



Measuring Broadband New Zealand



Report 22, December 2024

The Measuring Broadband New Zealand programme measures the quality of New Zealand's fixed line, fixed wireless, and satellite 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.

Please refer to [page 10](#) for speed test results. The report also includes summary tables at the back that show the results for easy reference.

This report provides an overview of the findings from data collected between 1st October and 31st October 2024.

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Overview

This report presents the key indicators of consumer internet performance in New Zealand from testing during October 2024.

Highlights include:

1. Continued monitoring of online game store test results, which measure the time taken to download a game from three popular online gaming stores.
2. Continued monitoring of Starlink's Residential Lite LEO Satellite plan across all quality of service and quality of experience metrics.
3. For the first time, quality of experience metrics now focus on peak hours (7pm-11pm) to make it more relevant to consumers.
4. Results for Spark 5G Fixed Wireless are included for the first time for Netflix and Video Conferencing performance.

This report draws on testing from a wide range of providers, and a full list of RSPs included in this MBNZ report can be found in Table 2. 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. Previous reports released by the MBNZ programme can be found [here](#)¹.

The MBNZ programme has a code of conduct to ensure that the parties involved 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. All tested RSPs complied with the current code of conduct, including validation of the data used in this report. You can see the code of conduct on our website [here](#).²

As the MBNZ programme has expanded significantly over the past few years, incorporating more technologies, plans and tests, we have taken steps to refine the report. To make the reports more focused, we have removed some charts that we believe are less impactful or less relevant for consumers. We value your feedback—if there is a chart or data point you found particularly useful and would like to see reinstated, please do not hesitate to reach out to us.

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

² https://comcom.govt.nz/_data/assets/pdf_file/0026/334871/Measuring-Broadband-NZ-Code-of-Conduct-October-2023.pdf

Executive Summary

Application Performance

1. 100% of Fibre 300, Fibre Max and HFC households were able to support at least 2 simultaneous UHD Netflix Streams during peak hours. 90% of LEO Satellite households were able to support 2 simultaneous streams on Starlink's Residential plan, and 61% on their Residential Lite plan.
2. Online game store results measure the time taken to download Hogwarts Legacy from three popular online game stores across plans. Fibre Max and HFC Max both achieved average download speeds to the three game stores capable of downloading a 79.5GB game in under 15 mins during peak hours while Fibre 300 took just under 40 minutes. LEO Satellite plans averaged under 2 hours, while Fibre 50 and VDSL averaged between 3 to 4 hours. ADSL plans had the worst performance, averaging over 21 hours.
3. Latency to video conferencing services remained consistent compared to the previous report.

Benchmarking

1. All plans saw stable download, upload and latency results compared to the previous reporting month.

Broadband Plan Comparison

This report includes broadband plans across a range of technologies and areas. The report shows performance comparison split across areas where Fibre broadband is available (urban areas), and where Fibre is not an option (rural areas). 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 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. More information on the withdrawal of copper-based internet services is available on the Commerce Commission website [here](https://comcom.govt.nz/regulated-industries/telecommunications/regulated-services/consumer-protections-for-copper-withdrawal)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 many ADSL lines 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 similar download/upload speeds to 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 (UHD) streaming, whereas higher speed lines will generally support more data-heavy applications.

Fibre 50 - Supports latency-sensitive applications such as online gaming. Fibre 50 will also support applications such as UHD streaming and video conferencing. Fibre 50 may be unsuitable for data-heavy households with multiple simultaneous users.

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

Fibre Max - Higher download and upload speeds than Fibre 300. The idle latency to internet applications, such as online games, through a Fibre Max line is the same as through any other Fibre

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

plan. Latency under load is lower for Fibre Max plans than for Fibre 300. Performance can vary depending on RSP, and Fibre 300 will support most modern internet applications and multi-user households. Fibre Max might be needed in cases where there is a genuine need for more bandwidth (e.g. frequently uploading or downloading large files) or when using extremely latency sensitive applications on a busy connection.

HFC (Cable) - Available in some areas (Wellington, Upper & Lower Hutt, the Kapiti Coast, and parts of Christchurch). HFC is also referred to as Cable and DOCSIS. One New Zealand is the only provider operating an HFC network in New Zealand. HFC lines achieve similar download performance to Fibre Max, and similar upload performance to Fibre 300. However, latency can be higher due to the difference between Cable and Fibre technologies.

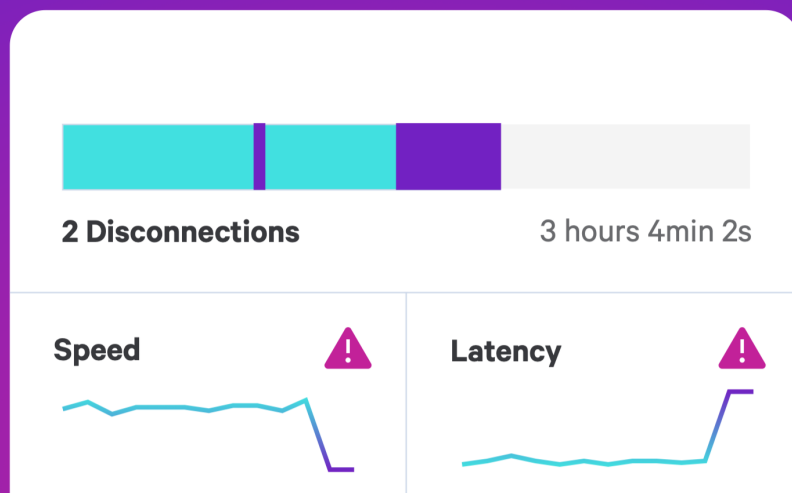
4G Fixed Wireless - Can offer higher download speeds than ADSL, and on average similar speeds to VDSL. Users will experience higher latencies due to the cellular technology underlying these plans. 4G Fixed Wireless has the highest latency of all technologies, and also delivers lower download/upload speeds and more frequent dropouts than Fibre. Speeds also can be more variable depending on the time of day, and other environmental factors. 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).

5G Fixed Wireless - Expected to support data-heavy applications, such as UHD streaming with multiple simultaneous users. Being a Fixed Wireless technology, users will likely experience higher latencies due to the nature of cellular technology. Speeds also can be more variable depending on the time of day, and other environmental factors. The 5G Fixed Wireless results presented in this report are specific to Spark. As each RSP has different fixed wireless infrastructure, these results should not be directly compared between RSPs.

LEO Satellite - Available in both rural and urban areas and is transmitted wirelessly using a satellite and ground based satellite dish. Typically higher download speeds than a Fibre 100 plan, but this 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 due to factors such as congestion and bad weather. Starlink is currently the only LEO Satellite provider included in the MBNZ report. Starlink also offer a Residential Lite service, which means that traffic is deprioritized

over their Residential service during peak hours. Results for both the Residential (LEO Satellite) and Residential Lite (LEO Satellite (Lite)) plans are included in MBNZ.

Other Broadband Plans - There are other plans available that are not currently reported on by MBNZ. Fibre 30, 100 and 200 plans should be broadly consistent with results measured for Fibre 50, 300 and Fibre Max for latency and reliability metrics. The main differences for these lower speed Fibre plans would be lower download and upload speeds, meaning it would take longer to download and upload larger files, and they would be able to support fewer users at the same time when using video streaming services. For WISP Fixed Wireless plans it is not possible to give any firm advice around their suitability for different applications at this stage due to the variety of implementations and low sample size.



Quality of Service & Reliability

In this section we report on the performance of a number of popular plans across New Zealand for quality of service metrics.

Some results in this section are shown with error bars representing the 95% confidence interval for each plan. This means that if we had repeated our measurements 100 times, we would expect the true result to fall within the black bands in at least 95 of the 100 cases.

We have updated our methodology in this report to include weighting results for Fibre 300 and Fibre Max plans, and we have also updated the way we calculate confidence intervals. The error bars in this report may look slightly different from previous MBNZ reports, however their interpretation remains the same.

The transparent bars 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.

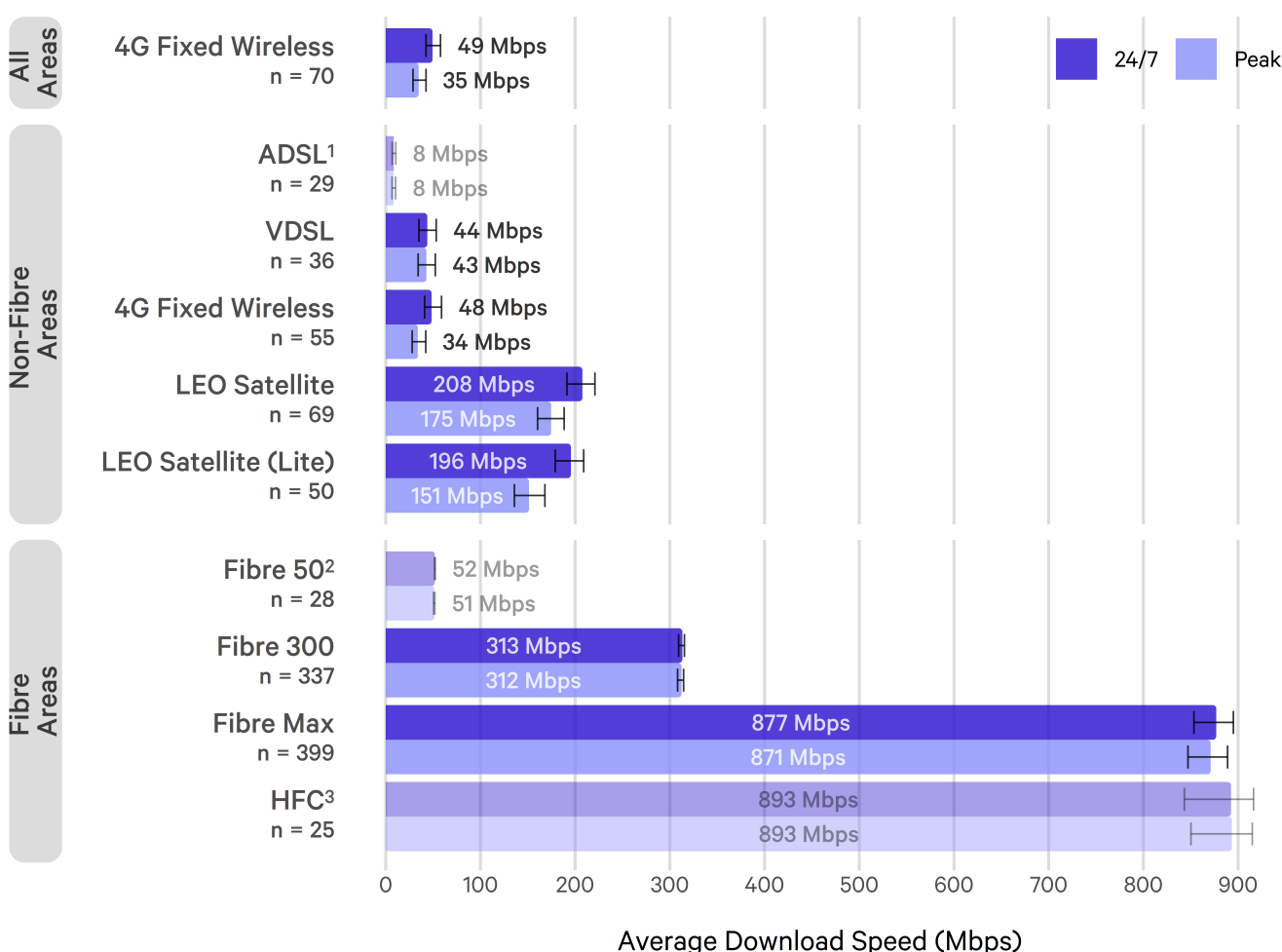
Speed Tests - Download

Figures 1 and 11 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 available. 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 = 70). Error bars show 95% confidence intervals of the mean.



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¹ Results for ADSL are based on a sample size of 29 Whiteboxes. The low sample size can be attributed to volunteer numbers falling as consumers move away from copper services.

² Results for Fibre 50 are based on a sample size of 28 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

³ Results for HFC are based on a sample size of 25 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.

Key Observations

- ADSL and VDSL results are consistent with those seen in the previous report, showing similar results during peak hours.
- LEO Satellite results are broadly consistent with the previous report. Results for Starlink's Residential Lite plan (formally Deprioritized plan)¹ show a small decrease in speeds, particularly during peak hours compared to their Residential LEO Satellite service.
- LEO Satellite and 4G Fixed Wireless show a larger variation between peak hour download speeds and all hour download speeds compared to fixed line plans. This could be due to these technologies being more sensitive to congestion during peak hours. There was not enough sample in fibre areas for 4G Fixed Wireless to compare results between fibre areas and non-fibre areas.
- Fibre 50, 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 are consistent with previous results. RSP specific results for Fibre Max and Fibre 300 can be found in Figures 2 and 3.
- Results for HFC are broadly consistent with the previous report.

