Measuring Broadband New Zealand

Summer Report, May 2023

The Measuring Broadband New Zealand programme measures the quality of New Zealand's fixed line internet. The aim of the programme is to independently measure and report on the actual in-home broadband performance so consumers can assess different providers, plans, and technologies to help them choose the best broadband for their homes. It will also encourage providers to improve and compete on their performance.

In late 2022 the Commerce Commission and SamKnows launched the next phase of the programme. This next phase will expand to cover more providers, particularly those who offer Fixed Wireless (including 5G) and satellite technologies, and into rural areas that do not have access to Fibre broadband services.

This report provides an overview of the findings from data collected between 1st February and 28th February 2023.

Contents

Overview

This report presents the most recent key indicators of consumer internet performance in New Zealand from testing during February 2023.

Highlights include:

1. Monitoring of the largest providers and plans, including splits by non-Fibre areas for the first time.
2. Reporting on LEO Satellite performance for the first time.
3. New Retail Service Providers (RSPs) contributing to the programme, including Contact Energy, Inspire Net, Starlink, Unifone and Wireless Nation.

This is the first report in the next phase of the Measuring Broadband New Zealand programme, which will cover more providers and technologies, and expands analysis into rural areas that do not have access to Fibre broadband services. Previous reports released by the Measuring Broadband New Zealand (MBNZ) programme can be found here[1].

This report draws on testing from a wider range of providers including Contact Energy, Inspire Net, Starlink, Unifone and Wireless Nation for the first time. There are a range of other RSPs to choose from who are not currently included in the testing, and we encourage Kiwis to shop around. The MBNZ programme previously tested eight RSPs (Trustpower, Orcon, Slingshot, MyRepublic, Skinny, 2degrees, Spark, and One New Zealand (previously Vodafone New Zealand)) who between them provide broadband services for over 84% of the market.

The MBNZ project has a code of conduct to ensure that parties involved in the MBNZ programme act in good faith and in accordance with principles relating to data validation, 'gaming' of results, and appropriate public usage of the MBNZ results. A list of the signatories is included in the code, including the Commission and SamKnows. The current code of conduct is undergoing a review and remains in place until the updated code is and published in the coming months. All tested RSPs complied with the code of conduct, including validation of the data used in this report. You can see the code of conduct on our website: https://comcom.govt.nz/regulated-industries/telecommunications/monitoring-the-telecommunications-market/monitoring-new-zealands-broadband

[1] https://comcom.govt.nz/regulated-industries/telecommunications/monitoring-the-telecommunications-market/monitoring-new-zealands-broadband/Reports-from-Measuring-Broadband-New-Zealand

Executive Summary

Benchmarking

1. ADSL, VDSL and Fibre plans see stable upload and download results compared to the previous reporting month.

2. 4G Fixed Wireless plans are now reported split by Fibre and non-Fibre areas, with both areas seeing slower download speeds during peak hours. Distributions of download speeds show Fibre areas having fewer test results below 25 Mbps than non-Fibre areas.

3. Satellite results are reported for the first time for download, upload and latency. Results for application performance (online gaming, Netflix etc) will be included in the next report.

Application Performance

1. Online gaming shows consistent results for the games included in the previous report. The three games testing to servers in North America showed much higher latencies across all technologies compared to games with gaming servers located in Australia, at a level which would impact user experience.

2. Over 99% of Fibre 300, Fibre Max and HFC Max plans were able to support 4 simultaneous UHD Netflix streams. Only 40% of ADSL plans were able to support 1 UHD stream.

3. Social media results remain consistent with the previous report.

Broadband Plan Comparison

This report includes broadband plans across a range of technologies and areas. The report also shows performance comparison split across areas where Fibre broadband is available, and where Fibre is not an option. This comparison refines and expands our previous urban and rural view to better allow consumers to see how different technologies such as 4G Fixed Wireless perform in different areas. Areas of New Zealand with access to Fibre plans (Specified Fibre Areas) are the locations where Chorus will eventually be able to stop providing copper-based internet services (ADSL & VDSL plans), because Fibre is available. These are typically in more urban areas of New Zealand. This replaces the urban and rural comparison that featured in previous Measuring Broadband New Zealand reports. More information on the withdrawal of copper-based internet services is available on the Commerce Commission website here[1].

ADSL - Remains suitable for traditional services like web browsing, email, and basic video streaming, particularly when there is only one person using the connection. Due to physical limitations, the highest-performing ADSL lines will never achieve download speeds higher than ~25 Mbps. The distance from house to exchange has a big effect on attainable speeds, with most ADSL lines in New Zealand averaging under 8 Mbps download. The higher latency, more frequent dropouts, and lower upload speeds make ADSL less suitable for video calls and multi-user households.

VDSL - There is a range in performance, some lines will achieve download/upload speeds indistinguishable from ADSL, whereas a small proportion of lines will achieve speeds comparable with Fibre 100, and certainly with lower speed Fibre plans. Lower speed lines will be less suitable for applications that use a lot of data, such as video conferencing and Ultra High Definition streaming, whereas higher speed lines will generally support more data-heavy applications.

Fibre 300 - Supports latency-sensitive applications such as online gaming. Fibre 300 will also support data-heavy applications such as Ultra High Definition streaming with multiple concurrent users or video conferences with a large number of participants. Fibre 300 will cover most users' requirements.

[1] https://comcom.govt.nz/regulated-industries/telecommunications/regulated-services/consumer-protections-for-copper-withdrawal

Fibre Max[1] - Higher download and upload speeds than Fibre 300. The latency to internet applications, such as online games, through a Fibre Max line is the same as through any other Fibre plan. Performance varies depending on RSP. Fibre 300 will support all modern internet applications and multi-user households, so Fibre Max is still only recommended in cases where there is a genuine need for more bandwidth e.g. frequently uploading or downloading large files.

Cable - Available in some areas (Wellington, Upper & Lower Hutt, the Kapiti Coast, and parts of Christchurch). Cable is also referred to as HFC and DOCSIS. One New Zealand (previously Vodafone) is the only provider operating a Cable network in New Zealand. Two plans are available: UltraFast HFC Max and UltraFast HFC 200. Due to the limited coverage of the Cable network, MBNZ does not collect enough data to formally report on the performance of the UltraFast HFC 200 plan.

4G Fixed Wireless - Can offer higher download speeds than ADSL, but on average slower speeds than VDSL. Users also experience higher latencies due to the cellular technology underlying these plans. 4G Fixed Wireless has the highest latency of all technologies, and also delivers lower download/upload speeds and more frequent dropouts than Fibre. This range of performance factors means 4G Fixed Wireless should not necessarily be preferred to Fibre on performance grounds, however in some areas 4G Fixed Wireless is the only option for consumers, and even in areas where Fibre is available there are other reasons consumers might choose this option (ease of installation for example).

LEO Satellite - Available in both rural and urban areas and is transmitted wirelessly using a satellite and ground based satellite dish. Typically higher speeds than 100 Mbps, but can vary with location. While speeds can be expected to handle most applications, including video conferencing and streaming, it is not as consistent as fixed line broadband. Generally, speeds are more consistent than Fixed Wireless, and faster than 4G.

Other Broadband Plans - There are other plans available, such as Fibre 30, Fibre 50, Fibre 100, Fibre 200, HFC 200, WISP Fixed Wireless and 5G Fixed Wireless plans. Since MBNZ collects less data on these plans it is not possible to give any firm advice around their suitability for different applications at this stage.

[1] All references to Fibre Max in this report encompass broadband plans derived from 'gigabit' wholesale products, in particular: 2degrees' Ultimate, MyRepublic's Fibre Pro/Gamer Pro, Orcon and Slingshot's Gigantic Fibre, Spark's Fibre Max, Trustpower's Fibre Max, and One New Zealand's Fibre Max plans.

