2920, while Dunedin, Wellington and Christchurch all achieved very similar outcomes.

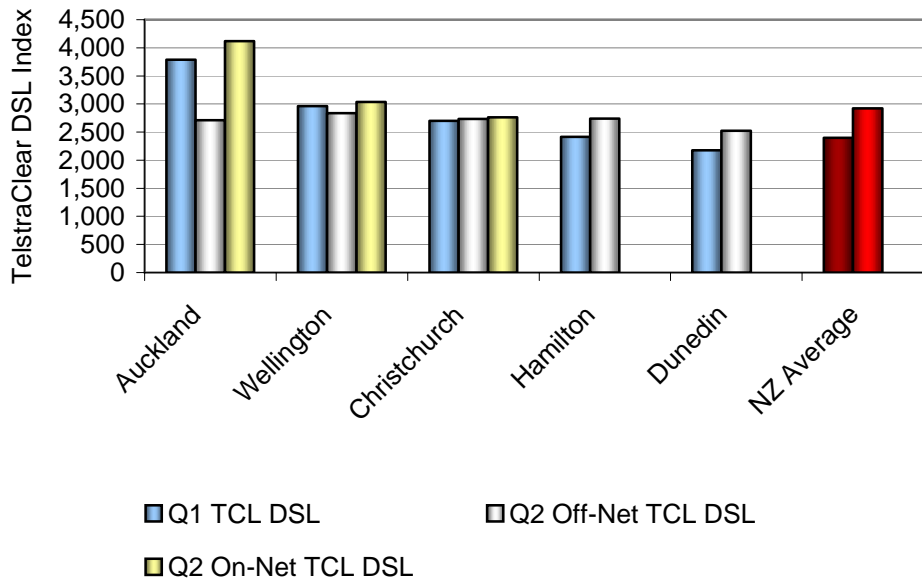
***TelstraClear's Quarterly Performance***

This quarter, Epitiro-IDC has separated out the reporting of TelstraClear's three broadband platforms – Cable, TCL On-Net DSL and TCL Off-Net DSL - for clarity. TelstraClear owns and operates a cable network in Wellington, Kapiti and Christchurch. It also has its own, very limited coverage DSL copper network over which it sells broadband services in the metropolitan areas of Auckland, Wellington and Christchurch. This network has short copper loop lengths of less than a thousand metres, which allows TelstraClear to offer high speed broadband to those within its catchment. However the vast majority of its DSL broadband customers are on its 'Off-Net' service, which is wholesaled from Telecom. *(For more information, please refer to the methodology.)*

The change in reporting methodology means TCL's quarterly DSL scores are not strictly comparable in Auckland, Wellington and Christchurch, as the first quarter's result aggregated both On-Net and Off-Net DSL results.

**FIGURE 4**

TelstraClear's DSL performance by city



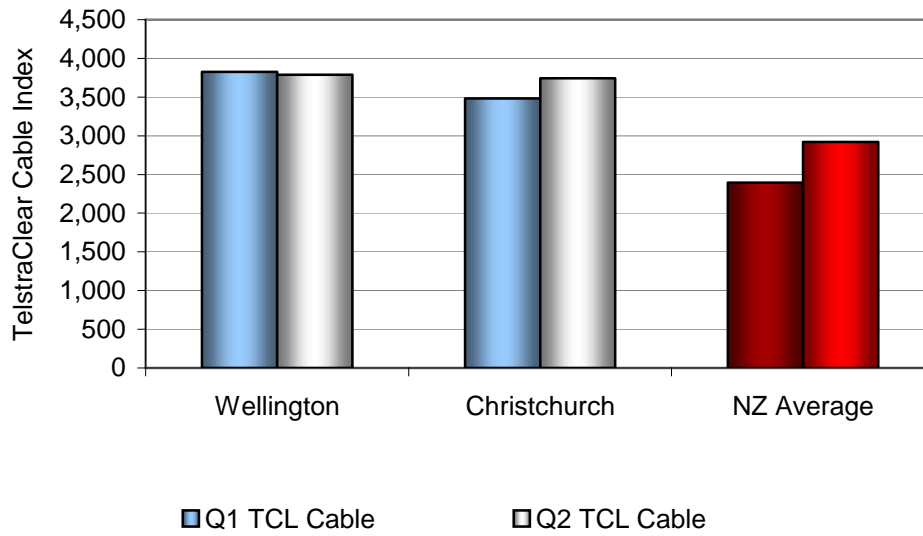
Source: Epitiro 2008

In the June quarter, TCL's On-Net DSL services in Wellington and Christchurch, delivered over its own DSL network, achieved a Q2 index score in line with or just above the New Zealand average, with a stronger 4119 score in Auckland. The mass-market Off-Net wholesale service from Telecom in these centres is 3% to 10% below the NZ average.