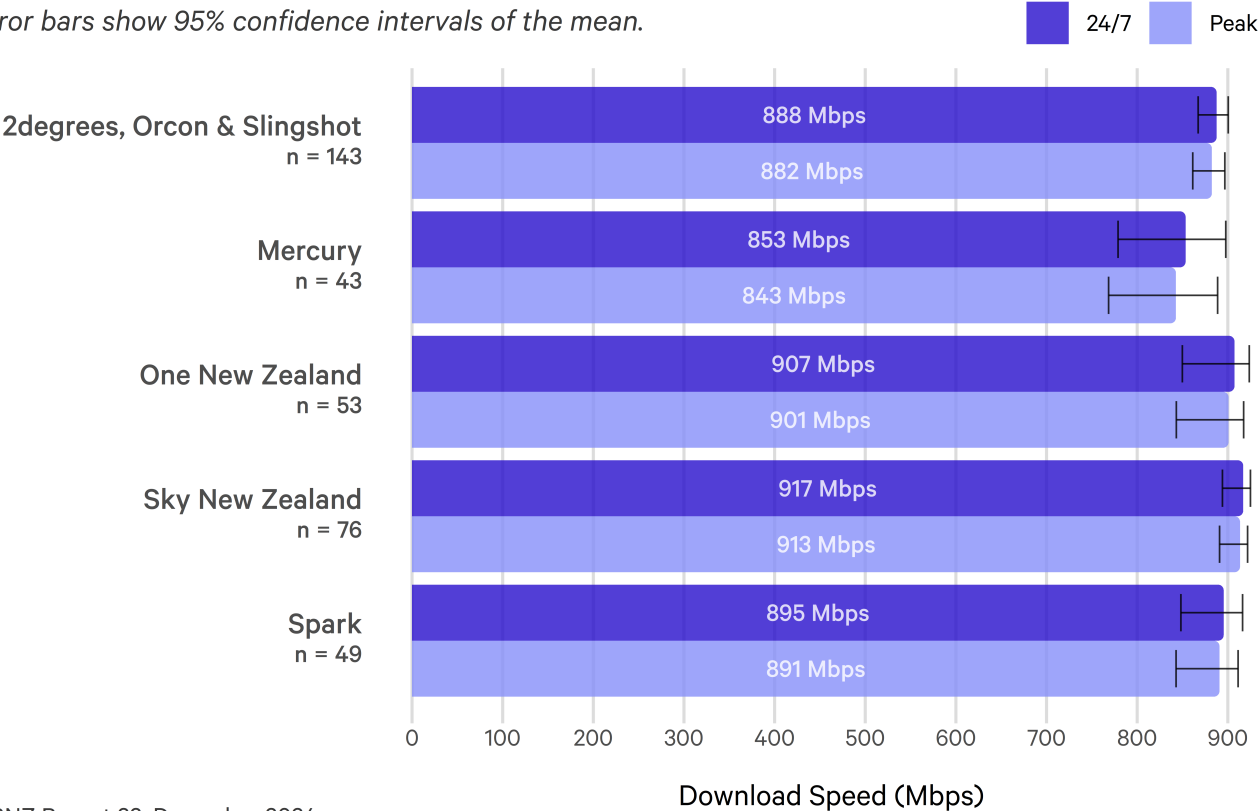
¹ Starlink offer a Residential, and Residential Lite service (previously branded Standard and Deprioritized). Traffic for the Residential Lite service is deprioritized over the Residential service during peak hours. Results for both the Starlink Residential (LEO Satellite) and Starlink Residential Lite (LEO Satellite (Lite)) plans are included in MBNZ.

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 2: 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 = 143).
Error bars show 95% confidence intervals of the mean.



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Key Observations

- All RSPs, the results are broadly in line with those seen in the previous report, with One New Zealand showing a small increase in average download speeds across all hours and peak hours.
- There were not enough Fibre Max volunteers on Contact Energy, Electric Kiwi, NOW NZ or PureLink during the measurement period to report results for these RSPs. All tested RSPs are included in the overall Fibre Max results shown in Figure 1.

Fibre 300 Breakdown by RSP

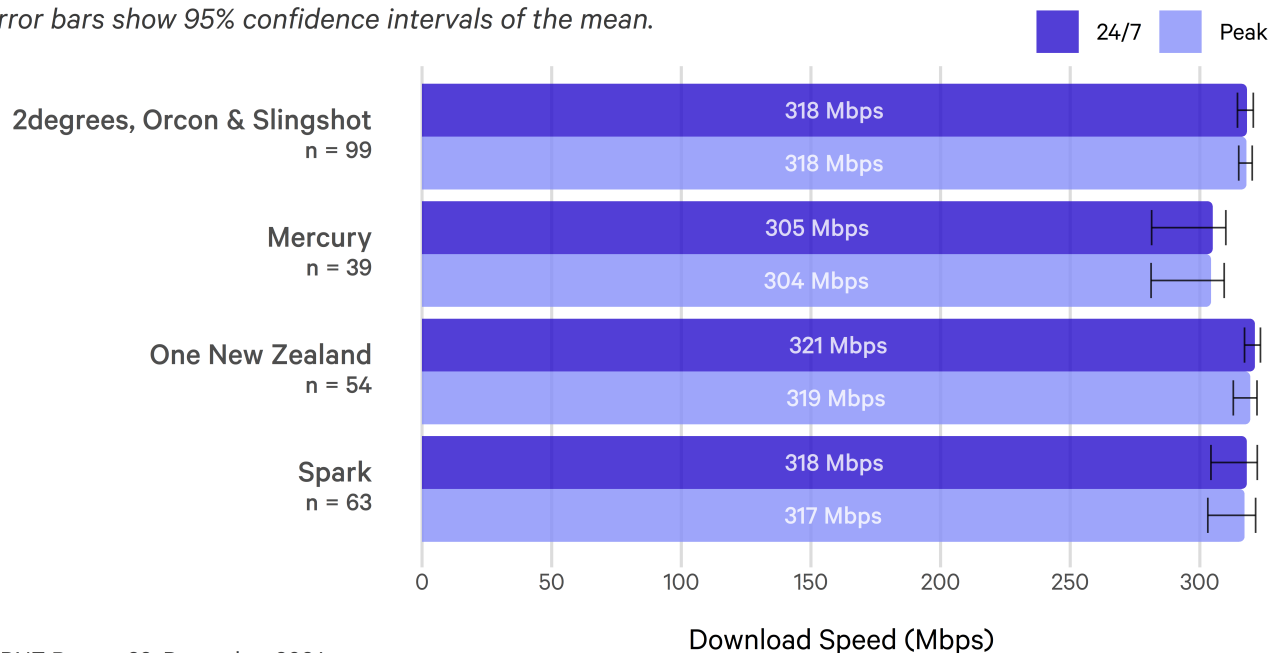
The speeds Fibre 300 is typically advertised to consumers are 300 Mbps download and 100 Mbps upload. In practice, since the provisioned speed is set slightly higher to allow for extra bandwidth used up by the network protocol overhead, it is quite common to see measured download speeds close to or slightly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

Figure 3: 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 = 99)

Error bars show 95% confidence intervals of the mean.



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Key Observations

- All RSPs tested previously continued to perform consistently in October, with all RSPs shown in the chart achieving average download speeds above 300 Mbps, including during peak hours.
- There were not enough volunteers on Contact Energy, Electric Kiwi, Inspire Net, Mercury, NOW NZ, Sky New Zealand or Wireless Nation to report results. All tested RSPs are included in the overall Fibre 300 results shown in Figure 1.

Spark Fixed Wireless Embedded Download Speeds

This report includes results from embedded agent testing, with SamKnows (part of Cisco) embedding its software directly into the modems of customers of an RSP. The embedded agent uses the same methodology as the Whitebox. Any customer with a modem that has the embedded software can become part of an RSP's test population. More details on this testing can be found in the technical FAQs on the Commerce Commission's website [here](#).

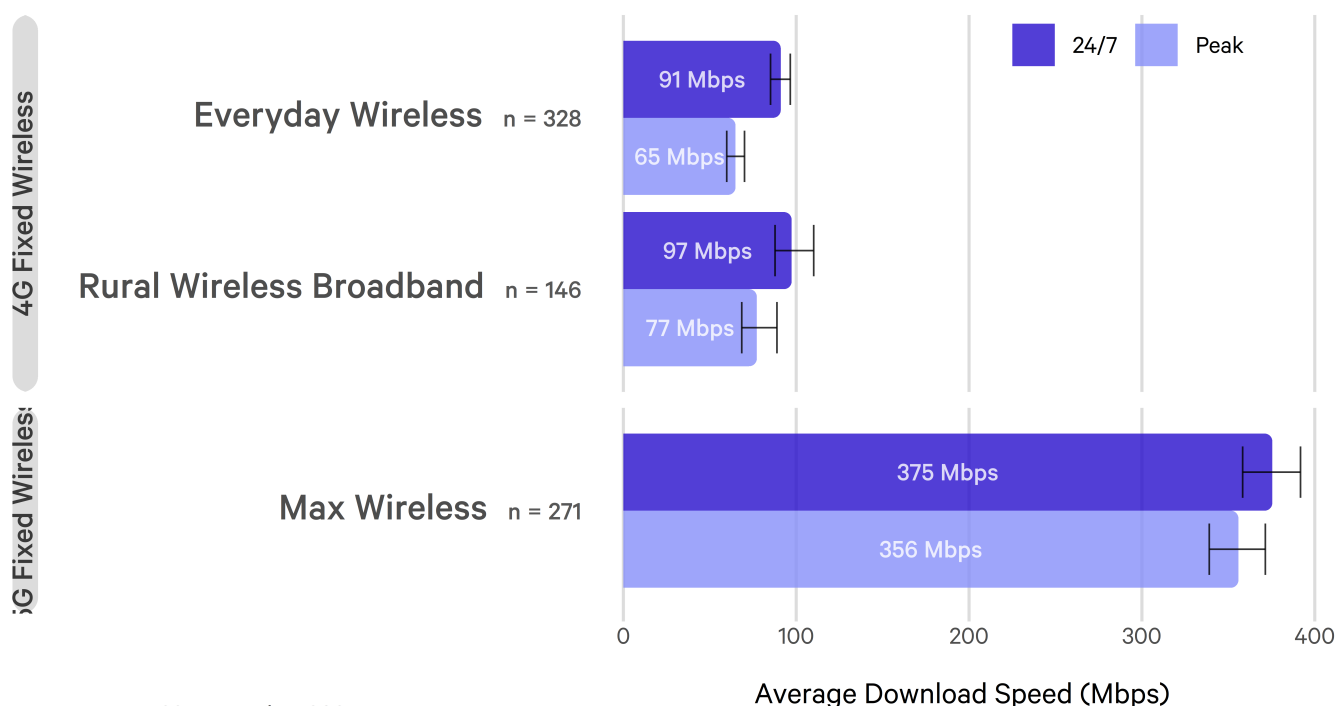
Spark is the first RSP to submit results of embedded agent testing for inclusion in the MBNZ report. To do so, Spark randomly selected around 800 customers across their Everyday Wireless, Max Wireless, and Rural Wireless Broadband plans with Spark's latest Wireless Broadband modems (Spark Smart Modem 2 or a 5G Smart Modem), to be part of the sample group. We have ensured that this has resulted in a geographically representative sample of the plans being tested. The Spark modems with the embedded agent ran a comparable test schedule to the Whitebox agents used in the MBNZ project using the same off-net test servers, located in Auckland, Wellington, and Christchurch. The Spark 5G FWA sample has been reselected (and increased) for this report due to the number of eligible users being much higher and more geographically distributed than when it was first included.

Figure 4: Average Download Speeds for Spark Fixed Wireless Plans.

Average of monthly household weighted averages. Peak hours are Monday - Friday, 7pm - 11pm.

The number of embedded agents contributing to each result is shown under each plan name (eg n = 328).

Error bars show 95% confidence intervals of the mean.



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Average Download Speed (Mbps)

Key Observations

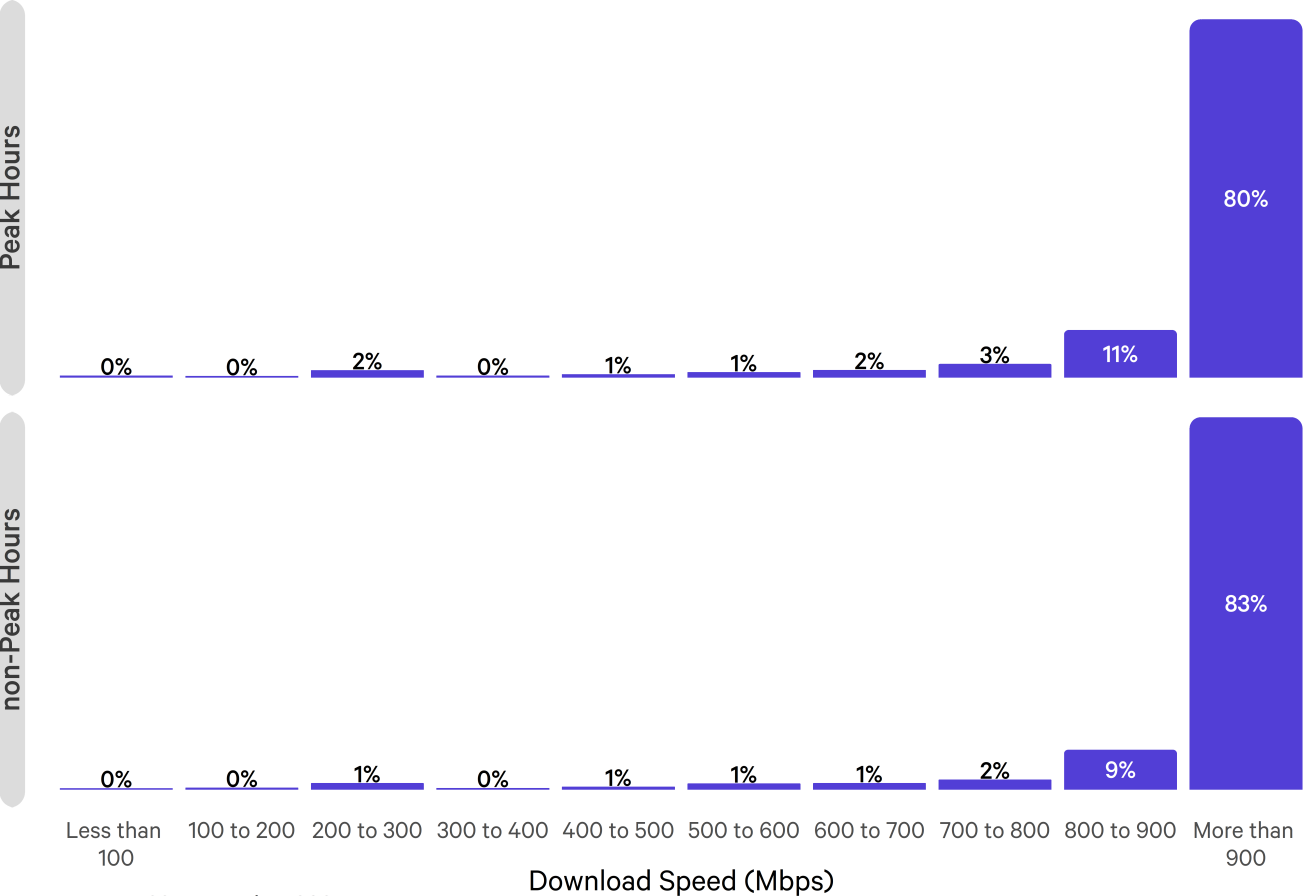
- There is minimal difference in average download speeds between Spark 4G Everyday Wireless and Rural Wireless Broadband, with both plans seeing slightly lower download speeds during peak hours.
- The average download speeds across all 4G Fixed Wireless plans and RSPs in NZ is 49 Mbps during all hours, and 35 Mbps during peak hours. All average results for the Spark 4G plans measured are higher than the average download speed of all 4G Fixed Wireless results.
- There are a number of factors that influence Fixed Wireless broadband performance including distance, and number of customers connected to the nearest cell tower. During peak hours, the number of customers connected to a cell tower in an urban area can be much higher than in a rural area, which could be one explanation for higher average peak hour speeds in rural areas.
- The average download speed measured for Spark's Max Wireless 5G Plan was 375 Mbps during all hours, and 356 Mbps during peak hours. This is an increase in over 20 Mbps compared to the previous report.