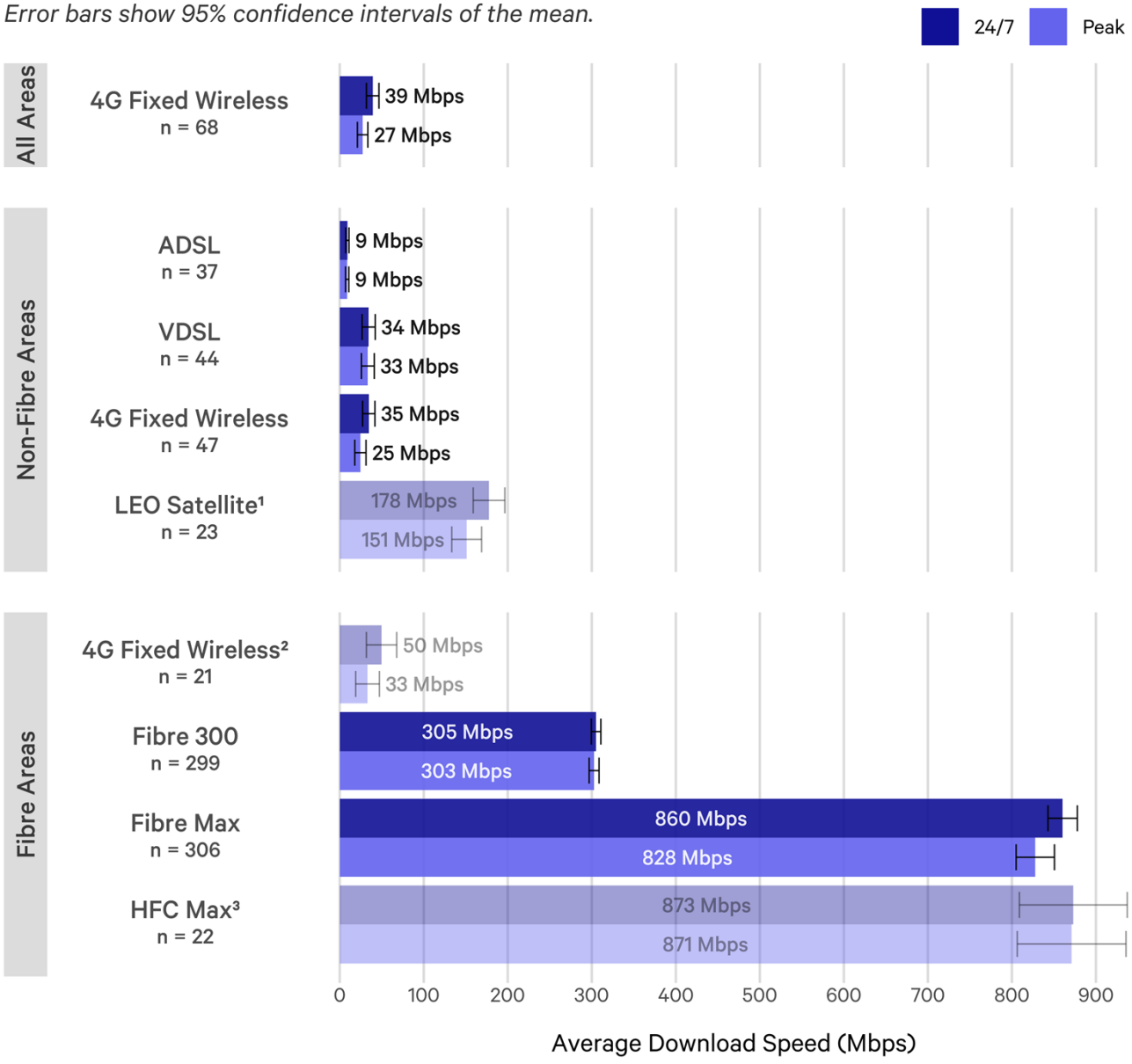
Speed Tests - Download

Figures 1 and 2 give an overview of download and upload speed across the country. These are included in every report to provide a benchmark that can be tracked over time. These results are split across Fibre areas, where Fibre is available to consumers and non-Fibre areas where Fibre is not yet rolled out. There were not enough Whiteboxes to report ADSL and VDSL results in Fibre areas.

Peak hours are the times when people typically use the internet; in New Zealand this is 7pm to 11pm on Monday-Friday.

Figure 1: Average Download Speeds by Plan

Average of monthly household weighted averages. Peak hours are Monday - Friday, 7pm - 11pm. The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 68). Error bars show 95% confidence intervals of the mean.



MBNZ Summer Report, 2023

These results are shown with error bars representing the 95% confidence interval for each plan's average speed. If we had repeated our measurements 100 times, we would expect average speeds to have fallen within the black bands in at least 95 cases. Other graphs throughout the report display similar confidence intervals, which carry the same interpretation.

The transparent bars (eg LEO Satellite, HFC Max and 4G Fixed Wireless) show plans with a sample size lower than we would typically include within reporting. These plans have larger error bars due to the smaller sample size and care should be taken when comparing these plans against others. We recommend consumers factor in the error bars when comparing plan averages, especially those with smaller sample sizes.

Key Observations

- Satellite[1], 4G Fixed Wireless results in Fibre areas[2] and HFC Max[3] results are based on a smaller sample size than we would typically include within reporting, but are sufficient to indicate performance while we add more Whiteboxes to enable more definite reporting. This accounts for the larger confidence intervals for these plans and we caveat that consumers should be careful when comparing these plans with others directly, as there is more uncertainty around the average speeds for these plans, and they should factor in the error bars into their comparison.
- ADSL and VDSL results are consistent with those seen in the previous report, showing similar results during peak hours. Fixed Wireless average download speeds are similar to VDSL, but show a lower average during peak hours in non-Fibre areas.
- Fibre 300 and Fibre Max results are also broadly similar to the previous report, with Fibre 300 seeing average speeds above 300 Mbps, including during peak hours. Fibre Max average download speeds have decreased slightly due to MyRepublic seeing much lower results than previously. MyRepublic is working with SamKnows to understand the drop in performance over the last measurement period. RSP specific results for Fibre Max can be found in Figure 4. Fibre 300 and Fibre Max results include new RSPs who have not been included in the programme previously, including Contact Energy, Inspire Net, Unifone and Wireless Nation.

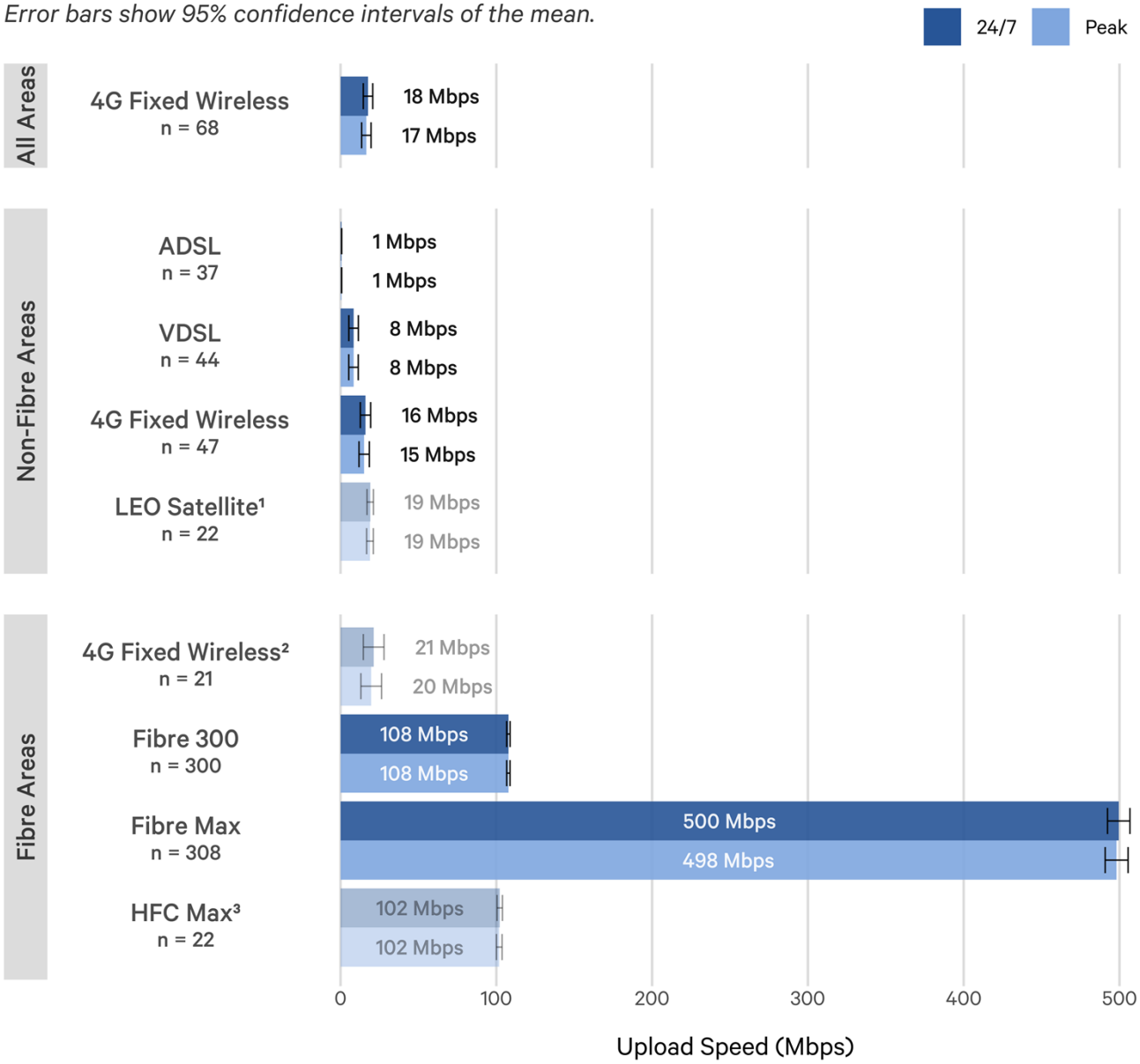
[1] Results for Satellite are based on a sample size of 23 Whiteboxes. The lower sample size can be attributed to Satellite being a new area of focus for the MBNZ programme and we hope to increase this number for the Autumn Report
[2] Results for 4G Fixed Wireless are based on a sample size of 21 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fixed Wireless being a new area of focus for the MBNZ programme and we hope to increase this number for the Autumn Report
[3] Results for HFC Max are based on a sample size of 22 Whiteboxes. The low sample size can be attributed to the relatively small coverage area of One New Zealand's Cable network and the competing influence of Copper, Fibre and Fixed Wireless in those areas.

Speed Tests - Upload

Upload speeds should be considered alongside download speeds. The main applications where the impact of upload speed is apparent are file transfers and video conferencing. For example, a lower upload speed will mean that it takes longer for files to sync or email attachments to be applied.

Figure 2: Average Upload Speeds by Plan

Average of monthly household weighted averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 37).
Error bars show 95% confidence intervals of the mean.



MBNZ Summer Report, 2023

Key Observations

- The average upload speeds are consistent with those seen in the previous report, with all technologies seeing very little decrease in average upload speeds during peak hours.
- Satellite[1], 4G Fixed Wireless results in Fibre areas[2] and HFC Max[3] results are based on a smaller sample size than we would typically include within reporting, but are sufficient to indicate performance while we add more Whiteboxes to enable more definite reporting. This accounts for the larger confidence intervals for these plans. We should caveat that consumers should be careful when comparing these plans with others directly, as there is more uncertainty around the average speeds for these plans, and they should factor in the error bars into their comparison.