In Christchurch and Dunedin, where only TCL Off-Net results are measured, its Q2 index score has improved by 14% and 16% respectively.

**FIGURE 5**

TelstraClear's Cable performance by city



Source: Epitiro 2008

TelstraClear's quarterly cable result in Wellington was flat, but improved 7% in Christchurch and continues to be higher than DSL overall and up to 30% higher than the NZ average.

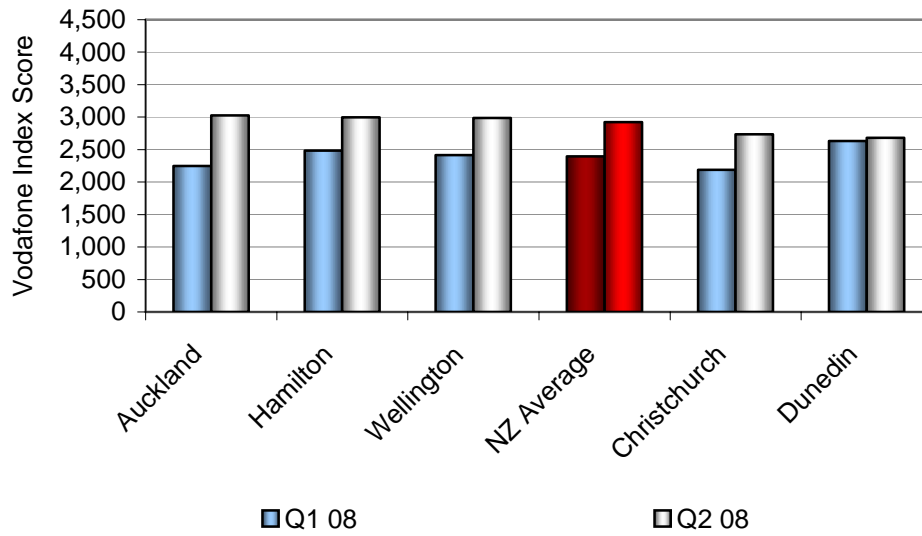
***Vodafone's Quarterly Performance***

Vodafone has demonstrated consistent gains in its broadband result in every city, with a 21% average improvement overall.

Vodafone's Q2 score improved 35% in Auckland to 3028, 24% in Wellington to 2985 and 25% in Christchurch to 2735. The net result is a more consistent performance profile across all cities.

**FIGURE 6**

Vodafone's performance by city centre



Source: Epitiro, June 2008

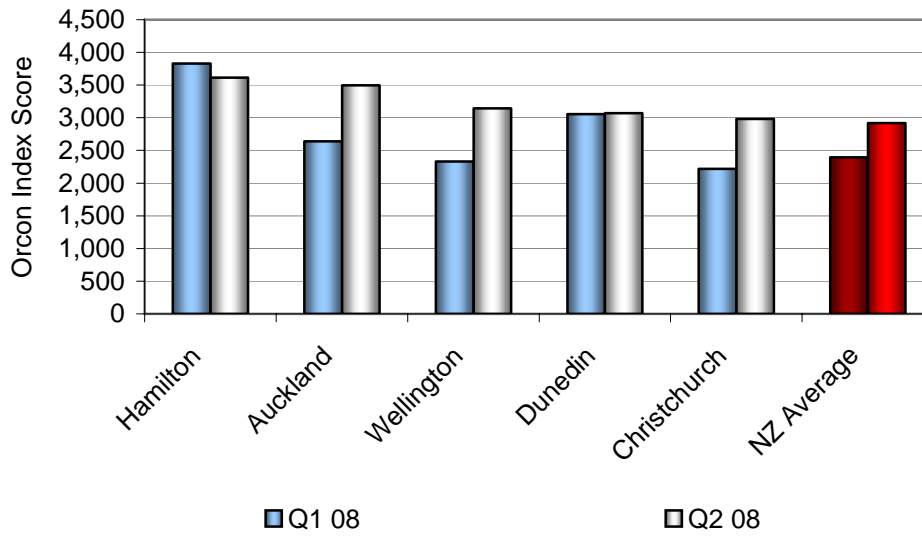
As a consequence, Vodafone's average Q2 outcomes are in line with or marginally ahead of the national average outcome of 2920.

***Orcon's Quarterly Performance***

Orcon's second quarter results led to a 32% rise in its Auckland index score to 3495, 35% in Wellington (3145) and 35% in Christchurch (2982). However it reported a flat Q2 result in Dunedin and a slight decline in Hamilton. These results do not reflect the technical issues faced with unbundling growth during the quarter, as ADSL2+ is not reported on in this period.