Distribution of Fibre Max Results

Figure 5: Download Speeds on Fibre Max Plans.

Distribution of test results across 400 Fibre Max households

Average (24/7) download speeds for Fibre Max plans is 877 Mbps; this varies by RSP and over time.



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Key Observations

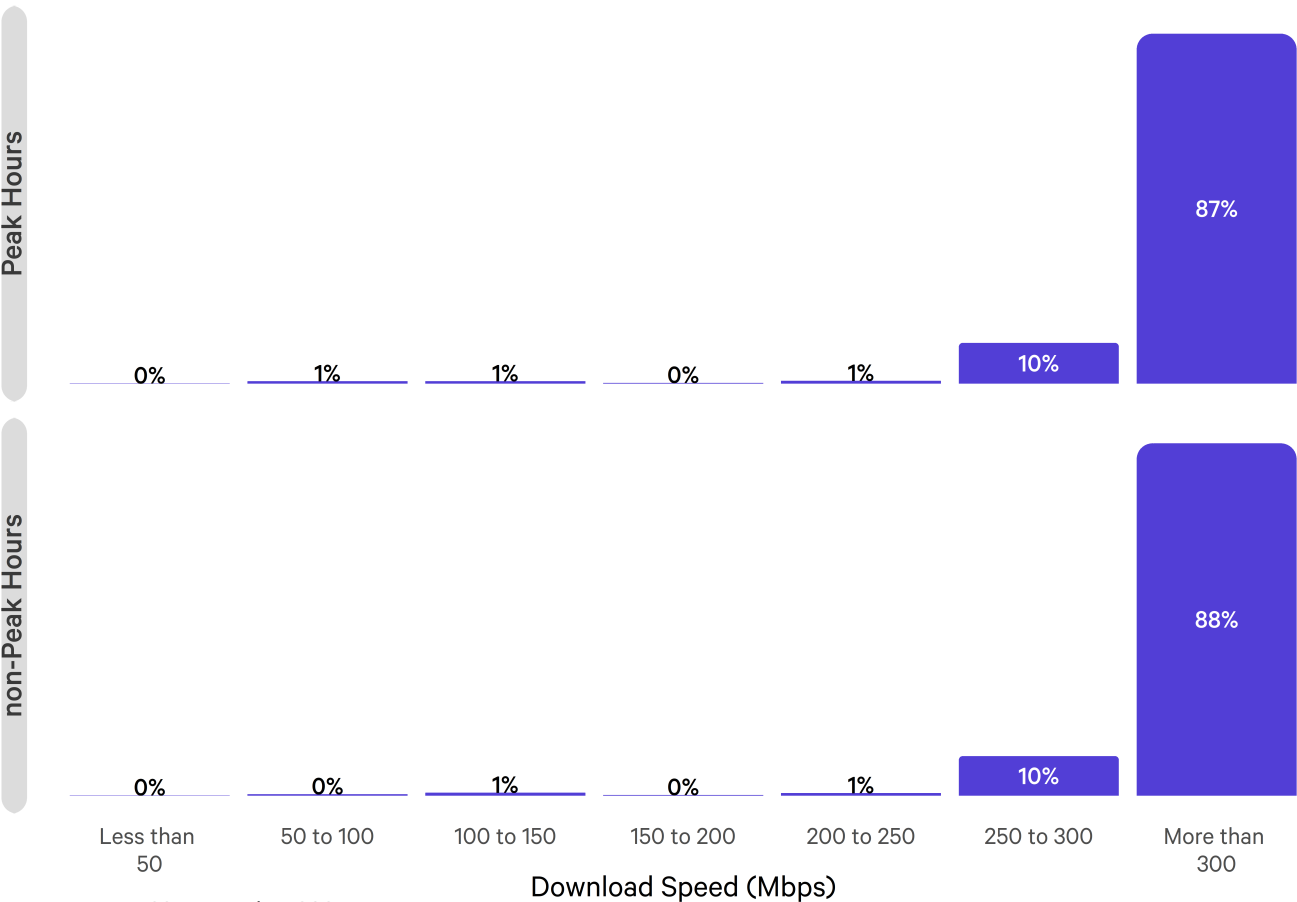
- 83% of speed tests run over Fibre Max lines achieved download speeds above 900 Mbps during non-peak hours, compared to 80% during peak hours.

Distribution of Fibre 300 Results

Figure 6: Download Speeds on Fibre 300 Plans.

Distribution of test results across 337 Fibre 300 households

Average (24/7) download speeds for Fibre 300 plans is 313 Mbps; this varies by RSP and over time.



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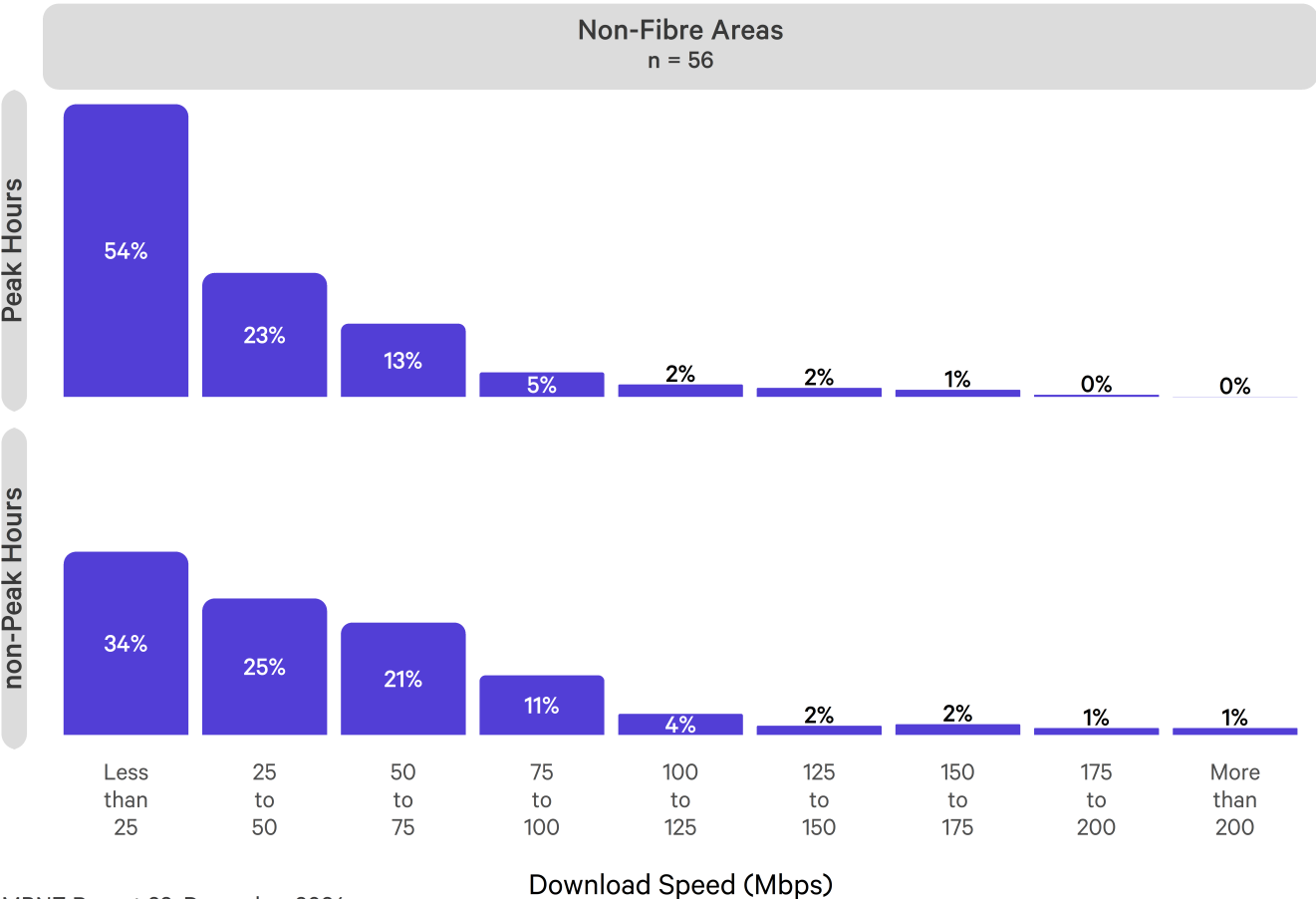
Key Observations

- 88% of speed tests run over Fibre 300 lines achieved download speeds above 300 Mbps during non-peak hours, compared to 87% during peak hours.

Distribution of 4G Fixed Wireless Results

Figure 7: Download Speeds on 4G Fixed Wireless Plans.

Distribution of test results. Average (24/7) download speeds for 4G Fixed Wireless plans is 48 Mbps in non-Fibre areas and 49 Mbps across all areas; this varies by RSP and over time.



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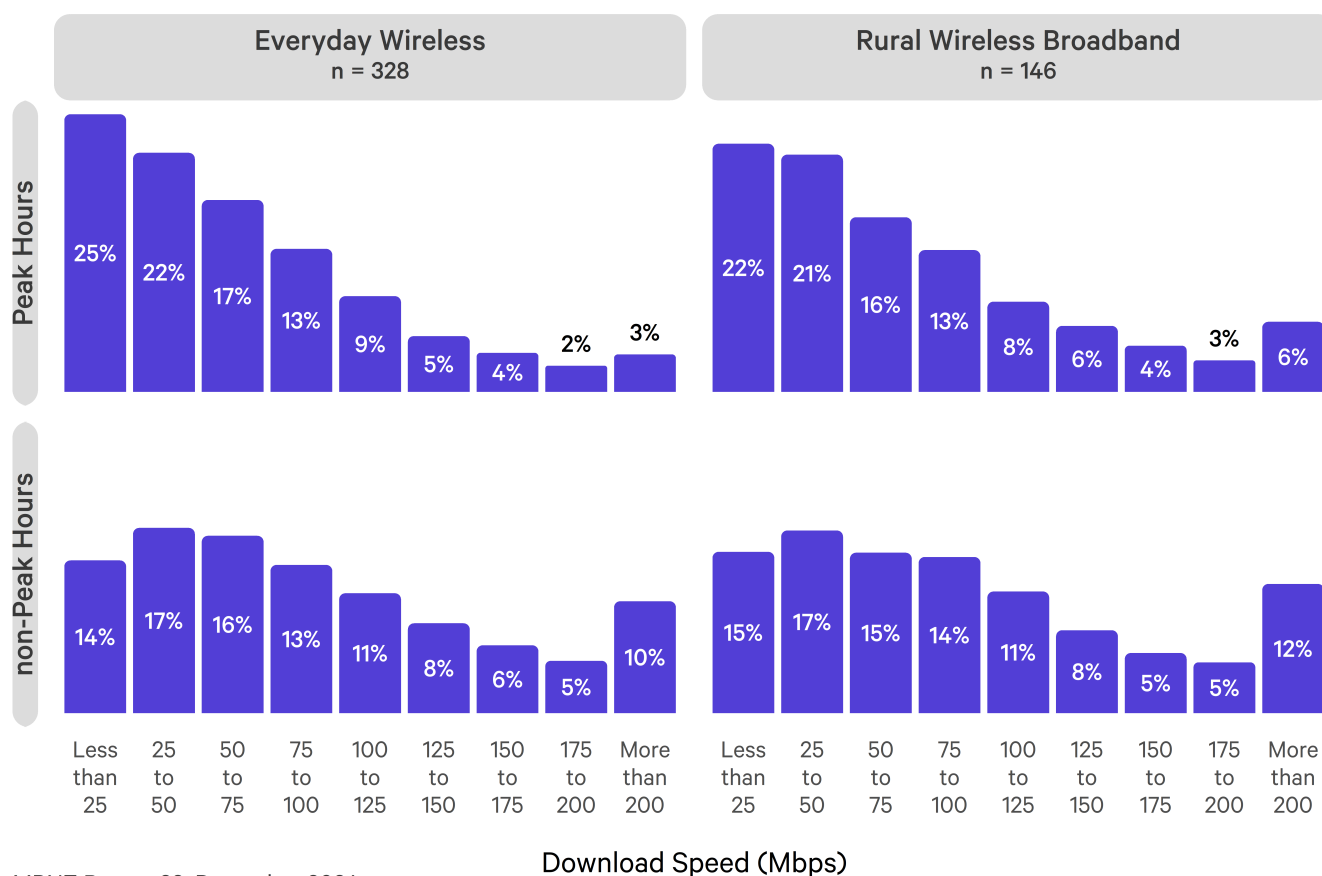
Key Observations

- 34% of speed tests run over Fixed Wireless lines achieve download speeds of less than 25 Mbps in non-Fibre areas during non-peak hours, compared to 54% during peak hours.

Distribution of Spark Embedded Fixed Wireless Results

Figure 8: Download Speeds on Spark Embedded 4G Fixed Wireless Plans.

Distribution of test results.