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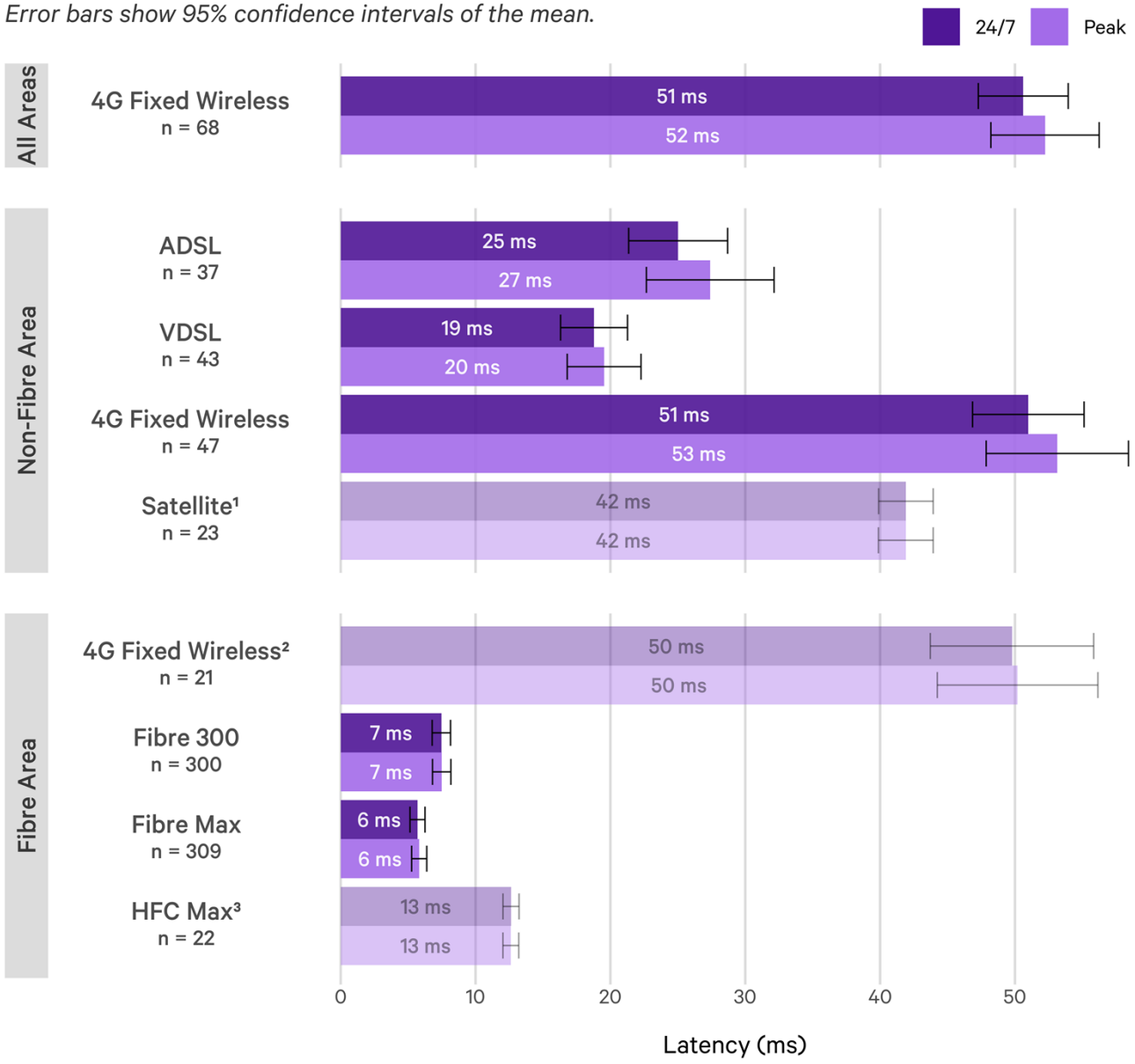
Latency

Latency is another key factor that should be considered when assessing broadband performance. The time it takes to transmit and receive messages between households and servers limits the responsiveness of realtime applications such as interactive webpages or video calls. Higher baseline latency makes realtime applications more vulnerable to jitter (also known as packet delay variation) and dropouts. Figure 3 only includes results relating to servers hosted in New Zealand.

Figure 3: Average Latency to Test Servers by Plan. Lower is better.

Average of monthly household weighted averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 37).
Error bars show 95% confidence intervals of the mean.



MBNZ Summer Report, 2023

Some plans show a wider variation of latency than others: latency across a Fixed Wireless connection will generally be more variable than over a Fibre line. The impact of latency on user experience relating to specific applications is investigated elsewhere in the report.

Key Observations

- Latency over Fixed Wireless is higher than over Copper (ADSL, VDSL), Cable, or Fibre. Fibre is faster due to both the lower latency over Fibre optics and the more recent infrastructure that underpins the Fibre network.
- Satellite connections have higher latencies than Copper (ADSL, VDSL) but lower latency than 4G Fixed Wireless plans in non-Fibre areas.
- Cable connections have a higher latency than Fibre on average.
- There is no material difference in latency across different Fibre plans. Since latency is independent of bandwidth, a Fibre Max plan will not necessarily result in more responsive performance of interactive applications than a Fibre 300 plan.
- Satellite[1], 4G Fixed Wireless results in Fibre areas[2] and HFC Max[3] results are based on a smaller sample size than we would typically include within reporting, but are sufficient to indicate performance while we add more Whiteboxes to enable more definite reporting. This accounts for the larger confidence intervals for these plans. We should caveat that consumers should be careful when comparing these plans with others directly, as there is more uncertainty around the average speeds for these plans, and they should factor in the error bars into their comparison.

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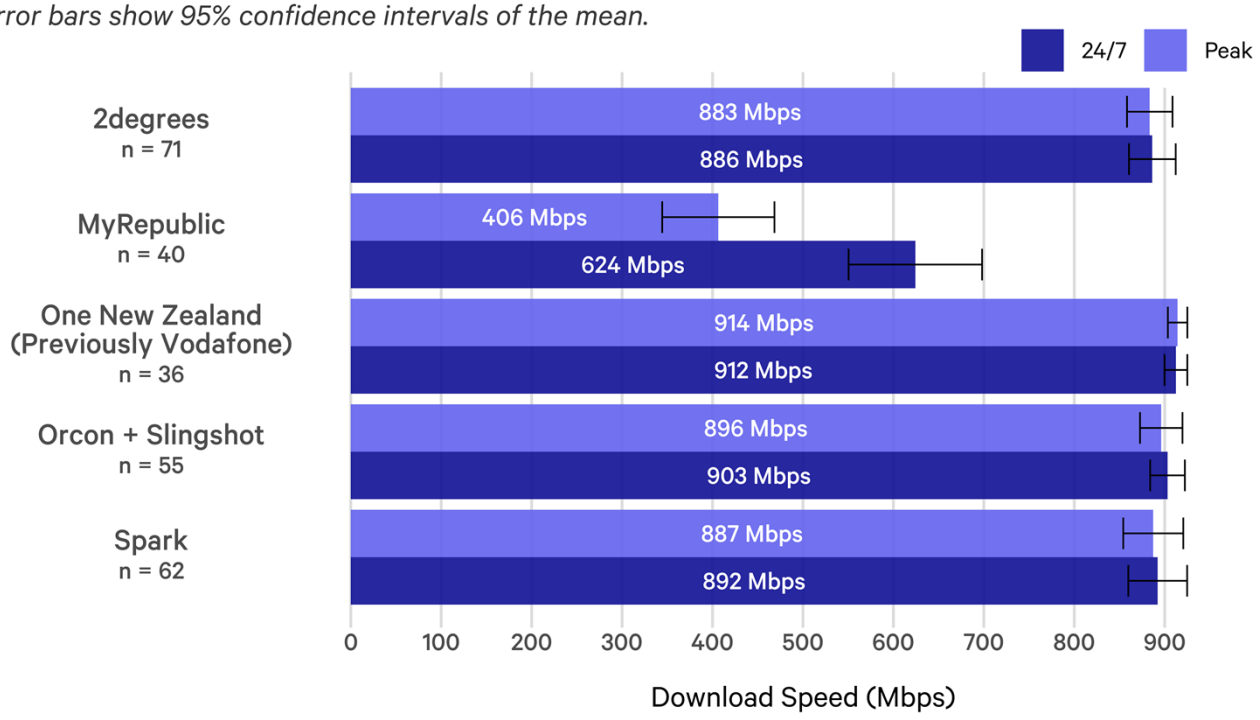
[3] Results for HFC Max are based on a sample size of 22 Whiteboxes. The low sample size can be attributed to the relatively small coverage area of One New Zealand's Cable network and the competing influence of Copper, Fibre and Fixed Wireless in those areas.

Fibre Max Breakdown by RSP

Fibre Max plans are derived from 'gigabit' wholesale products but, since around 6% of the data in HTTP traffic is given over to protocol overhead (IP packet headers etc), the highest speed test result that can theoretically be achieved by a Fibre Max line is around 940 Mbps.

Figure 4: Average Fibre Max Download Speed by RSP

Average of monthly household averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 71).
Error bars show 95% confidence intervals of the mean.