**FIGURE 7**

Orcon's performance by city centre



Source: Epitiro, March 2008

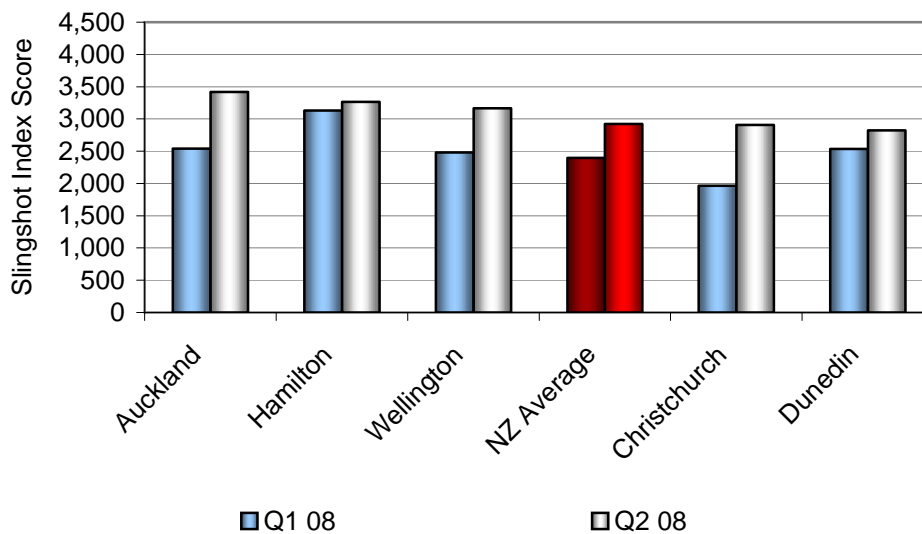
As with other leading ISPs in the quarter, there has been a more consistent city outcome for Orcon, with a 21% range across the city scores, compared to 73% variation in the first quarter. Orcon's results in Wellington, Dunedin and Christchurch are marginally ahead of the national average, with a stronger outcome in Hamilton and Auckland.

***Slingshot's quarterly performance***

Slingshot has had a 48% lift in its Christchurch index score to 2908 after a very low Q1 result.

**FIGURE 8**

Slingshot's performance by city centre



Source: Epitiro, March 2008

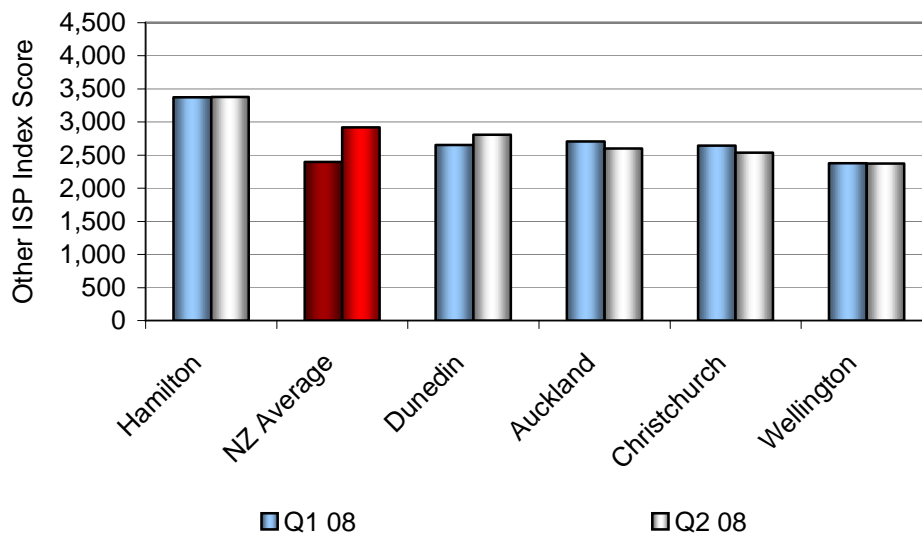
Slingshot's Auckland result was up 35% to 3418; Wellington rose 28% to 3168, while Hamilton and Dunedin outcomes were 4% and 11% higher respectively. The variation in Slingshot's Q2 results narrowed from 60% in Q1 to 19% in Q2.

**Other ISP quarterly performance**

The aggregated performance of other ISPs this quarter was flat or declined slightly in Q2. However care must be taken in interpreting this result, as it is affected by the email outage that took place in Q1. Smaller ISPs, many measured at only one site, had no email data in Q1. The inclusion of email in the June makes a direct quarter on quarter comparison difficult.

**FIGURE 9**

Other ISP performance by City Centre



Source: Epitiro, March 2008

The 'other' group includes results from WorldxChange (11 sites); Snap (1 site), Actrix (1 site), Compass (2 sites), MaxNet (2 sites) and Inspire (3 sites) and Woosh DSL (4 Sites)

One service development which may positively impact 2<sup>nd</sup> tier carriers going forward will be the open access to the Akamai caching solution provided by Slingshot. This has the potential to providing caching solutions for smaller ISPs that lack the scale for their own dedicated caching, improving the browsing experience for their users.