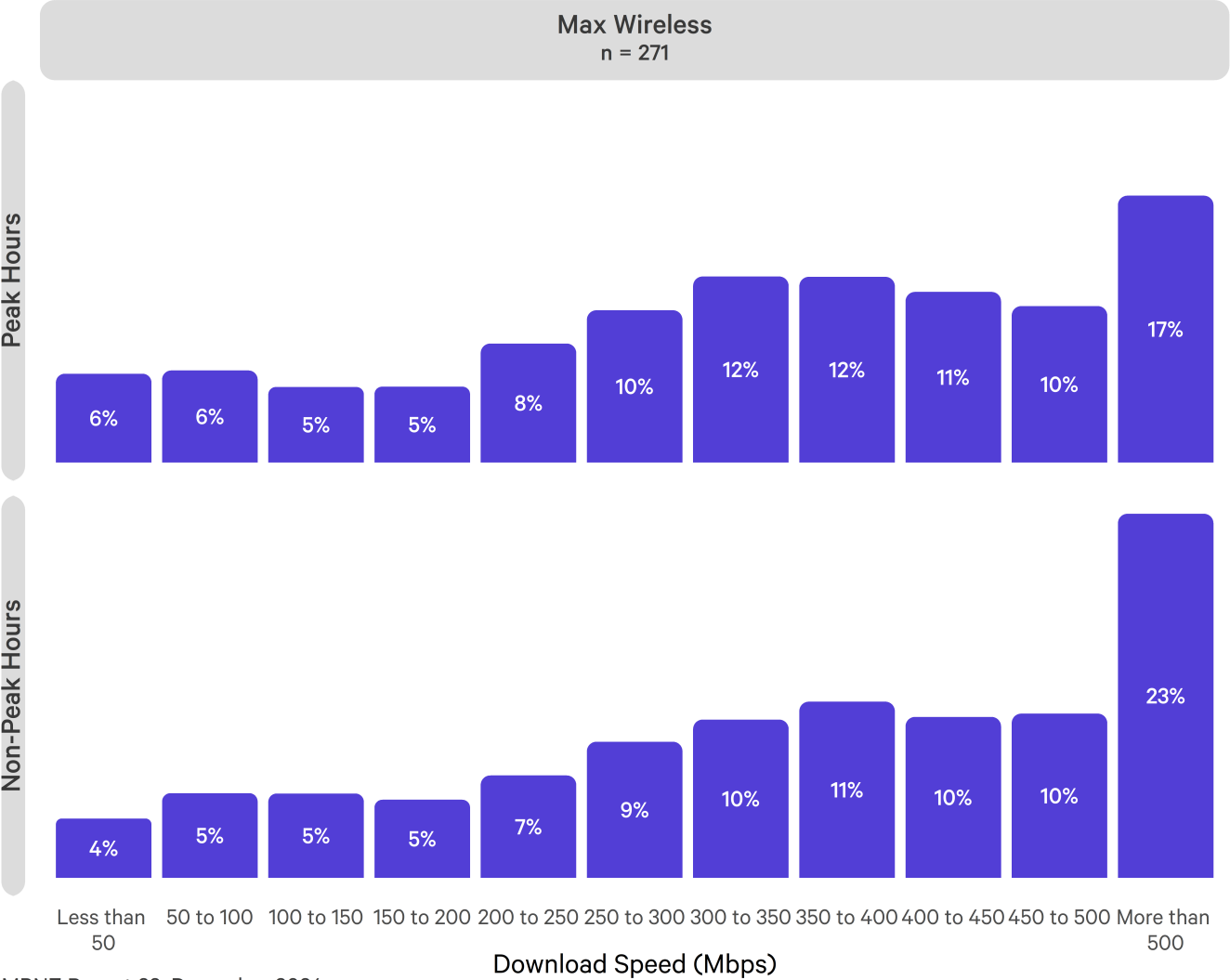
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Key Observations

- During non-peak hours, 40% of Everyday Wireless download tests achieved speeds above 100 Mbps, compared to 41% for Rural Wireless Broadband. During peak hours, the percentage of tests over 100 Mbps for Everyday Wireless fell to 23%, and Rural Wireless Broadband also saw the percentage fall to 27%.
- For both plans, the percentage of tests below 25 Mbps increased during peak hours compared to non-peak hours. For Everyday Wireless plans, the percentage rose from 14% to 25%, and for Rural Wireless plans, it also increased from 15% to 22%.
- Both plans saw similar percentages of tests achieve speeds over 200 Mbps during non-peak hours, at 10% and 12% for Everyday Wireless and Rural Wireless respectively. However, during peak hours, the percentage of tests fell to only 3% for Everyday Wireless, and 6% for Rural Wireless.

Figure 9: Download Speeds on Spark Embedded 5G Fixed Wireless Plan.

Distribution of download test results.



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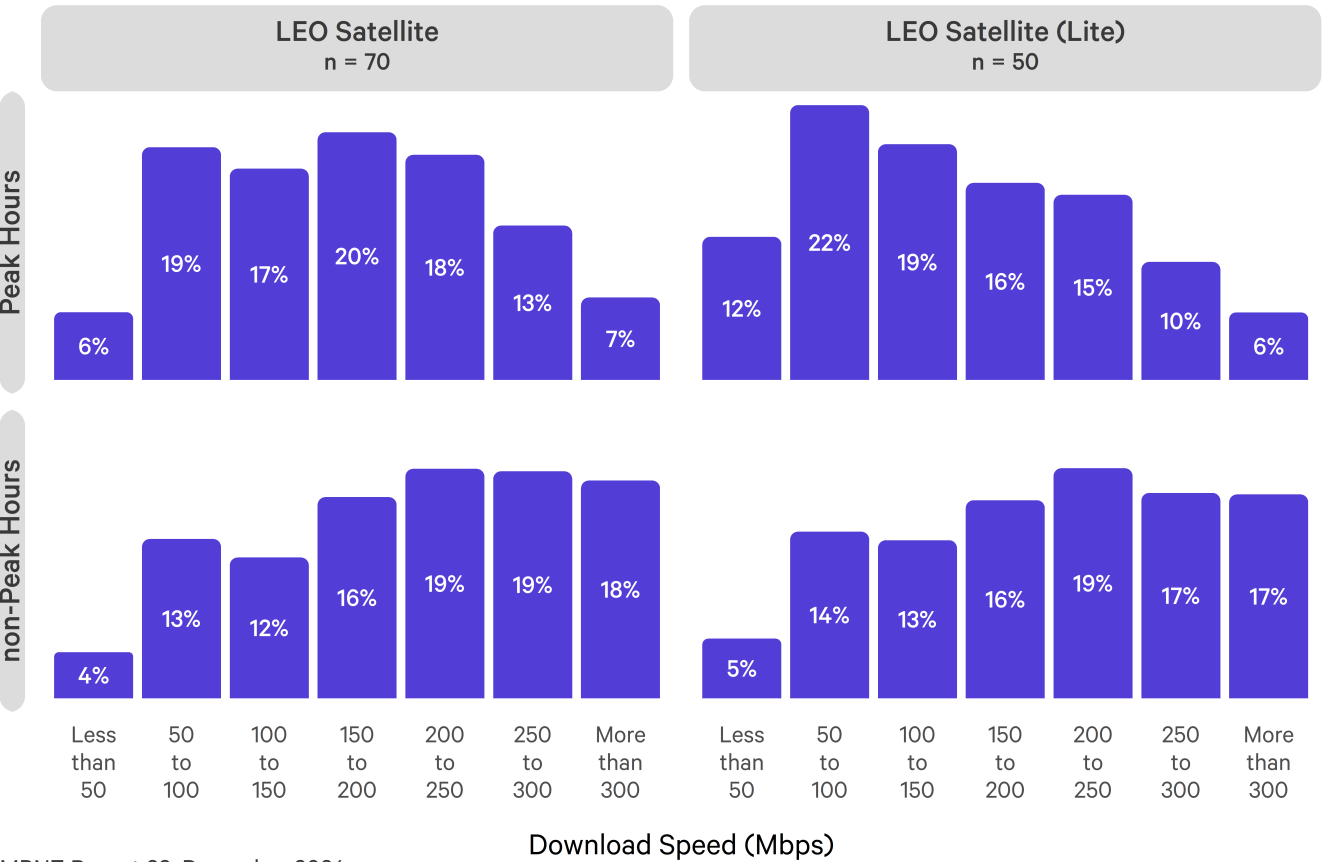
Key Observations

- The distribution of download tests for Spark 5G Max Wireless was broadly similar during peak hours compared to non-peak hours.
- During non-peak hours, 9% of tests resulted in download speeds below 100 Mbps, while during peak hours this figure rose to 12%. This is a large decrease compared to the previous report, likely due to changes in Spark's 5G customer base. The Spark 5G FWA sample has been reselected (and increased) for this report due to the number of eligible users being much higher and more geographically distributed than when it was first included.
- 64% of tests run during non-peak hours achieved download speeds above 300 Mbps. This decreased slightly to 62% during peak hours.
- During non-Peak hours, 23% of all embedded download speed tests run on Max Wireless plans achieved speeds greater than 500 Mbps, an increase compared to the previous report.

Distribution of LEO Satellite Results

Figure 10: Download Speeds on LEO Satellite Plans.

Distribution of test results across LEO Satellite households. Average (24/7) download speeds for LEO Satellite plans average 208 Mbps in non-Fibre areas on Starlink’s Residential plan and 196 Mbps on their Residential Lite plan; this varies over time.



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Key Observations

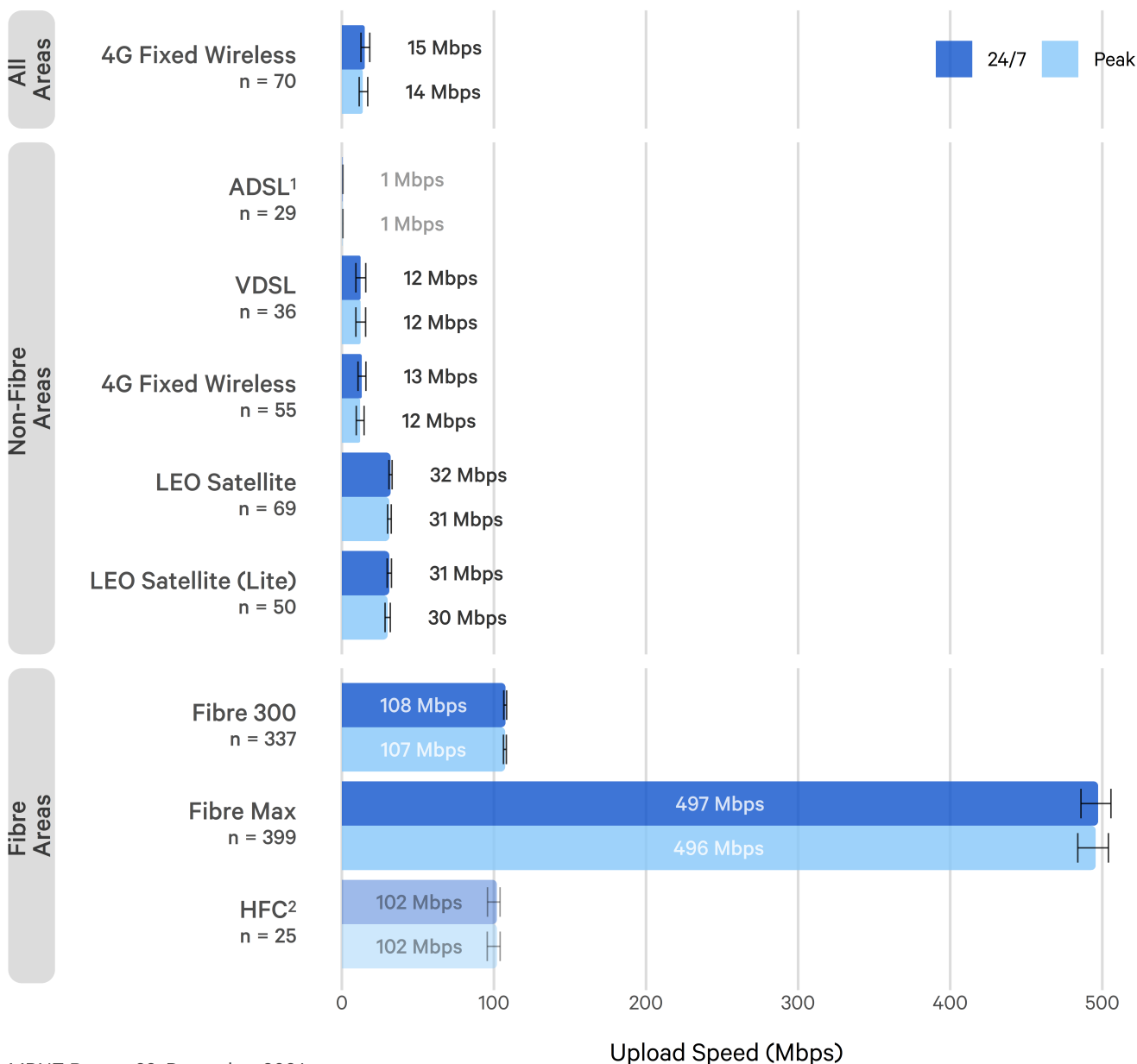
- Only 4% of speed tests run over Starlink’s Residential plan achieve download speeds of less than 50 Mbps, compared to 5% for Starlink’s Lite plan. During peak hours, this increased to 6% for the Residential plan, and 12% for the Residential Lite plan.
- During non-peak hours, 18% of download speed tests for the Residential plan reached speeds of 300 Mbps or higher, compared to 17% for the Residential Lite plan.

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 11: Average Upload Speeds by Plan

Average (24/7) 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 = 70). Error bars show 95% confidence intervals of the mean.



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¹ Results for ADSL are based on a sample size of 29 Whiteboxes. The low sample size can be attributed to volunteer numbers falling as consumers move away from copper services.

² Results for HFC are based on a sample size of 25 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.

Key Observations

- The average upload speeds are broadly consistent with those seen in the previous report.
- Average upload speeds for Fibre 50 are not included in this report due to different upload allocations across local fibre companies. There were not enough Whiteboxes on Fibre 50 to split upload results by local fibre company.