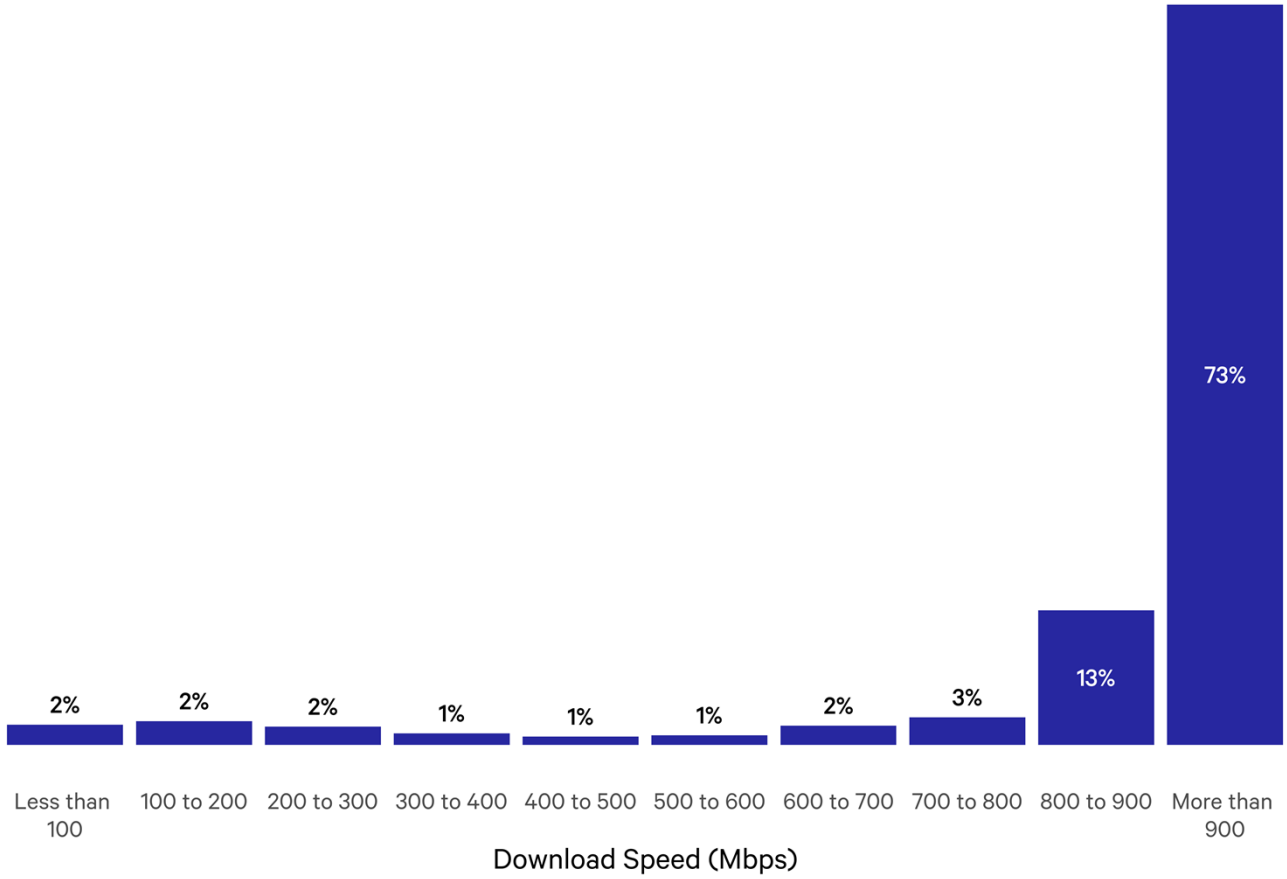
MBNZ Summer Report, 2023

Key Observations

- For MyRepublic, average download speeds have decreased significantly since the previous report across all hours and peak hours. MyRepublic is working with SamKnows to understand the drop in performance over the last measurement period.
- For all other RSPs, the results are broadly in line with those seen in the previous report, showing similar average download speeds across all hours and peak hours.
- There were not enough Fibre Max volunteers connected to Contact Energy, Inspire Net or Trustpower during the measurement period to report results for these RSP. All tested RSPs are included in the overall Fibre Max results shown in Figures 1-3.

Figure 5: Download speeds on Fibre Max plans.

Distribution of test results. Average download speeds for Fibre Max plans is 860 Mbps; this varies by RSP and over time.



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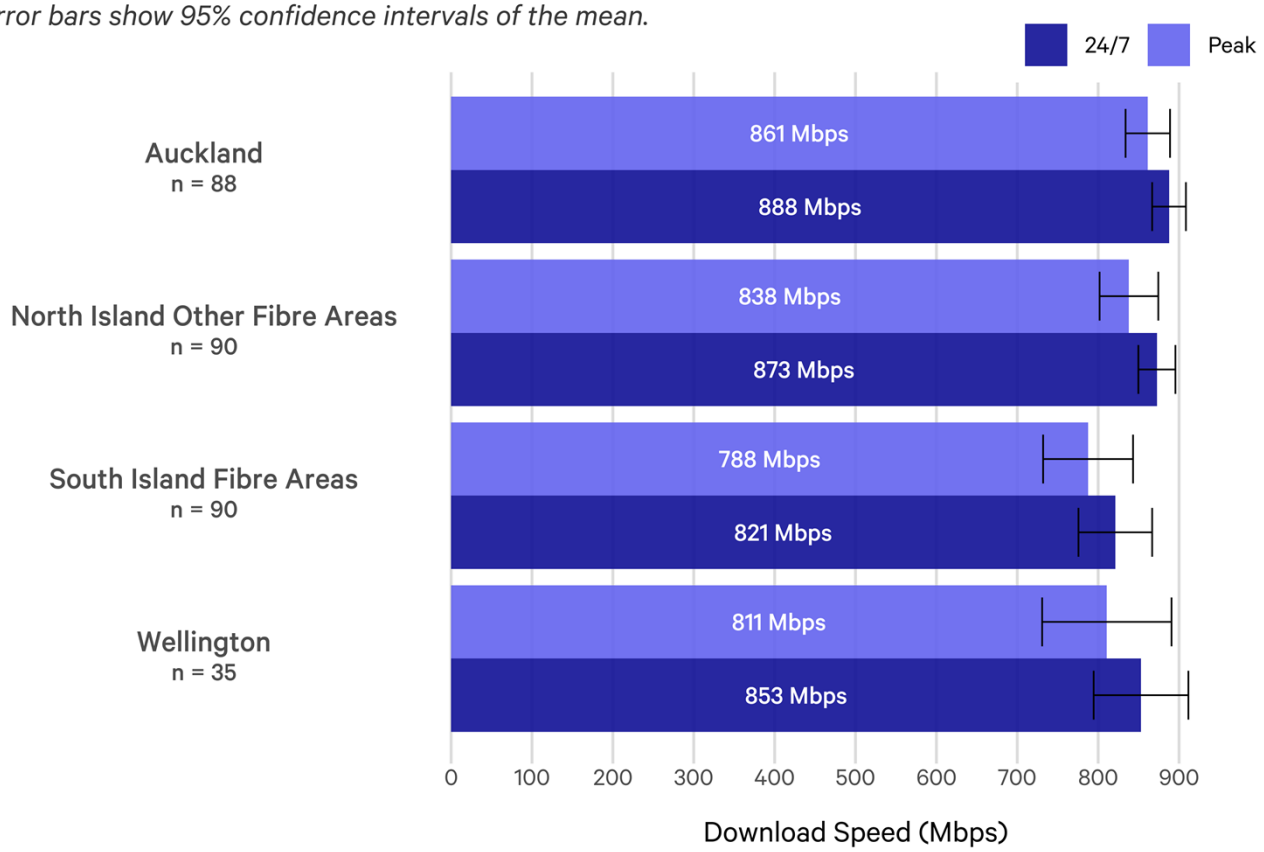
Key Observations

- 73% of speed tests run over Fibre Max lines achieved download speeds above 900 Mbps, a small decrease compared to the previous report.

Fibre Max Breakdown by Region

Figure 6: Average Fibre Max Download Speed by Region

Average of monthly household averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each geographical area (eg n = 88)
Error bars show 95% confidence intervals of the mean.



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Key Observations

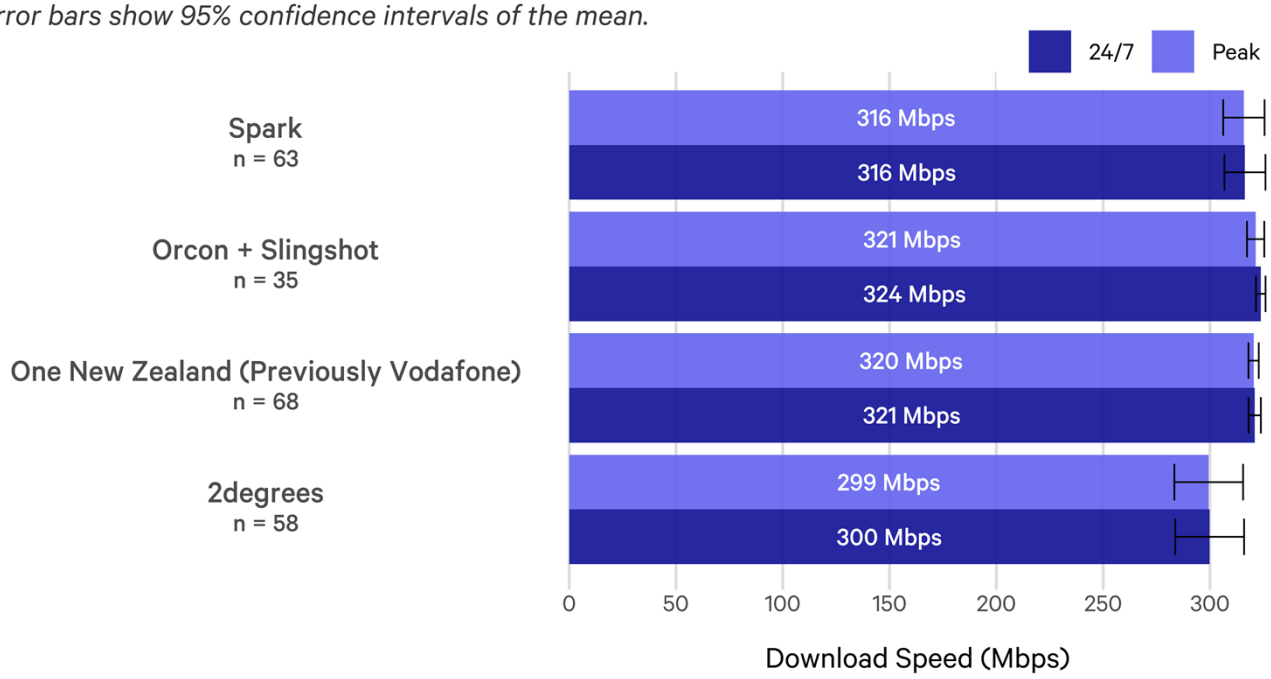
- There remains a small difference in performance between the two main islands, as has been noted in previous reports, but the difference is at a level which is unlikely to be noticed by end users.

Fibre 300 Breakdown by RSP

The speeds under which Fibre 300 is advertised to consumers are 300 Mbps download and 100 Mbps upload. In practice, since the provisioned speed is set slightly higher to allow for extra bandwidth used up by the network protocol overhead, it is quite common to see measured speeds close to or slightly above 300 Mbps.

Figure 7: Comparison of average Fibre 300 download speeds across RSPs.

Average of monthly household averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 63)
Error bars show 95% confidence intervals of the mean.