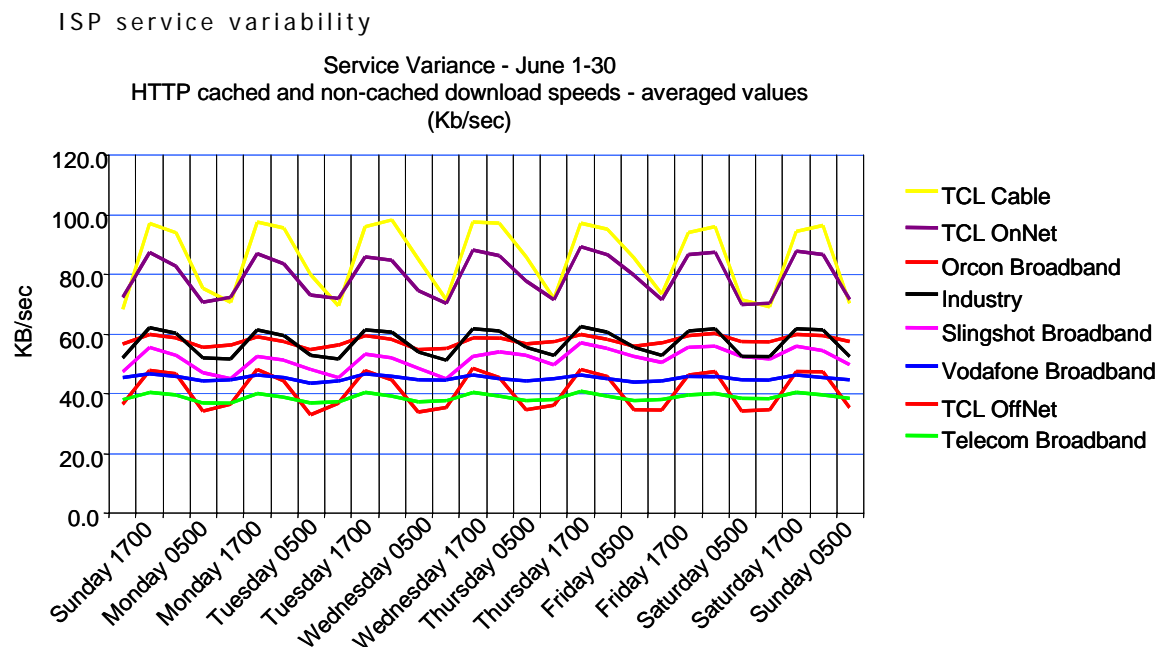
## SERVICE VARIABILITY BY TIME OF DAY

### Overview

Service variability is a new measure introduced in Q2. Its purpose is to provide insight into the degree of variation that can occur in an ISP's service over a specified period of time, based on peak and off-peak times in the day.

Figure 10 below shows service variability across a month based on cached and non-cached HTTP data, which impact the user's browsing experience. Four data points each day are shown - 5am (off peak), 11am (peak), 5pm (peak) and 11pm (off peak). For each ISP, Epitiro has captured these daily data points over a month, and then averaged the result for consistency. Figure 10 shows the outcome expressed over the course of a week.

**FIGURE 10**



Source: IDC, 2008

Figure 10 shows that service is generally slower at peak times when more users are online. TCL Cable and TCL On-Net, which are the highest speed services, have the highest degree of daily variation, ranging from almost 100 Kbps to close to 70Kbps. By contrast, those ISPs with lower HTTP download speeds, such as Telecom and Vodafone, tend to have considerably less variation with an almost flat profile. The exception is TCL's Off-Net service wholesaled from Telecom, which has similar HTTP speeds to Telecom and Vodafone, but shows greater variation.

Over the course of the month, the range of variation within Slingshot's services has evened out, with the speed profile improving slightly. This could have been due to an increase in capacity. Orcon combines a higher speed performance with minimal variation over the quarter.

## **CONCLUSIONS**

New Zealand is at a dynamic, but also volatile stage of broadband growth. New competition, next generation network technology and new IP services will continue to transform and, in time, improve our broadband service capability.

This quarter shows that the new infrastructure investment and technologies is beginning to positively impact the end user's experience, particularly in areas of greatest population density. The Q1 email issues have affected the comparisons of smaller 2nd tier ISP results this quarter: this will be resolved in the next NZBBI report.

The NZBBI today provides a valuable benchmark for tracking and measuring that change at a national level over time. The Index is expanding, with ADSL2+ reported on in the next quarter's results, potentially creating more variability in outcomes. It is therefore important to recognize the NZBBI is at an early stage in the reporting process, and the range of 'normal' quarterly variation and underlying trends will only begin to become clear after four or more quarters.