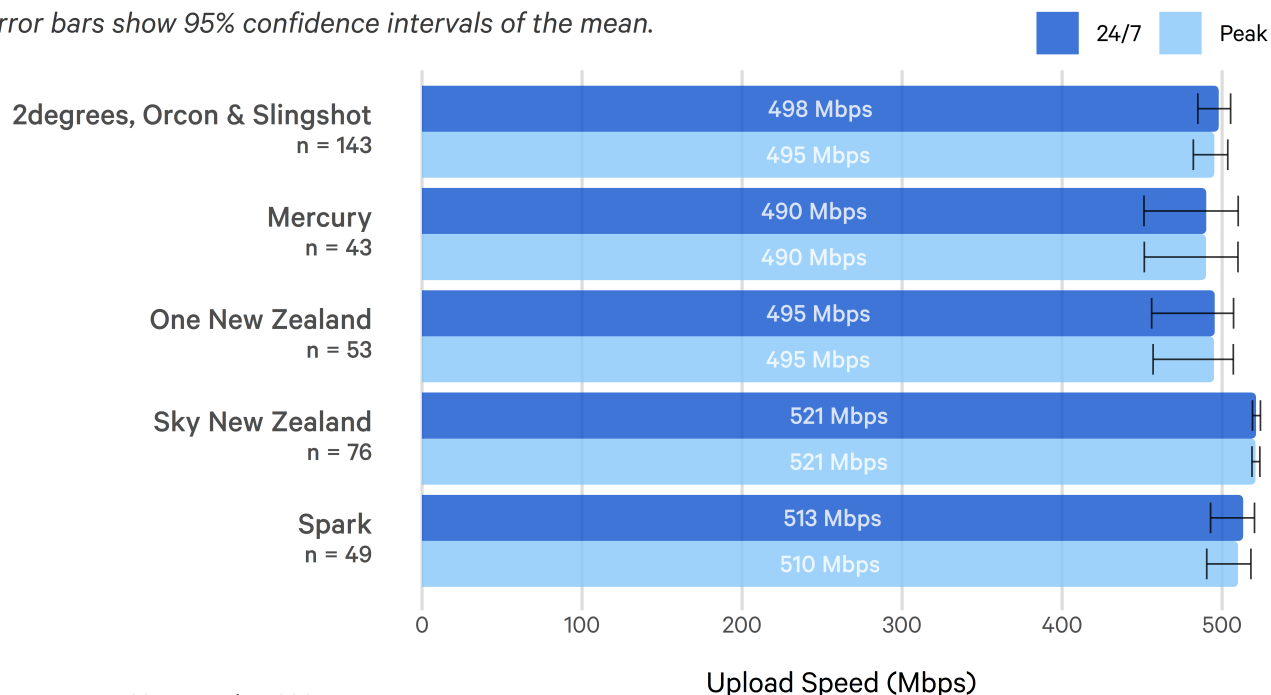
Fibre Max Breakdown by RSP

Figure 12: Average Fibre Max Upload 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 = 143).

Error bars show 95% confidence intervals of the mean.



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Key Observations

- All RSPs achieved average upload results above 490 Mbps, with Sky New Zealand and Spark achieving average speeds above 500 Mbps.
- Upload speeds were consistent during peak hours, with all RSPs only showing the same or a very small decrease in speed compared to their all hours result.
- There were not enough Fibre Max volunteers on Contact Energy, Electric Kiwi, NOW NZ or PureLink during the measurement period to report results for these RSPs. All tested RSPs are included in the overall Fibre Max results shown in Figure 11.

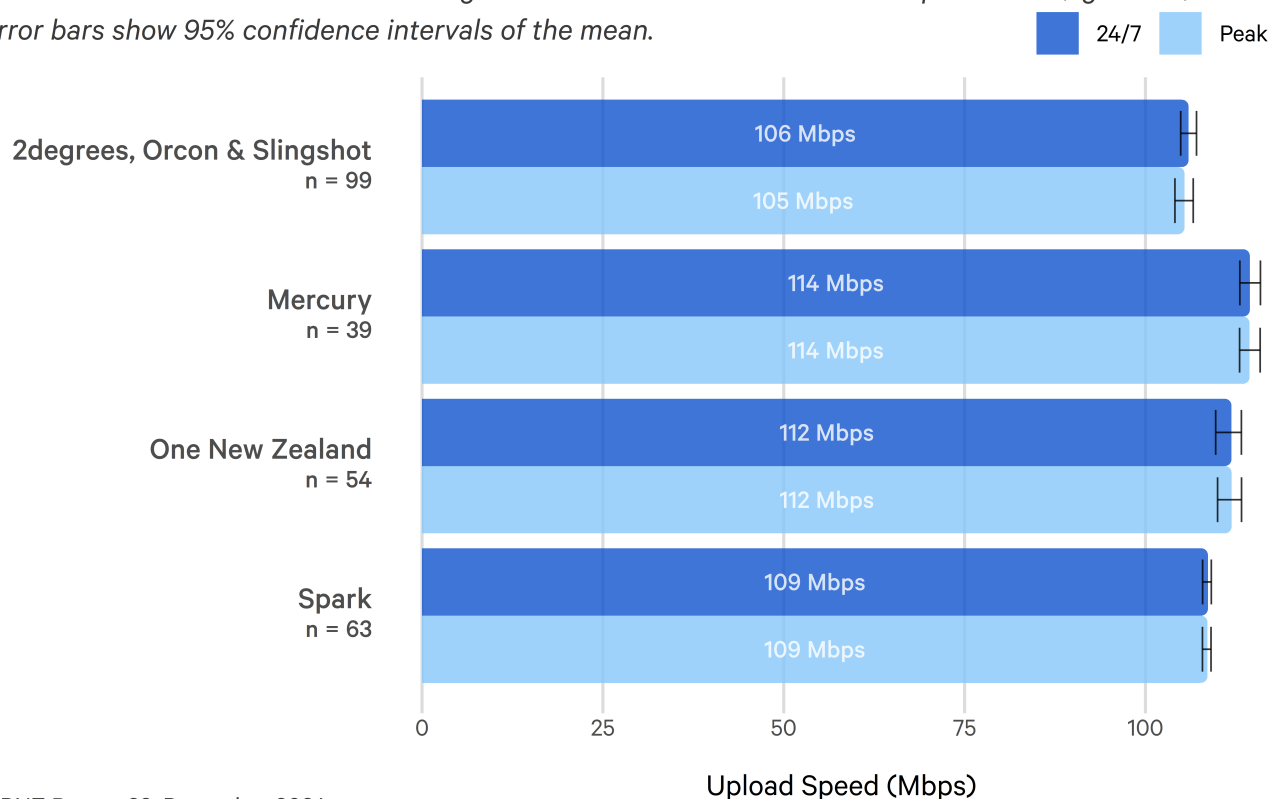
Fibre 300 Breakdown by RSP

Figure 13: Comparison of Average Fibre 300 Upload 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 = 99)

Error bars show 95% confidence intervals of the mean.



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Key Observations

- All RSPs achieved average upload results above 100 Mbps.
- Upload speeds were consistent during peak hours, with no noticeable drop compared to average upload speeds across all hours.
- There were not enough volunteers on Contact Energy, Electric Kiwi, Inspire Net, Mercury, NOW NZ, Sky New Zealand or Wireless Nation to report results. All tested RSPs are included in the overall Fibre 300 results shown in Figure 1.

Spark Fixed Wireless Embedded Upload Speeds

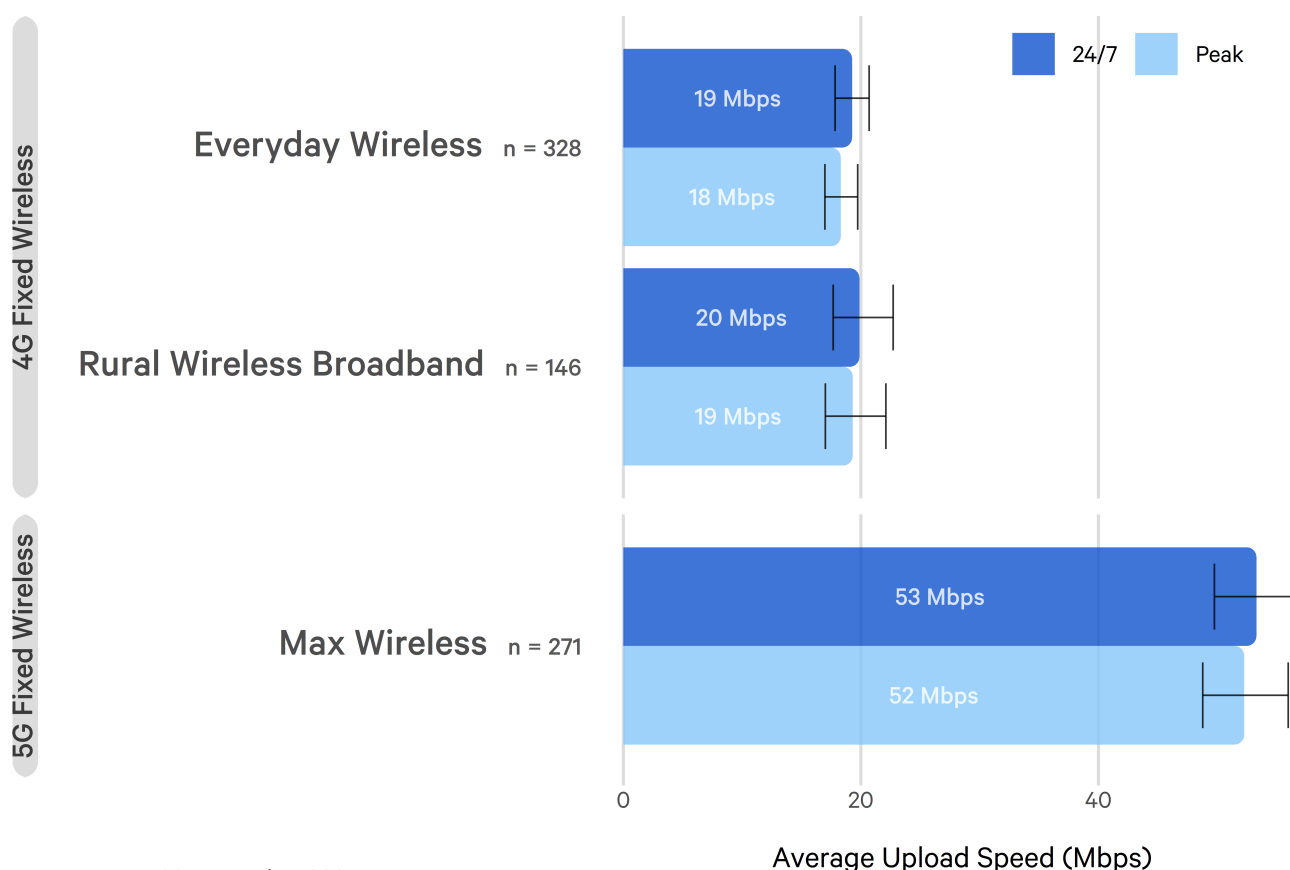
The results below are for some of Spark's 4G Fixed Wireless and 5G Fixed Wireless plans. More information on Spark's embedded testing can be found on [page 14](#).

Figure 14: Average Upload Speeds for Spark Fixed Wireless Plans.

Average of monthly household weighted averages. Peak hours are Monday - Friday, 7pm - 11pm.

The number of embedded agents contributing to each result is shown under each plan name (eg n = 328).

Error bars show 95% confidence intervals of the mean.



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Key Observations

- There is minimal difference in average upload speeds between Spark 4G Everyday Wireless and Rural Wireless Broadband, with both plans seeing no noticeable decrease in upload speeds during peak hours.
- The average upload speed measured for Spark's Max Wireless 5G Plan was 53 Mbps during all hours, showing no noticeable decrease during peak hours.

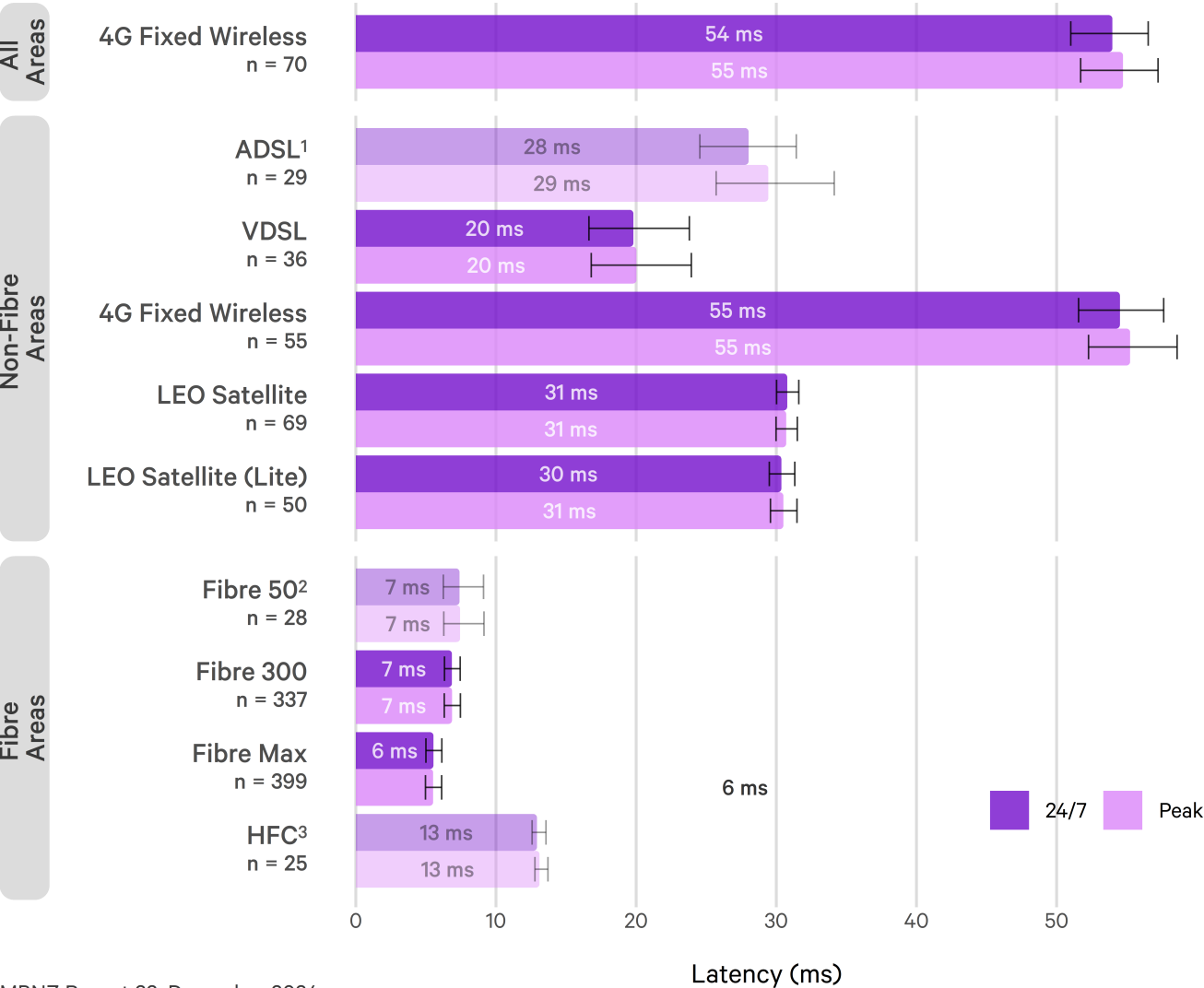
Latency

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 15 only includes results relating to servers hosted in New Zealand.