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Key Observations

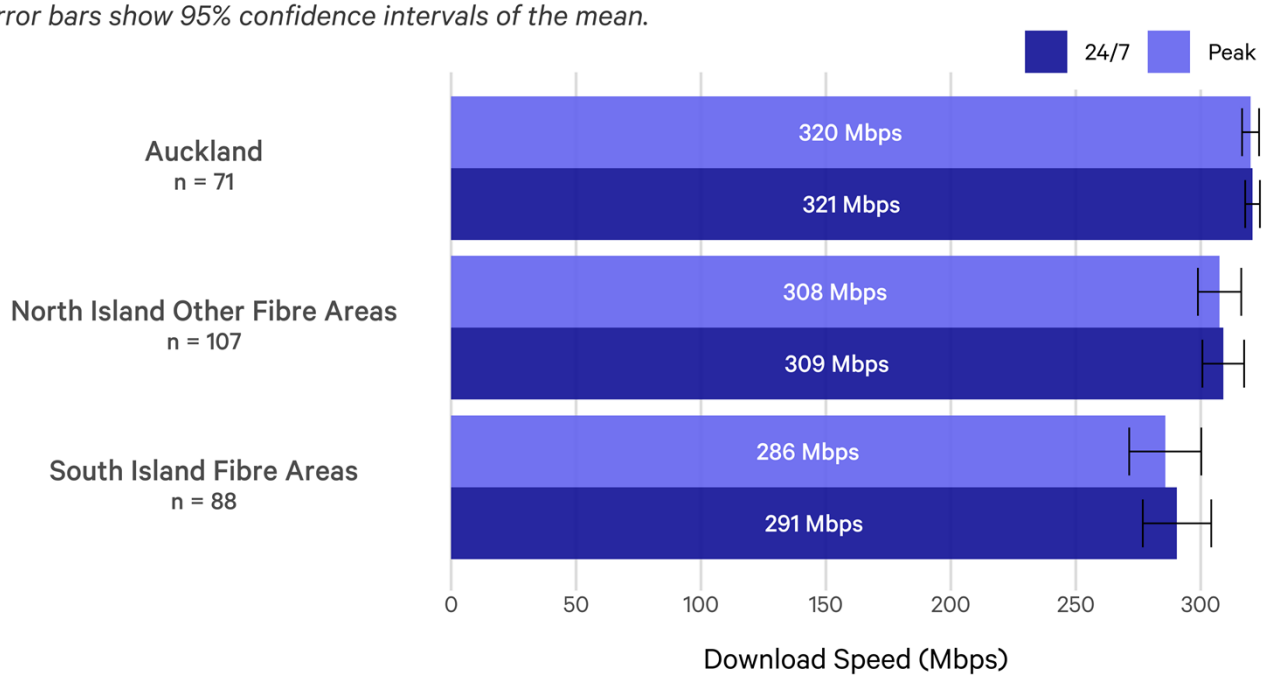
- All RSPs continued to perform consistently in February. All RSPs shown in the chart achieved average download speeds above 300 Mbps.[1]
- There were not enough volunteers connected to Contact Energy, MyRepublic, Trustpower, Unifone or Wireless Nation to report results. All tested RSPs are included in the overall Fibre 300 results shown in Figures 1-3.

[1] Orcon + Slingshot results are based on a sample size of 35 Whiteboxes

Fibre 300 Breakdown by Region

Figure 8: Average Fibre 300 download speeds by Region.

Average of monthly household averages. Peak hours are Monday - Friday, 7pm - 11pm.
The number of Whiteboxes contributing to each result is shown under each geographical area (eg n = 71)
Error bars show 95% confidence intervals of the mean.



MBNZ Summer Report, 2023

Key Observations

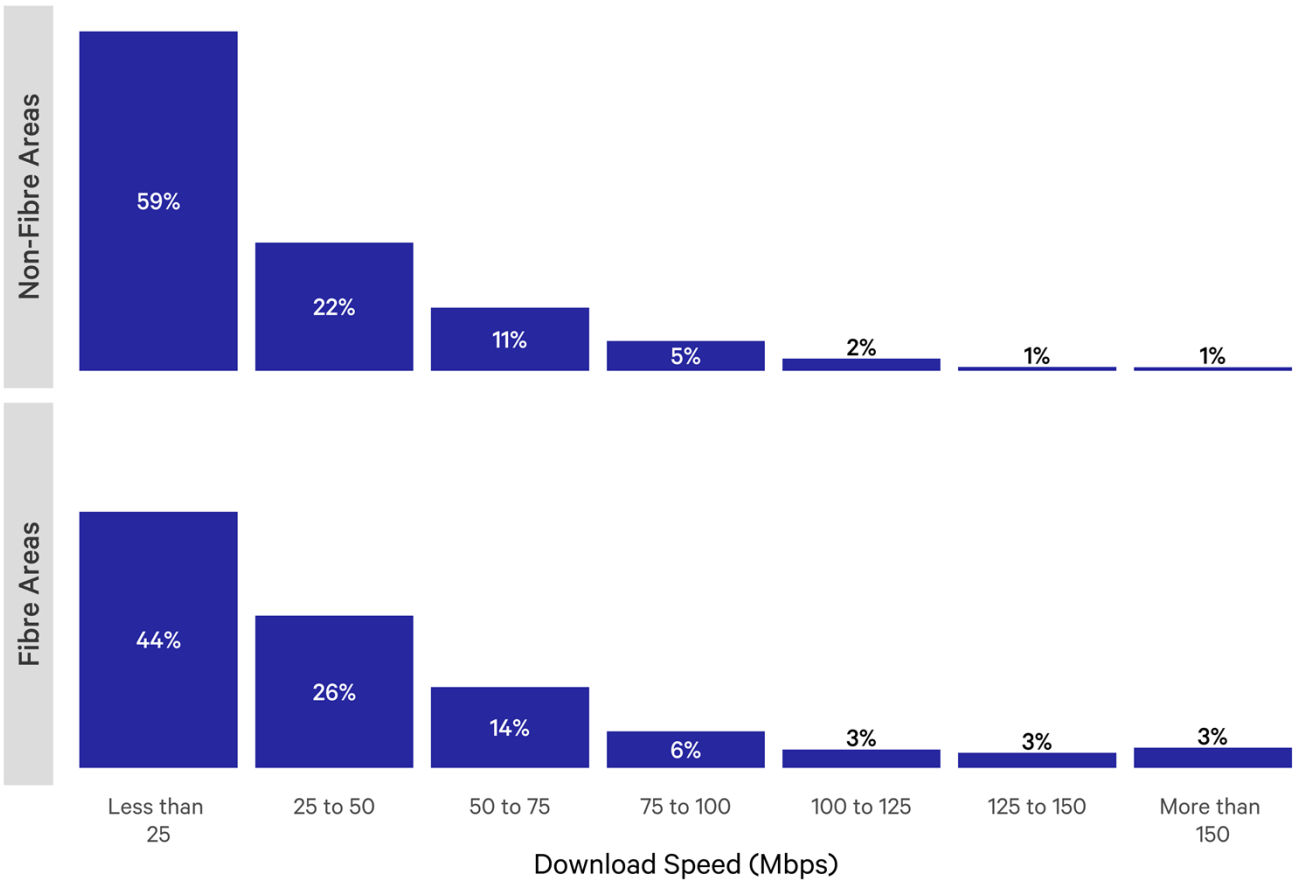
- There is a small difference in performance between the main islands, but the difference is at a level which is unlikely to be noticed by end users.
- All urban areas of New Zealand that we can provide results for see comparable download speeds through Fibre 300 plans, which are in line with the 300 Mbps headline download speed.[1]

[1] Testing is carried out across the country, but results can only be provided for regions with a sufficient sample of Whiteboxes.

Distribution of 4G Fixed Wireless Results

Figure 9: Download speeds on 4G Fixed Wireless plans.

Distribution of test results. Average download speeds for 4G Fixed Wireless plans is 35 Mbps in non-Fibre areas and 50 Mbps in Fibre areas; this varies by RSP and over time.



MBNZ Summer Report, 2023

Key Observations

- Overall average speeds for 4G Fixed Wireless are 35 Mbps in non-Fibre areas and 50 Mbps in Fibre areas.
- 59% of speed tests run over Fixed Wireless lines achieve download speeds of less than 25 Mbps in non-fibre areas, compared to 44% in Fibre areas.
- 9% of download speed tests in Fibre areas achieved speeds of 100 Mbps or higher.

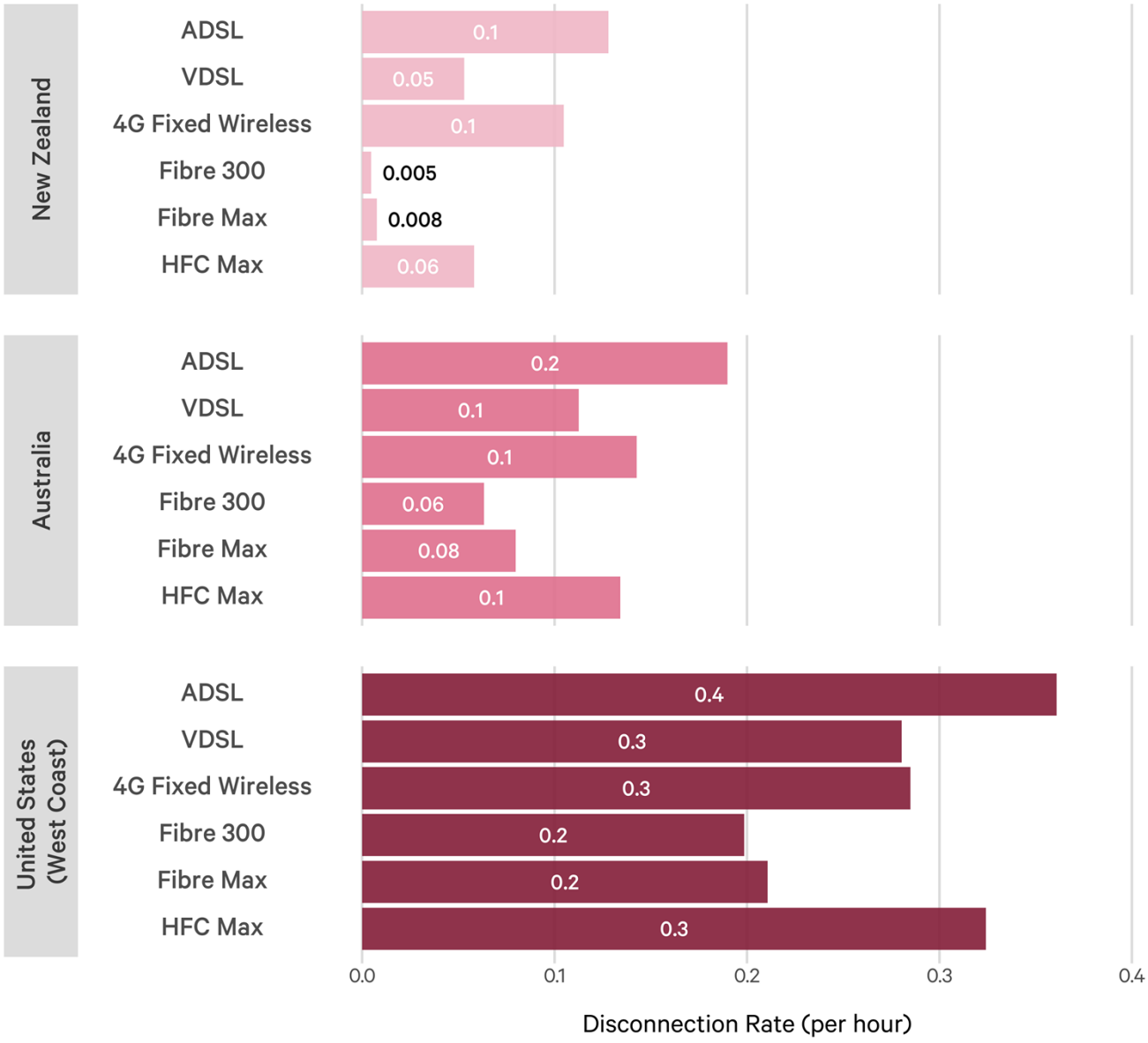
Disconnections

Realtime applications like video calls rely on a consistent connection between the home router and the target server. If the connection drops, even for a few seconds, the application will exhibit some form of stuttering. In the worst instance, a user might be disconnected and have to reconnect or wait for their broadband connection to come back online.