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.

Figure 15: 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 = 70). Error bars show 95% confidence intervals of the mean.



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Latency Under Load

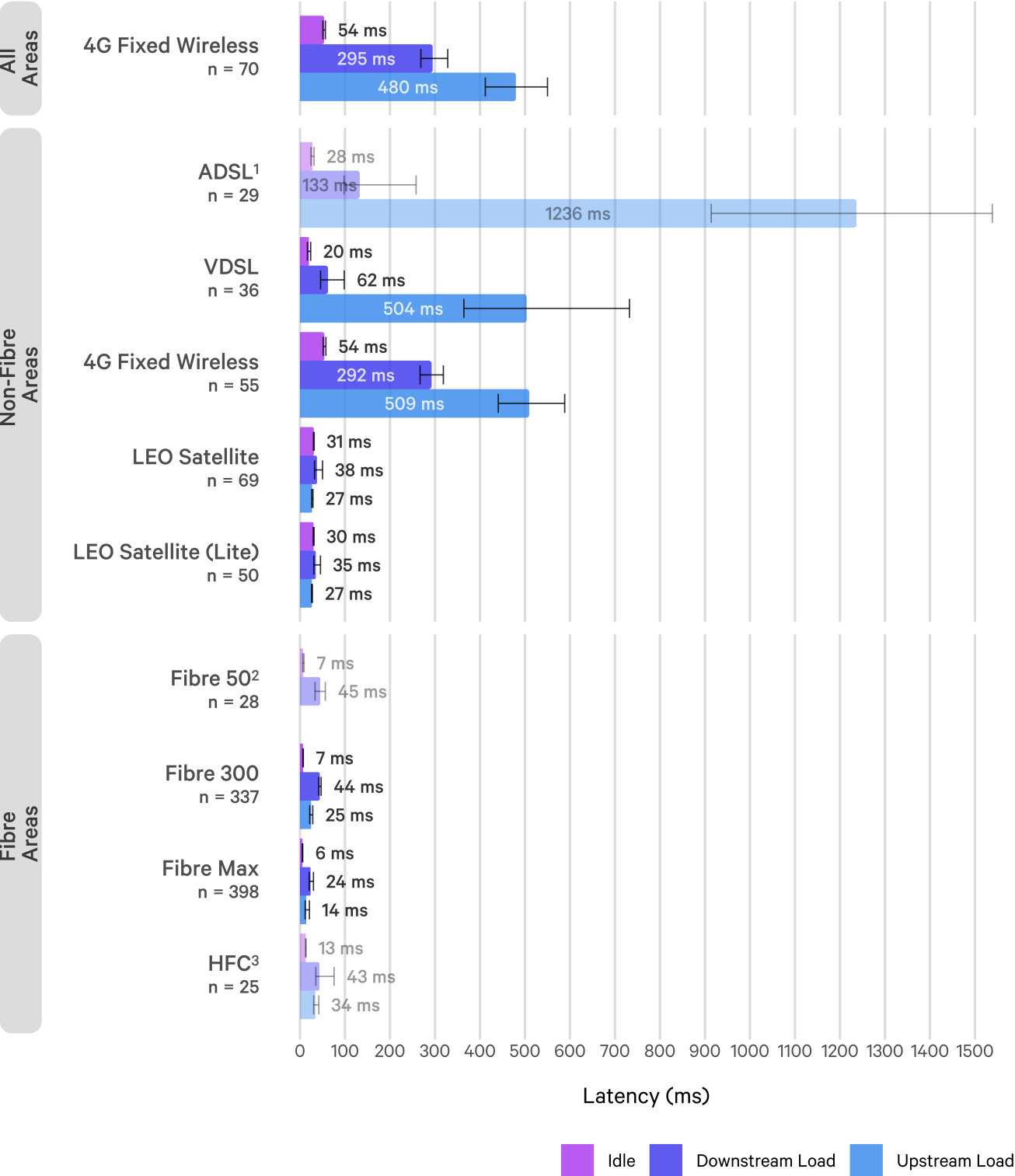
The latency under load test measures the latency when the broadband connection is heavily utilised (by the way of a speed test run in parallel). This is more representative of user experience than idle latency as it shows the impact of downloading or uploading data to the internet (e.g. watching Netflix 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 or some video games.

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.

Figure 16: Average Latency Under Load to Test Servers by Plan.
Lower is Better.

Averages of monthly household averages. The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 70).



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¹ Results for ADSL are based on a sample size of 29 Whiteboxes. The low sample size can be attributed to volunteer numbers falling as consumers move away from copper services.

² Results for Fibre 50 are based on a sample size of 28 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

³ Results for HFC are based on a sample size of 25 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.

Key Observations

- Idle latency over Fixed Wireless is higher than over Copper (ADSL, VDSL), Cable (HFC), or Fibre (Fibre 50, Fibre 300, Fibre Max). Fibre is faster due to both the lower latency over Fibre optics and the more recent infrastructure that underpins the Fibre network.
- All plans see latency increase when the line is running upload or download tests compared to when the line is idle. ADSL and 4G 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.
- Average latency under upload results for Fibre 50 are not included in this report due to different upload allocations across local fibre companies. There were not enough Whiteboxes on Fibre 50 to split upload results by local fibre company.
- Latency under downstream and upstream load is higher for the Fibre 300 plan compared to Fibre Max results. Fibre Max plans have lower latency results for latency under downstream and upstream load than HFC.
- LEO Satellite plans see a small increase in latency under load when download tests are running. Latency under upload shows a smaller increase on idle latency for satellite plans. While idle latency for satellite is higher than Copper (ADSL and VDSL), latency under downstream load is significantly lower for LEO Satellite than ADSL, and latency under upstream load is also lower for LEO Satellite than both ADSL and VDSL.

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 daily disconnection rates across plans.

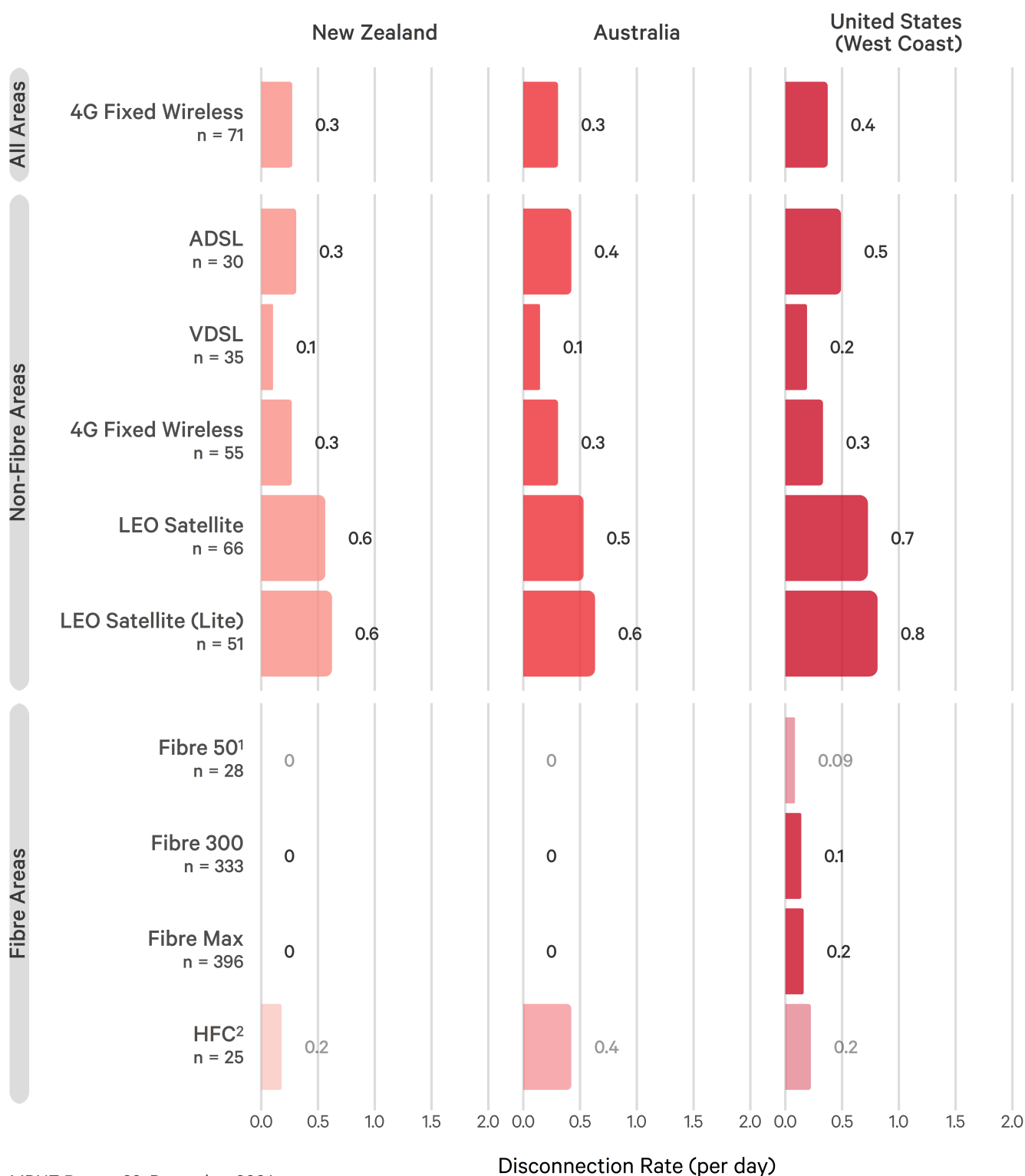
This graph shows medians across households. Taking VDSL as an example, 50% of households will experience no more than 1.7 disconnections per day for traffic remaining within New Zealand. This obscures the extremes of performance for each plan. While the median ADSL and Fixed Wireless results are comparable, 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.

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.

Figure 17: Median Daily Disconnection Rates. Lower is Better.

Medians of household daily rates. Disconnections greater than 30 seconds.

Testing only covers periods where the line is idle.



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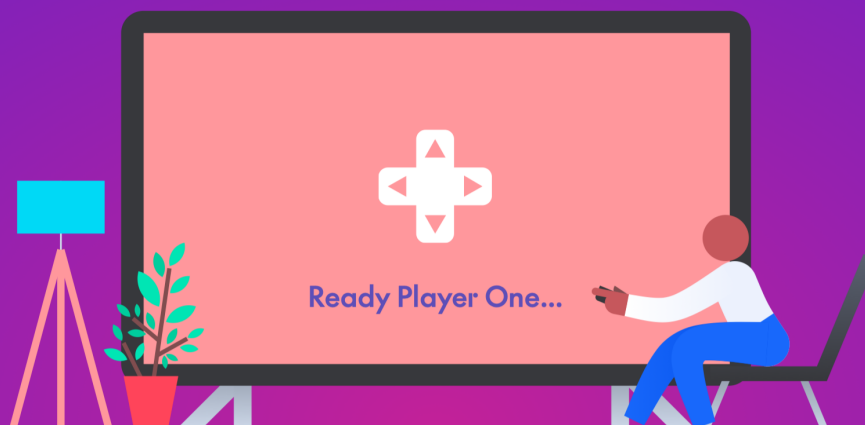
Disconnection Rate (per day)

¹ Results for Fibre 50 are based on a sample size of 28 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

² Results for HFC are based on a sample size of 25 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.

Key Observations

- Previous MBNZ reporting on disconnections defined a disconnection as two or more packets failing to complete a full round trip in a row. This meant previous reporting included many brief disconnections which consumers were probably unlikely to notice. This chart now categorises a disconnection as lasting longer than 30 seconds. This change aims to provide more consumer-relevant data as disconnections reported here are likely to be more noticeable to consumers. Most households now see a very low rate of noticeable disconnections, at least while the line is idle.
- There is a very low median rate of disconnection across Fibre plans. This rises slightly for HFC, and VDSL.
- Median disconnections for LEO Satellite plans are 0.6 to servers across New Zealand. This means that 50% of households will experience no more than 0.6 disconnections per day lasting over 30 seconds.
- Traffic going overseas is more likely to be lost than traffic remaining within New Zealand.



Application Performance

In this section we report on the performance of a number of common applications that consumers in New Zealand use on a regular basis.

Some results in this section are shown with error bars representing the 95% confidence interval for each plan. The transparent bars 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.

Netflix

Video streaming is a good example of an application where the quality of a user's experience is more affected by bandwidth (capacity) than by latency (lag). The Netflix measurement streams real video from the live Netflix service ¹. Traffic for this service is often delivered from within broadband provider's network to improve performance. The transparent screens show plans with a sample size lower than we would typically include within reporting.

¹ This test runs on an idle connection, results may be affected with simultaneous usage. HD is measured at 3 Mbps, and UHD at 15 Mbps in accordance with Netflix guidelines.

Figure 18:

% that can Reliably Stream HD & UHD Videos from Netflix during Peak Hours.

Plan

ADSL

Non-Fibre Areas, n = 30



7%



0%



0%



0%

0 simultaneous UHD video streams



83%



63%



37%



27%

1-2 simultaneous HD video streams

VDSL

Non-Fibre Areas, n = 37



86%



54%



32%



19%

1-2 simultaneous UHD video streams



100%



100%



95%



86%

4+ simultaneous HD video streams

LEO Satellite

Non-Fibre Areas, n = 71



100%



90%



42%



0%

1-2 simultaneous UHD video streams

LEO Satellite (Lite)

Non-Fibre Areas, n = 51



98%



61%



12%



2%

1-2 simultaneous UHD video streams

Fibre 50¹

Fibre Areas, n = 28



100%



100%



100%



0%

2-3 simultaneous UHD video streams

Fibre 300

Fibre Areas, n = 334



100%



100%



100%



100%

4+ simultaneous UHD video streams

Fibre Max

Fibre Areas, n = 404



100%



100%



100%



100%

4+ simultaneous UHD video streams

HFC²

Fibre Areas, n = 25



100%



100%



100%



100%

4+ simultaneous UHD video streams

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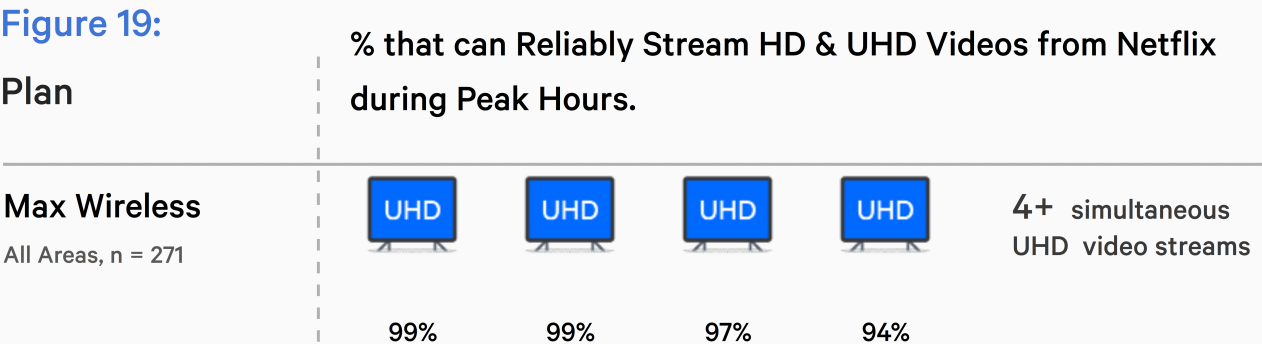
¹ Results for Fibre 50 are based on a sample size of 28 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

² Results for HFC are based on a sample size of 25 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.

Key Observations

- Previous MBNZ reports on Netflix performance provided data for a 24/7 period. For the first time, this chart now focuses on peak hours (7pm-11pm) to make it more relevant to consumers.
- During peak hours, 90% of LEO Satellite households on Starlink's Residential plan were able to stream 2 simultaneous UHD Netflix streams, compared to 61% on the Residential Lite plan.
- 100% of households on Fibre 50 were able to stream 3 simultaneous UHD Netflix streams. No households on Fibre 50 achieved download speeds high enough to support 4 simultaneous UHD streams.
- 100% of households on Fibre 300, Fibre Max or HFC plans had an average download speed able to support 4 simultaneous UHD Netflix streams.
- 86% of households on VDSL plans in non-Fibre areas were able to support a single UHD stream, and 86% could support 4 simultaneous HD streams. For ADSL households in non-Fibre areas, only 7% were able to support a single UHD stream during peak hours, while 37% could support 3 simultaneous HD streams.
- There were not enough tests run across 4G Fixed Wireless households to report peak time results for Netflix. Results for 4G Fixed Wireless plans are expected to be included in the next MBNZ report.

Some application performance results for Spark’s 5G Max Wireless plan are included for the first time. This marks the first insight into application performance for 5G Fixed Wireless technology within the MBNZ programme. Given that each RSP has different fixed wireless infrastructure, these results should not be directly compared across RSPs.



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Key Observations

- This is the first time Netflix performance results for Spark’s 5G Max Wireless plan are included in a MBNZ report.
- This chart focuses on peak hours (7pm-11pm) to make it more relevant to consumers. During peak hours, 94% of Spark units were able to support 4 simultaneous UHD Netflix streams.

Game Stores

Modern console games are delivered from online stores such as Steam, Xbox Live and PlayStation Network. These games can be tens or even hundreds of gigabytes so achieving high throughput from these stores is important to gamers. The game store measurement downloads a portion of a real game from three different game stores¹. Results will depend on the content distribution networks (CDNs) that host the games, and can vary depending on your RSP and where the CDNs are located.

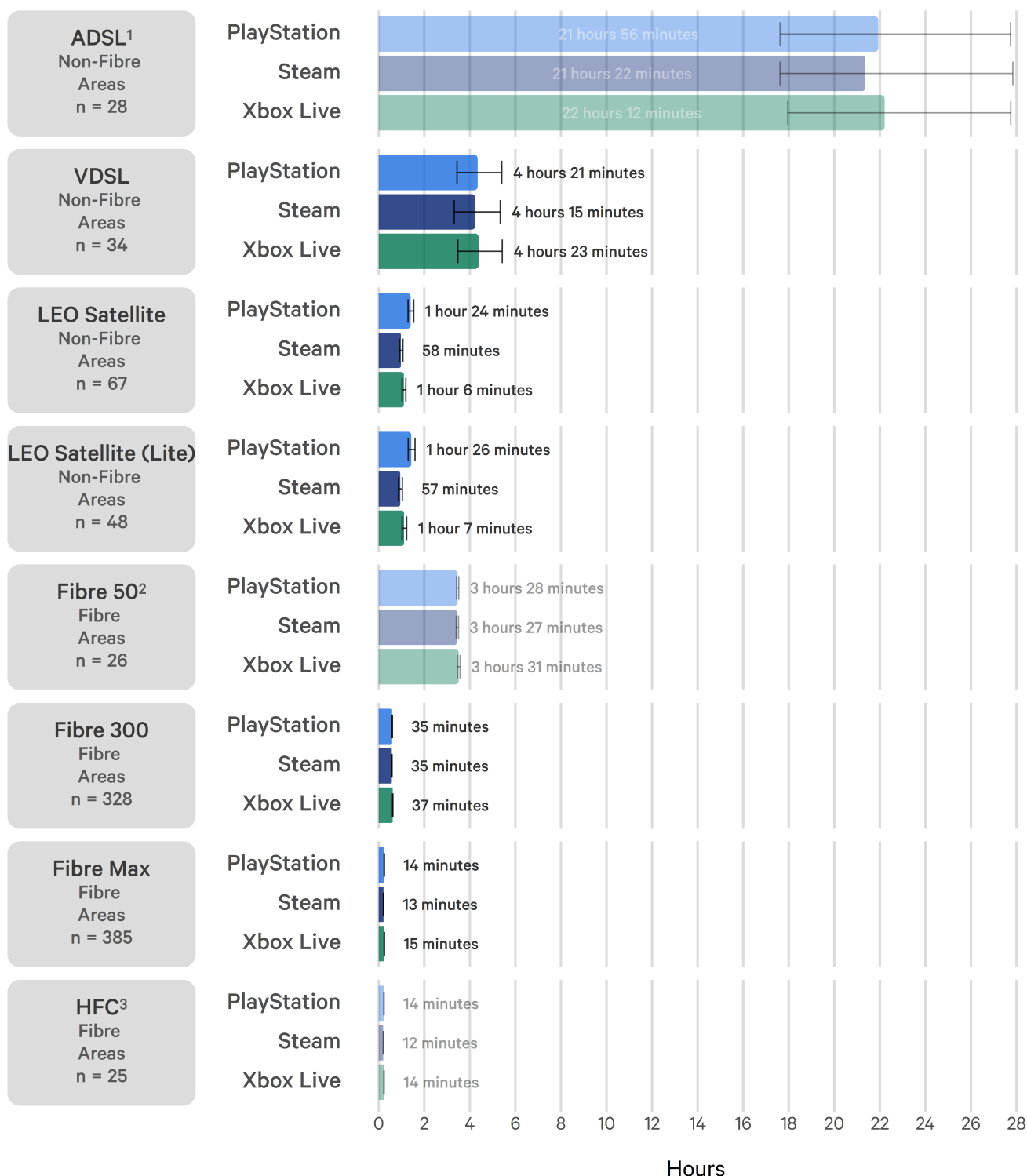
¹ This test runs on an idle connection, results may be affected with simultaneous usage.

Figure 20: Average Time Taken to Download Hogwarts Legacy by Plan during Peak Hours.

Average time taken to download a file of 79.5 GB.

Average of household average download speed, lower is better.

The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 28).



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¹ Results for ADSL are based on a sample size of 28 Whiteboxes. The low sample size can be attributed to volunteer numbers falling as consumers move away from copper services.

² Results for Fibre 50 are based on a sample size of 26 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

³ Results for HFC are based on a sample size of 25 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.

Key Observations

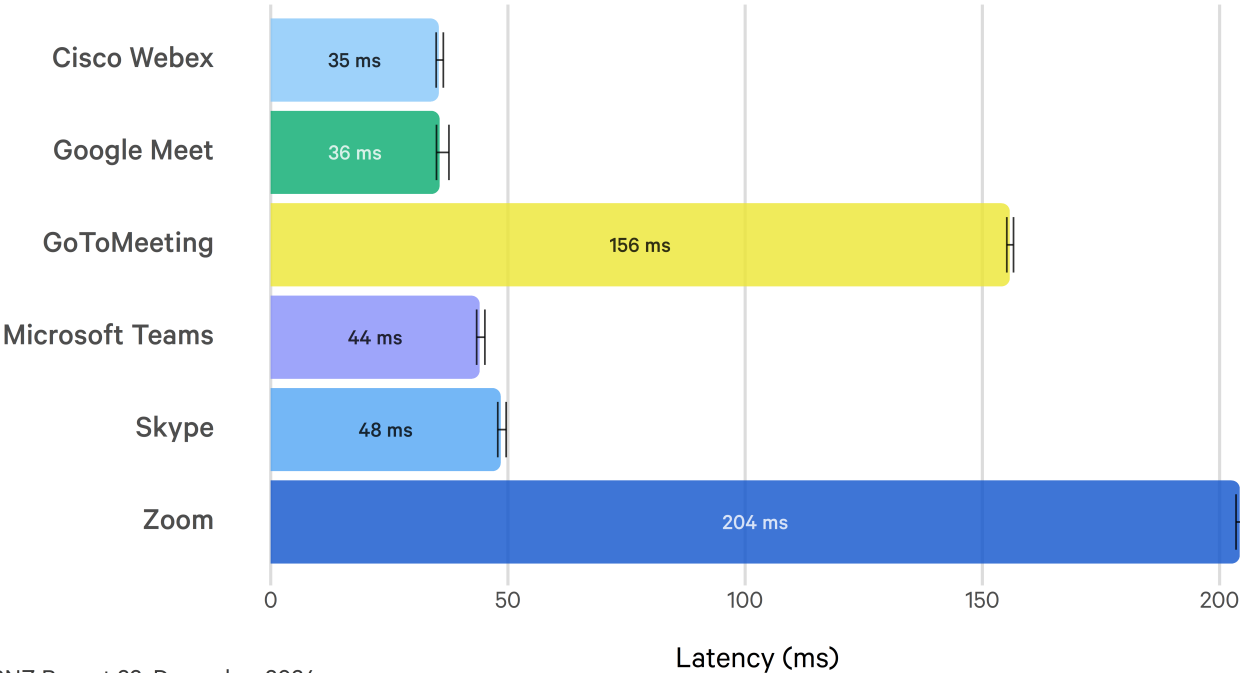
- Previous MBNZ reports on Game Store download performance provided data for a 24/7 period. For the first time, this chart now focuses on peak hours (7pm-11pm) to make it more relevant to consumers.
- Even with the shift to a peak hour focus, the results for all plans in this chart remain broadly consistent with those in the previous report.
- The average time taken to download Hogwarts Legacy was over 21 hours for ADSL plans across all game store providers. For VDSL and Fibre 50 this average was between 3 to 4 hours.
- LEO Satellite plans had average download speeds capable of downloading Hogwarts Legacy in around 1 hour across both Starlink's Residential and Residential Lite plan.
- Fibre 300 had average download speeds capable of downloading Hogwarts Legacy in under 40 minutes all game store providers tested, and for Fibre Max and HFC Max this was 15 minutes or less.
- Results for 4G Fixed Wireless are not included due to the data usage volumes used to run the test.

Video Conferencing

Latency is not the only factor impacting on the quality of a video call. Packet loss and jitter can result in stuttering and dropouts, and these are not captured in the round-trip times measured here. Application specific attributes such as audio/video encoding and proprietary communication protocols can lead to different performance characteristics for different services.

Figure 21: The Latency to Servers of Different Video Conferencing Services.

*Results are using free accounts only.
Average of household average latency, lower is better. Fibre plans only.*



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Key Observations

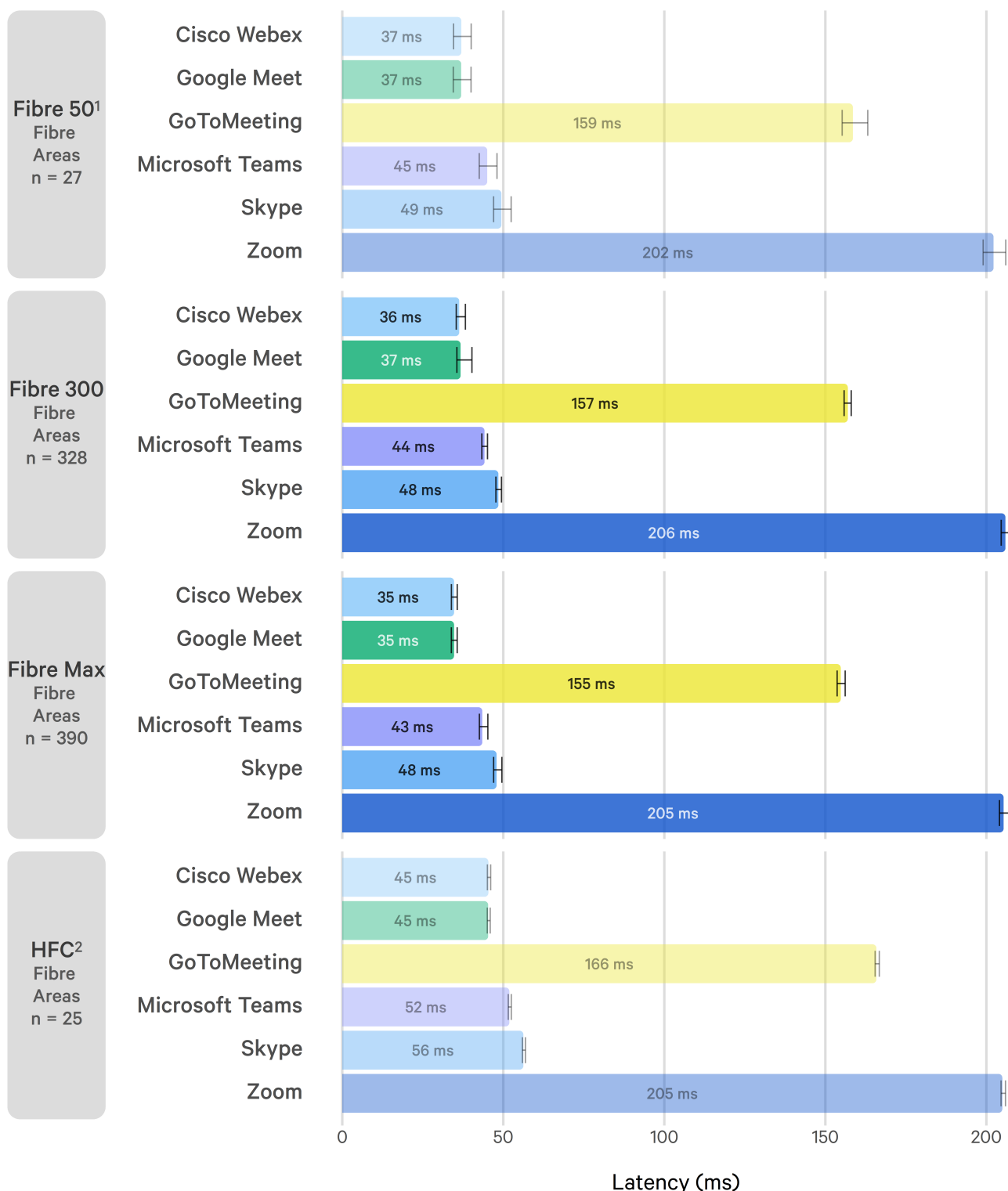
- All video conferencing results are included for a reduced period of the 1st to the 11th of October. This is due to configuration changes made during the latter half of October.
- Latency values for all video conferencing services remained consistent for Fibre plans compared to the previous report.
- Video conferencing services that use international servers usually see similar performance, however as the traffic is travelling further and subject to international routing, this could account for small differences in consumer experience like users talking over one another more frequently when using these unpaid services.
- The latency results above are shown for Fibre plans only. Results for video conferencing split by individual plans can be seen in the figure below, and results for all RSPs can be seen in Table 5.