A brief disconnection very rarely means that, for example, a physical cable has been cut. Instead, the main reasons for network dropouts relate to congestion and the configuration of network equipment. The following graph compares disconnection rates across plans.

Figure 10: Median hourly disconnection rates. Lower is better.

Medians of household hourly rates. A disconnection means that two or more packets in a row don't complete a full round trip. Testing only covers periods where the line is idle.



MBNZ Summer Report, 2023

This graph shows medians across households. Taking Fixed Wireless as an example 50% of households will experience no more than 0.1 disconnections per hour for traffic remaining within New Zealand. This obscures the extremes of performance for each plan: while the median ADSL and Fixed Wireless results are comparable, ADSL connections are more likely than others to have disconnection rates far above the median, whereas Fixed Wireless plans are more likely to have results close to the median. Disconnections vary by hour of the day, so the likelihood of 0.1 disconnection per hour when connected to a New Zealand server will not be consistent throughout all hours of the day.

Many common applications, such as video conferencing applications or online gaming used by New Zealanders are served from overseas, mainly Australia, East Asia, and the USA. All New Zealand RSPs share capacity through four undersea cable networks which carry traffic to and from New Zealand across the Tasman Sea and the Pacific.

The results for disconnections have increased for all technologies when compared to the previous report, especially disconnection to the United States. In spite of these changes, the level of disconnections is still at a level whereby user experience will not be unduly affected.

Key Observations

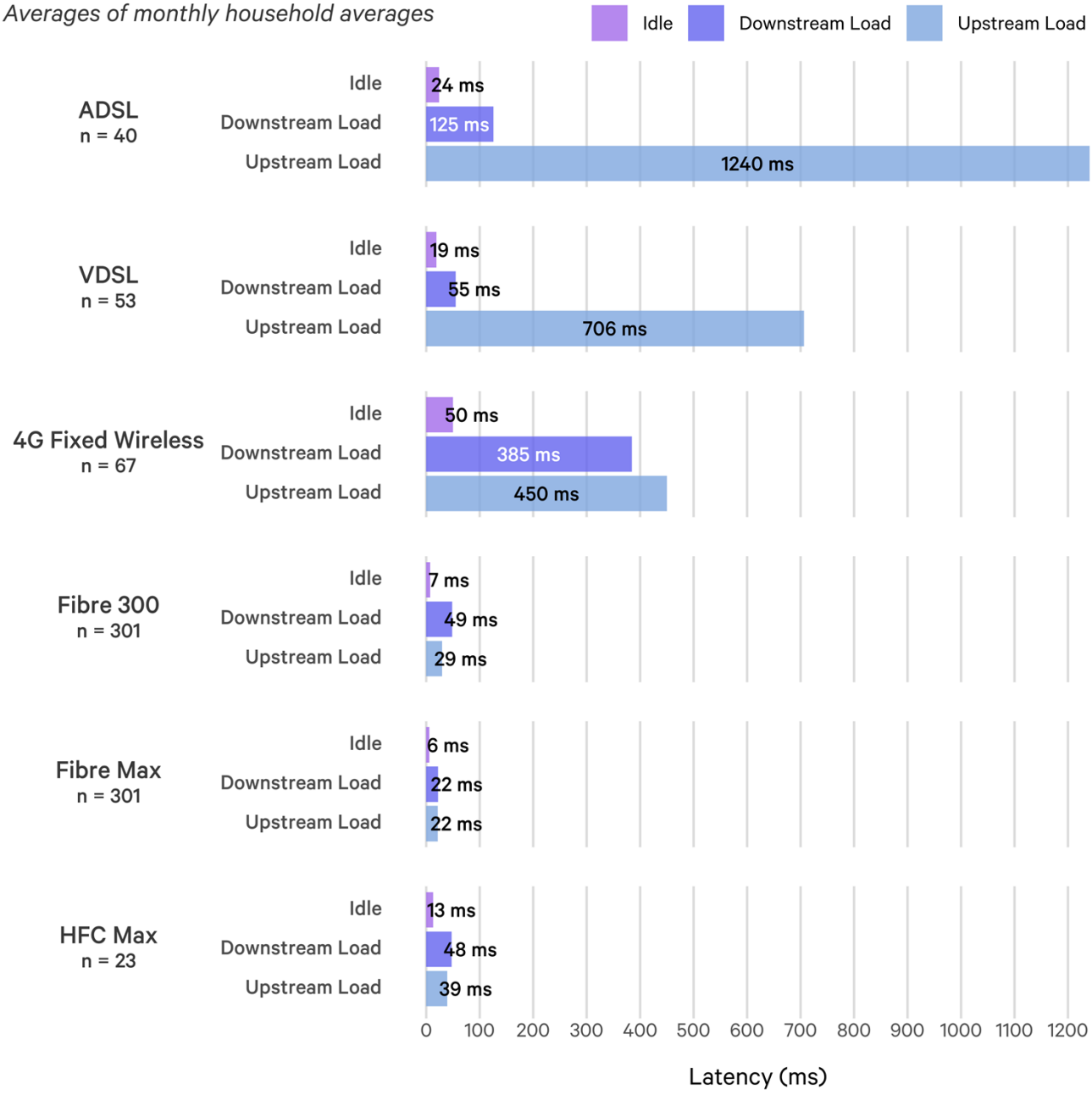
- Most households see a very low rate of disconnections, at least while the line is idle.
- Most ADSL connections experience a higher rate of disconnections than most VDSL, Fixed Wireless, Fibre, and Cable connections. Disconnections for Fibre plans remain low.
- Traffic going overseas is more likely to be lost than traffic remaining within New Zealand. Disconnections have increased this report for all technologies for traffic testing to the United States however these are not likely to notably impact user experience.
- There were not enough volunteers on LEO Satellite plans to report on disconnections during the measurement period. Analysis on disconnections for LEO Satellite plans will be included in future reports.

Latency Under Load

The latency under load test measures the latency whilst the broadband connection is heavily utilised (by the way of a speed test run in parallel). This is more representative of user experience than idle latency as it shows the impact of downloading or uploading data to the internet (e.g. watching Netflix or uploading a file) on latency (e.g. how long a webpage takes to load). The results are particularly illustrative of real-world experience for people who are using latency sensitive applications like video conferencing.

Figure 11: Average Latency Under Load to Test Servers by Plan. Lower is better.

Averages of monthly household averages



MBNZ Summer Report, 2023

The graph shows latency values while the connection is idle, compared with latency values while the connection under either downstream or upstream load. The latency under load test is performed while the download (or upload) speed tests are running, and this is compared to the idle latency measurement which is calculated when the line is idle. Differences in access technology and router models will result in different results for the user.

It is expected that the router model will be a factor in any latency rise, as the test is measuring what is known as bufferbloat, which is where the router or other network devices on the path are buffering large amounts of data. As such, differences in technology and router models will result in different results for the user.

Key Observations

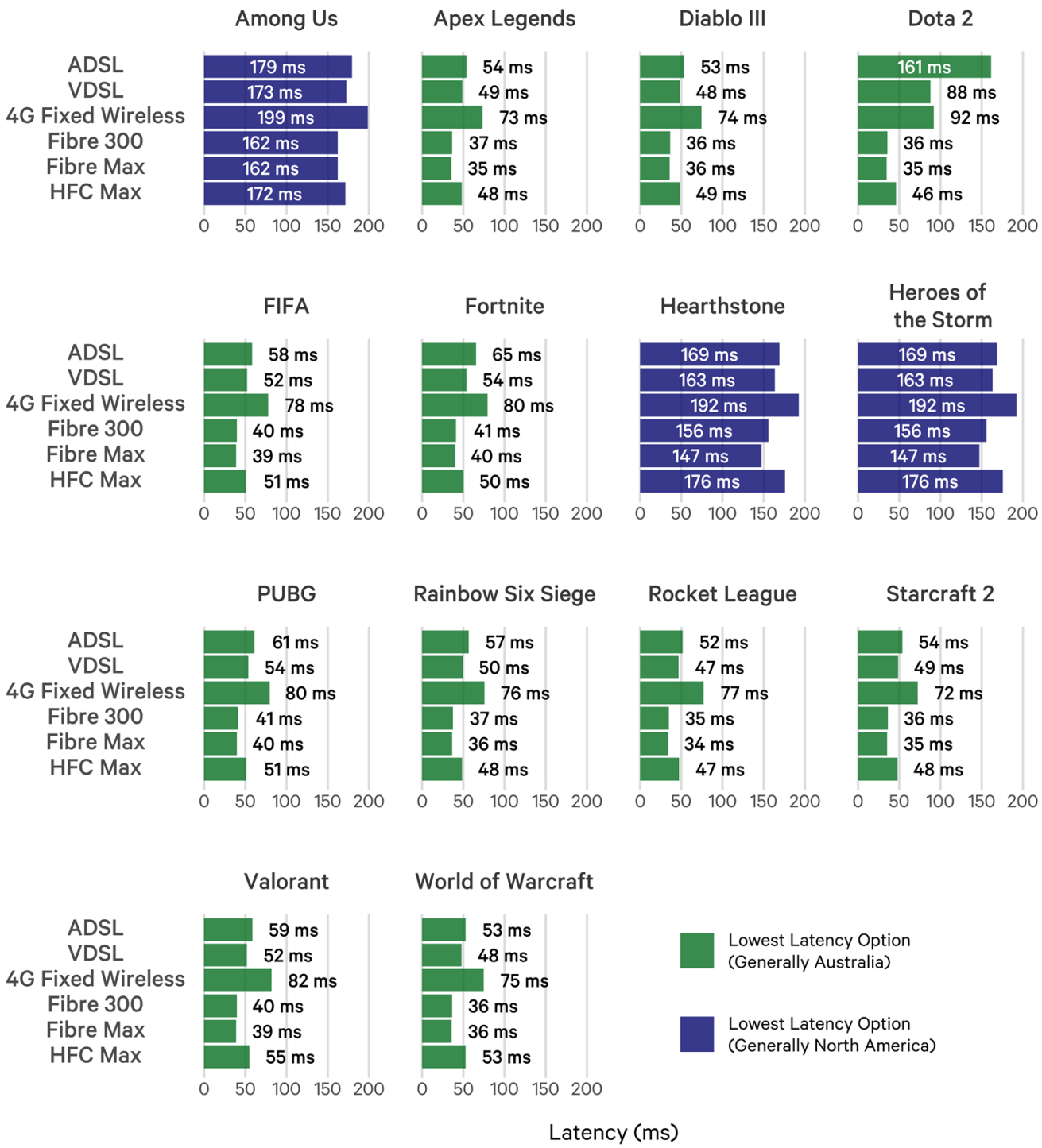
- All plans see latency increase when the line is running upload or download tests compared to when the line is idle.
- ADSL and Fixed Wireless plans see a large increase in latency under load while both download and upload tests are running. VDSL shows a high latency when upload tests are running. These latency values are high enough to be noticeable to the user if multiple devices are used simultaneously, with one device heavily using the connection.
- Latency under downstream and upstream load is higher for the Fibre 300 plan compared to Fibre Max results. Both Fibre plans have lower latency results for idle latency and latency under downstream and upstream load than HFC Max.
- The impacts of latency on specific application performance are discussed elsewhere in the report (Social Media, Online Games, Netflix).

Online Gaming

Online gaming applications require low latency between users' machines and the central host server. If it takes a long time to pass messages between the device and server where the game is hosted, then disruptive stuttering or lag will result.

Figure 12: The latency to various online gaming servers. Lower is better.

Average of household average latency to gaming servers.
Lower latency means that lag is less likely.



MBNZ Summer Report, 2023

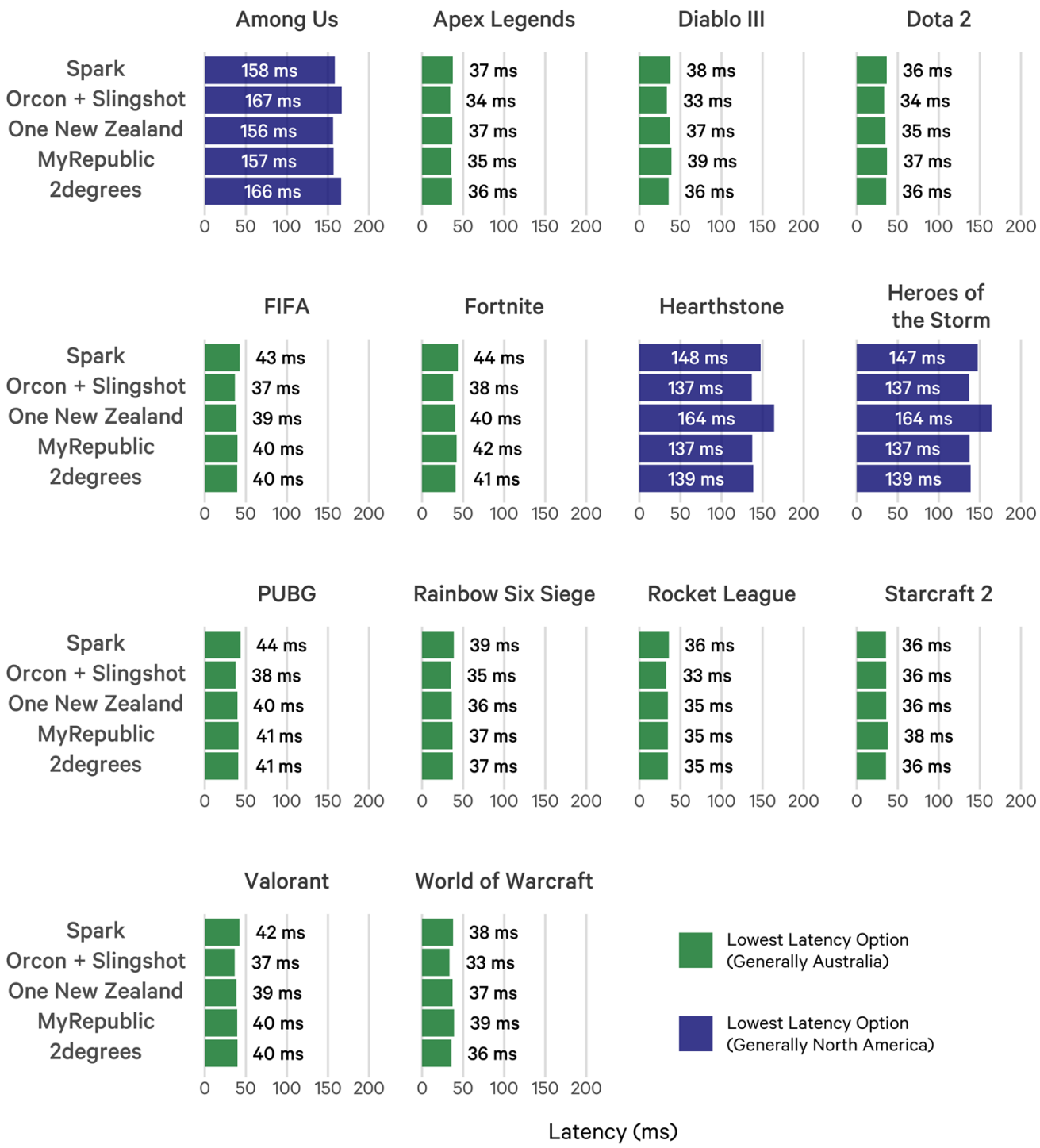
Key Observations

- Among Us, Hearthstone and Heroes of the Storm all tested to servers in North America. These games show higher average latencies across all technologies than the remaining games which tested to servers located in Australia.
- Fibre plans had the lowest latency to each game's servers on average. ADSL, VDSL, and Fixed Wireless plans are more likely to experience high latency and lag due to the variability of performance.
- Overwatch and League of Legends are not included in this report due to a recent change in server hosting made by the publisher. They will be included in future reports.
- Online gaming will start to stutter and lag when latency increases beyond 50 or 100 ms – some game servers will simply refuse to admit players who have triple-figure latency because this will ruin the game for everyone else. Games with servers located in North America and Asia saw latency values above 100 ms for all technologies.

Figure 13: The latency to various online gaming servers by RSP. Lower is better.

Average of household average latency to gaming servers. Fibre Plans Only.

Lower latency means that lag is less likely.



MBNZ Summer Report, 2023

Key Observations

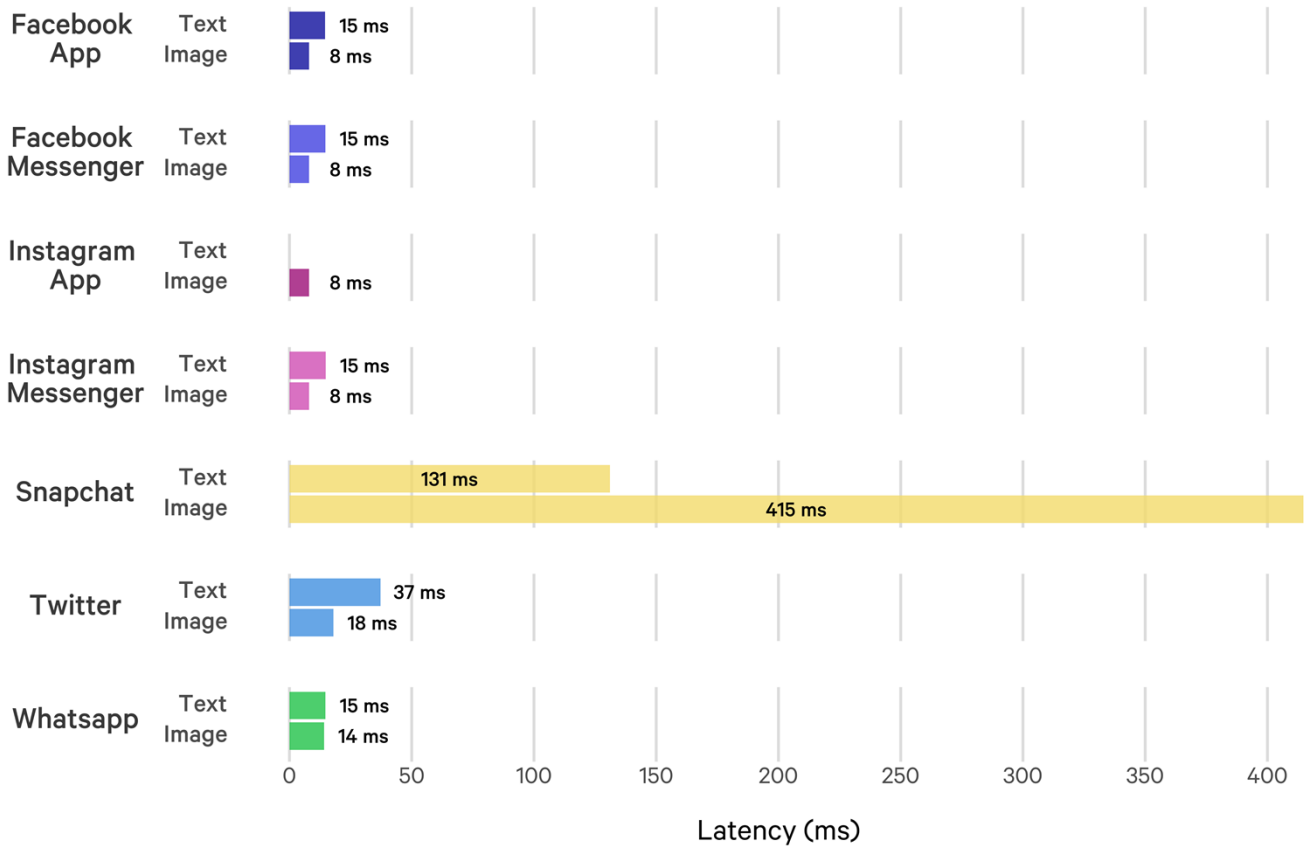
- Among Us, Hearthstone and Heroes of the Storm all tested to servers in North America. These games show higher average latencies across all technologies than the remaining games which tested to servers located in Australia.
- For games testing to Australia, average latencies were very similar across all RSPs.

Social Media

Social media applications generally involve fetching a large number of relatively small pieces of information (single images, short pieces of text, and so on). Applications such as Facebook serve different types of content from different servers - for example, an image will come from one server while its caption will come from a different server. Due to this, latency to the server will be a large determinant of how responsive social media applications will be, however there are other factors that can also influence performance.

Figure 14: The latency to servers of different social media platforms.

Average of household average latency to content servers. Fibre plans only.



MBNZ Summer Report, 2023

Key Observations

- Latency values for all social media services remained consistent for Fibre plans compared to the previous report.
- Snapchat latencies remain higher than all other social media platforms tested for both Image and Text downlink.

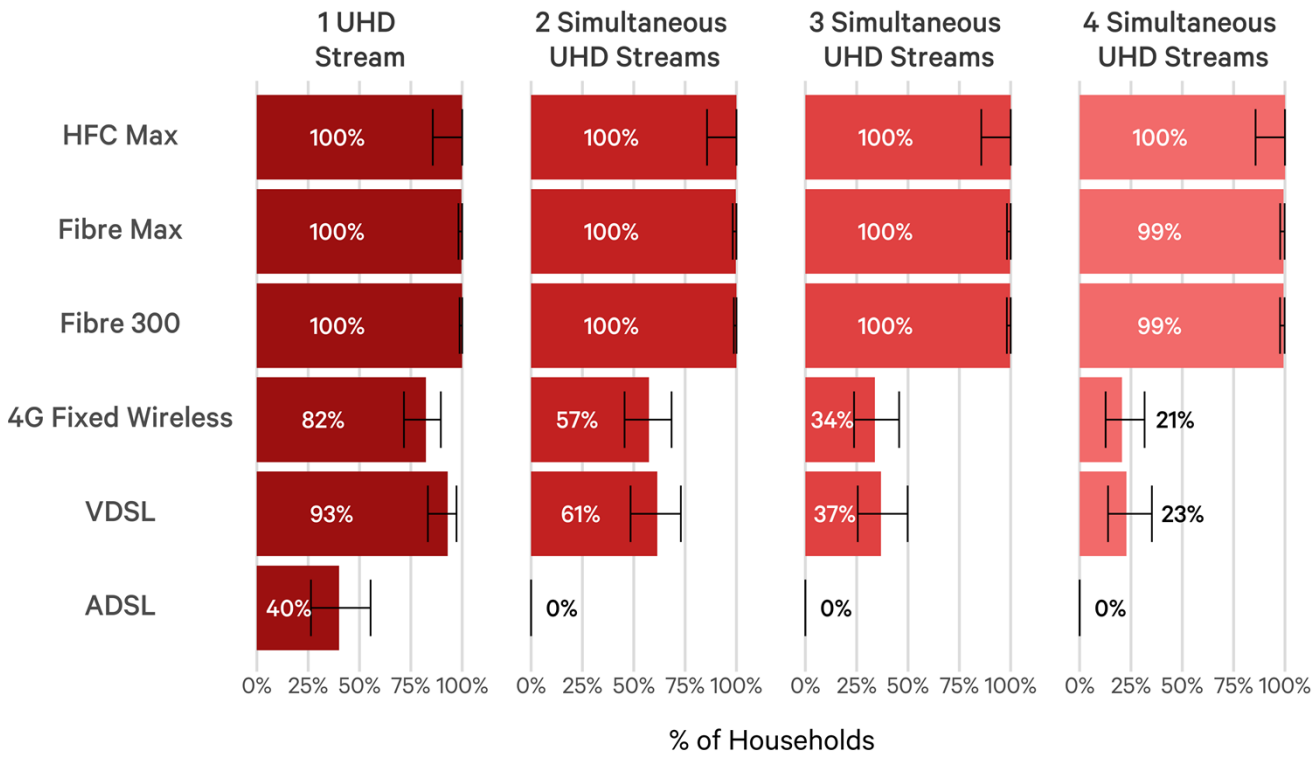
Netflix

Video streaming is a good example of an application where the quality of a user's experience is more affected by bandwidth than by latency. Since higher quality video takes up more data than lower resolution video, higher bandwidth plans such as Fibre 300, HFC Max and Fibre Max can reliably stream from Netflix in Ultra High Definition more of the time.

In 2021, Netflix introduced a change to the way its high definition and 4K video is encoded. Video is now delivered at a variable bitrate depending on the complexity of the video being transmitted. This means that a program with fewer colours and less movement, like a cartoon, will be encoded at a lower bitrate than a fast-paced action film. In practical terms, if 4K video was encoded at 15.6 Mbps previously, it would now be transmitted at no more than 12 Mbps as a worst case. This has little effect on higher speed Fibre plans, but does mean that a number of households on Copper and Fixed Wireless plans will be more likely to be able to watch an Ultra High Definition video, or even support multiple streams running simultaneously since the change was implemented.

Figure 15: The proportion of households able to stream 1, 2, 3 or 4 simultaneous Ultra High Definition videos from Netflix.

Based on the average download speed to Netflix servers for each household.
Error bars show 95% confidence intervals.



MBNZ Summer Report, 2023

Key Observations

- 99% of households on Fibre 300, Fibre Max or HFC Max plans were able to support 4 simultaneous UHD Netflix streams.
- 82% of households on Fixed Wireless and 93% of households on VDSL plans were able to support a single UHD stream. Only 40% of households on ADSL plans were able to stream UHD.

How we test

Measuring home broadband across New Zealand

- The SamKnows Whitebox is a purpose-built testing agent that connects to your router.
- It runs regular, automated performance tests to record the quality and performance of your internet connection without interfering with your network.
- The Whitebox does not record any personal information or browsing history.

SamKnows One Analytics

- View all your data in one place.
- Create customised charts and save the results that mean the most to you.
- Track changes in your connection over time.

Sign up

Please participate by volunteering to receive a Whitebox. The more volunteers we have, the more information we can provide to consumers in New Zealand in future reports.
https://www.measuringbroadbandnewzealand.com/sign-up

Our tests

	Test	Definition
	Download	The speed at which data can be transferred from the SamKnows test server to your device, measured in megabits per second (Mbps).
	Upload	The speed at which information is transferred from your device to the SamKnows test server, measured in megabits per second (Mbps).
	Latency	How long it takes a data packet to go from your device to our test server and back to your device, measured in milliseconds (ms). The shorter the latency, the better.
	Latency Under Load	How long it takes a data packet to go from your device to our test server and back to your device while a download/upload test is running, measured in milliseconds (ms). The shorter the latency, the better.
	Jitter	The variation in the delay of received packets, measured in milliseconds (ms). Essentially it is a measure of the stability of latency.
	Packet Loss	Packet loss counts packets that are sent over a network and do not make it to their destination, measured as a percentage of packets lost out of all packets sent.
	Disconnection	A disconnection means that two or more latency measurement packets in a row were lost. Measured as the median of household hourly rates.
	Video Conferencing	Measures round-trip latency and reachability of a selection of video conferencing services.
	Social Media	Measures round-trip latency and reachability of a selection of major social media services.
	Online Gaming	Measures performance for a number of major games and supporting services, such as game distribution platforms.
	Video Streaming	Measures the highest bitrate, and therefore quality level, you can reliably stream from real content servers.
	Webpage Loading Time	The time it takes for a specific webpage to fully load. This is a combination test that includes download, latency and DNS in one test that accurately mimics real-world usage.
	CDN Measurements	Measures download performance for the same (or very similar) object from a variety of popular Content Delivery Networks over HTTP.
	Voice over IP	Measures the suitability of a broadband connection for VoIP calls.

Glossary

Term	Definition
ADSL	Asymmetric digital subscriber line. A broadband connection that uses existing telephone lines to send data.
Advertised speed	The speed at which broadband services are typically advertised or marketed, usually described in Mbps (megabits per second). On some networks like ADSL or Fixed Wireless, these are not given as a general maximum but vary from line to line as they do not transmit data without depreciation across distance.
Broadband	A network service or connection which is defined as “always on”, as opposed to historical dial-up internet.
Broadband speed	The speed at which data is transmitted over a broadband connection, usually measured in megabits per second (Mbps).
Disconnection	A disconnection means that two or more latency measurement packets in a row were lost, resulting in stuttering broadband performance.
Download speed	The speed that data travels from our test server to your router. Measured in megabits per second (Mbps); higher is better.
HFC	Hybrid Fibre-Coaxial. A broadband connection that uses coaxial cables to send data.
Fibre	A broadband connection that uses Fibre-Optic cables to send data to and from a property directly. Sometimes referred to as FTTH (Fibre-to-the-home) or FTTP (Fibre-to-the- premises).
Fixed Wireless	A broadband connection that uses radio waves to provide internet access to a premises.
Latency	The time it takes for a data packet to travel from your router to our test server and back. Measured in milliseconds (ms); lower is better.
Latency under load	The time it takes for a data packet to travel from your router to our test server and back while a download/upload speed test is running. Measured in milliseconds (ms); lower is better.
Mbps	Megabits per second. A unit measuring broadband speed. Mbps is the equivalent of 1,000 kilobits per second.
Packet loss	The percentage of packets that were lost somewhere between your router and our test server. Measured as a percentage of all packets sent; lower is better.
Peak hours	The time of day when people are typically using their internet connection, defined in New Zealand as between 7pm and 11pm.
RSP	Retail Service Provider. A company that provides consumers with access to the internet.
Upload speed	The speed that data travels from your router to our test server. Measured in Mbps (megabits per second); higher is better.
VDSL	Very high speed digital subscriber line. A broadband connection that allows higher speeds than ADSL technologies.