Figure 22: The Latency to Servers of Different Video Conferencing Services by Plan.

Fibre Areas only. Results are using free accounts only.

Average of household average latency, lower is better.

The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 27).



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Latency (ms)

¹Results for Fibre 50 are based on a sample size of 27 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

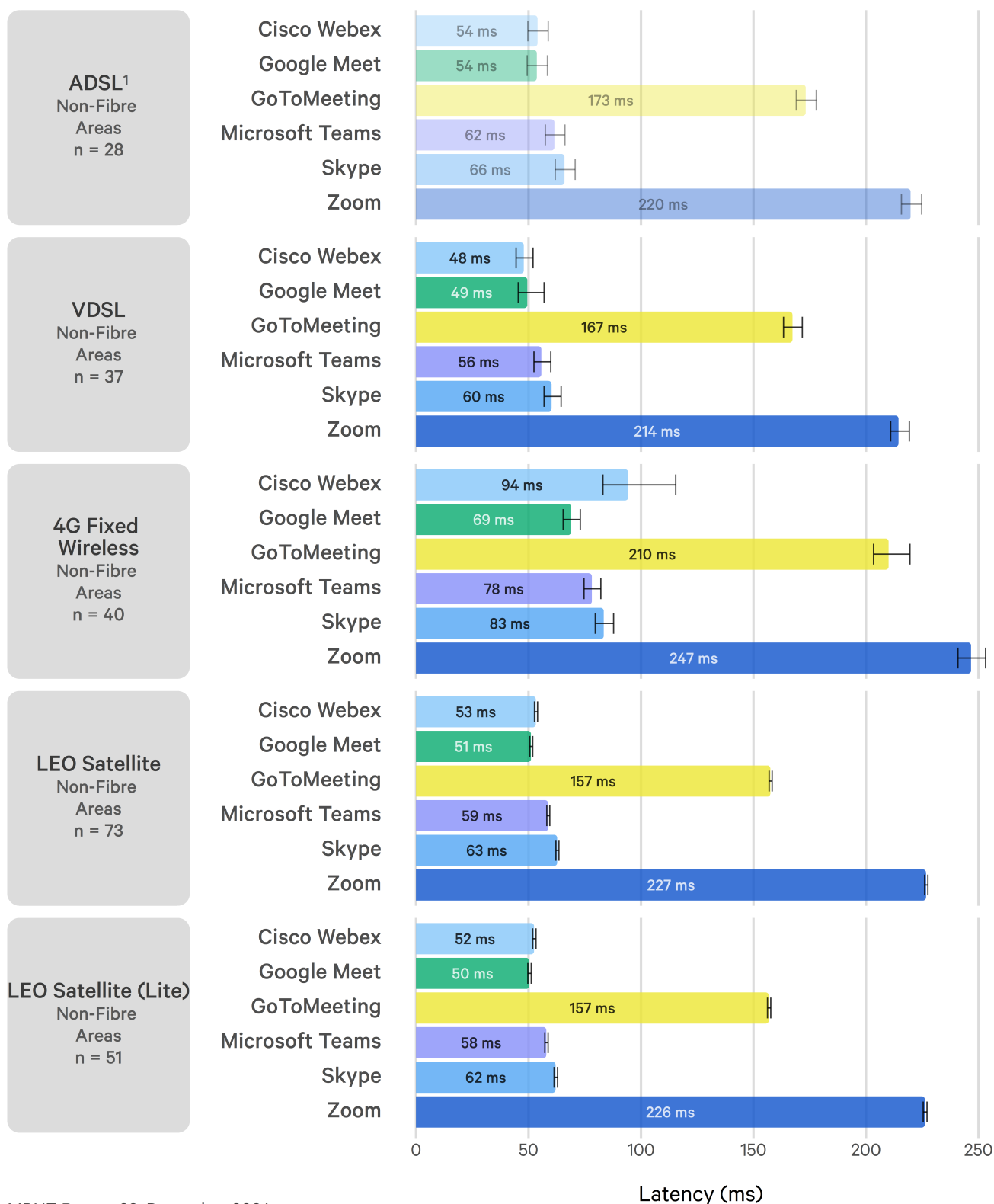
²Results for HFC are based on a sample size of 25 Whiteboxes. The low sample size can be attributed to the relatively small coverage area of One New Zealand's Cable network and the competing influence of Copper, Fibre and Fixed Wireless in those areas.

Figure 23: The Latency to Servers of Different Video Conferencing Services by Plan.

Fibre Areas only. Results are using free accounts only.

Average of household average latency, lower is better.

The number of Whiteboxes contributing to each result is shown under each plan name (eg n = 28).



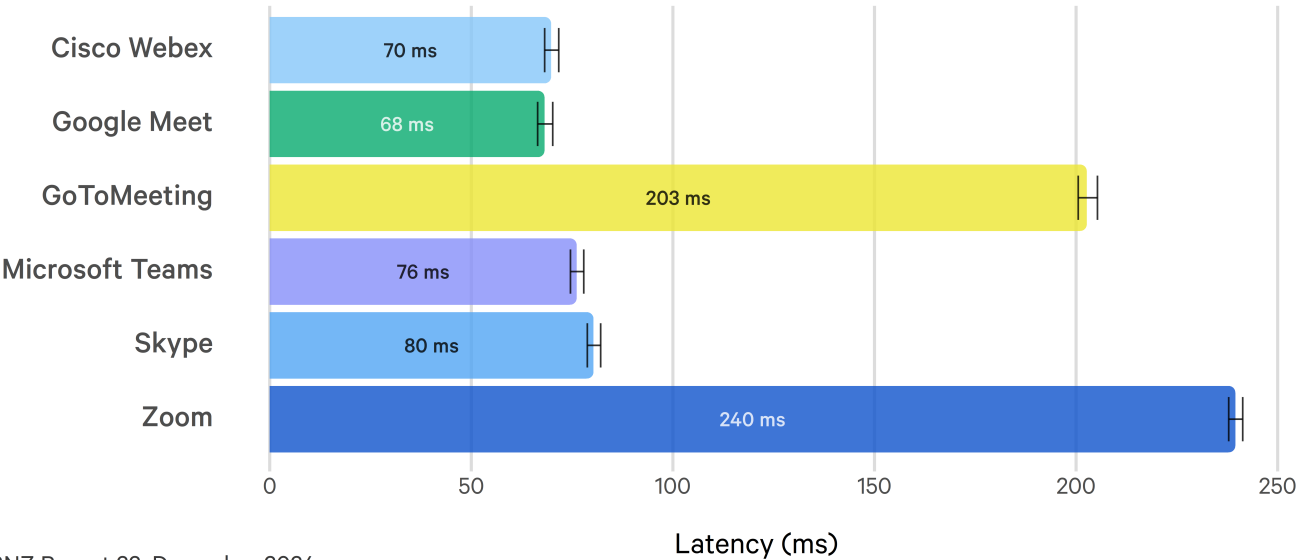
MBNZ Report 22, December 2024

Latency (ms)

Some application performance results for Spark’s 5G Max Wireless plan are included for the first time. This marks the first insight into application performance for 5G fixed wireless technology within the MBNZ programme. Given that each RSP has different fixed wireless infrastructure, these results should not be directly compared across RSPs.

Figure 24: The Latency to Servers of Different Video Conferencing Services for Spark’s 5G Fixed Wireless plan.

Results are using free accounts only.
Average of household average latency, lower is better.



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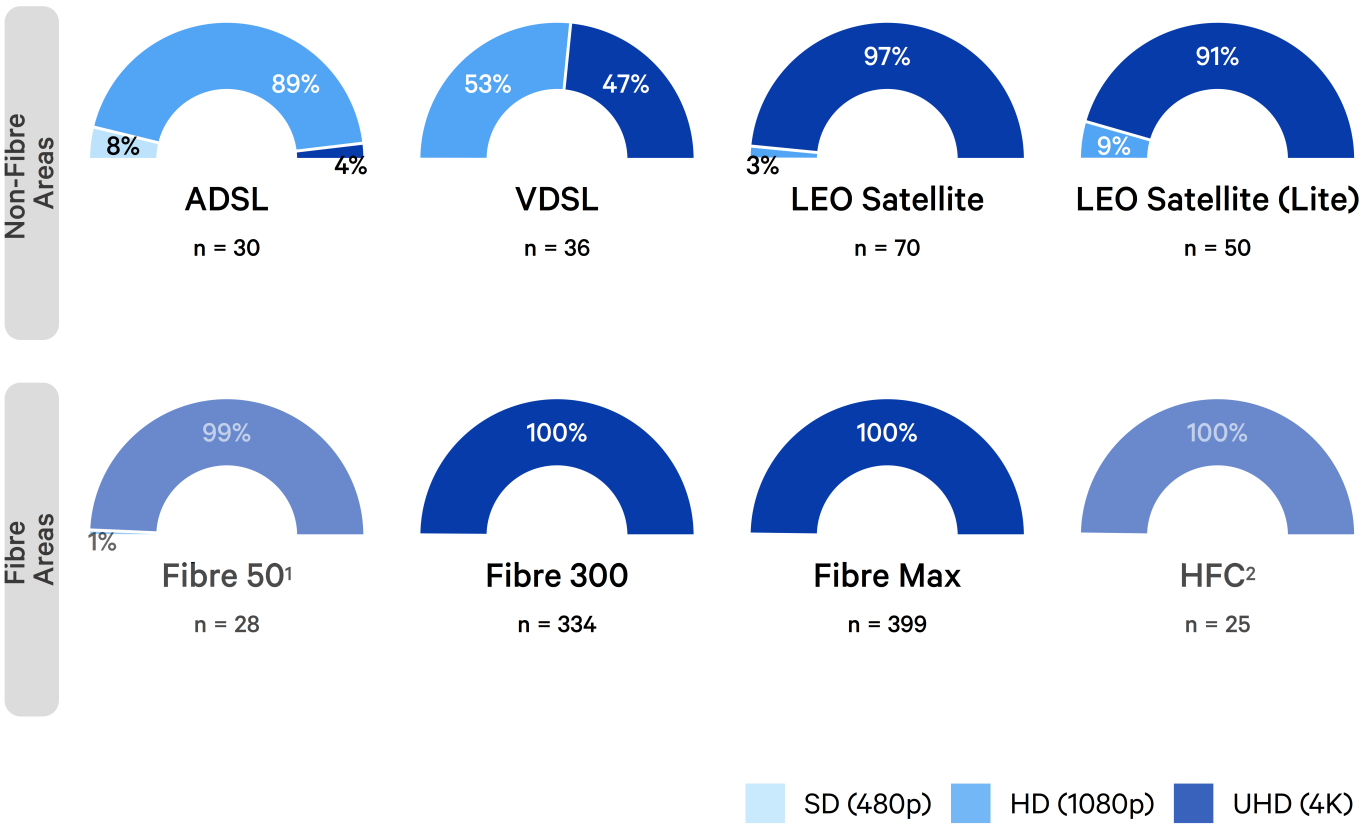
Key Observations

- All video conferencing results are included for a reduced period of the 1st to the 11th of October. This is due to configuration changes made during the latter half of October.
- This is the first time results for video conferencing services for Spark’s 5G Max Wireless plan are included in a MBNZ report.

YouTube

The YouTube measurement streams a real video from the live YouTube service⁴. Traffic for this service is often delivered from within the broadband provider’s networks, through the use of Google Global Caches (GGCs). These are servers installed by the broadband provider inside their network to cache YouTube and other Google content to improve performance.

Figure 25: Highest Quality that can be streamed over YouTube by Plan during Pea



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¹ Results for Fibre 50 are based on a sample size of 28 Whiteboxes in Fibre areas. The lower sample size can be attributed to Fibre 50 being a new area of focus for the MBNZ programme and we hope to increase this number for subsequent reports.

² Results for HFC are based on a sample size of 25 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.

³ This test runs on an idle connection, results may be affected with simultaneous usage.

Key Observations

- Previous MBNZ reports on YouTube performance provided data for a 24/7 period. For the first time, this chart now focuses on peak hours (7pm-11pm) to make it more relevant to consumers.
- 47% of VDSL households in non-Fibre areas were able to stream an UHD video, compared to just 4% of ADSL households.
- 97% of Starlink Residential LEO Satellite households, and 91% on the Residential Lite service were able to stream a UHD YouTube video.
- Over 99% of Fibre 50, Fibre 300, Fibre Max and HFC households in Fibre areas were able to stream a UHD YouTube video.



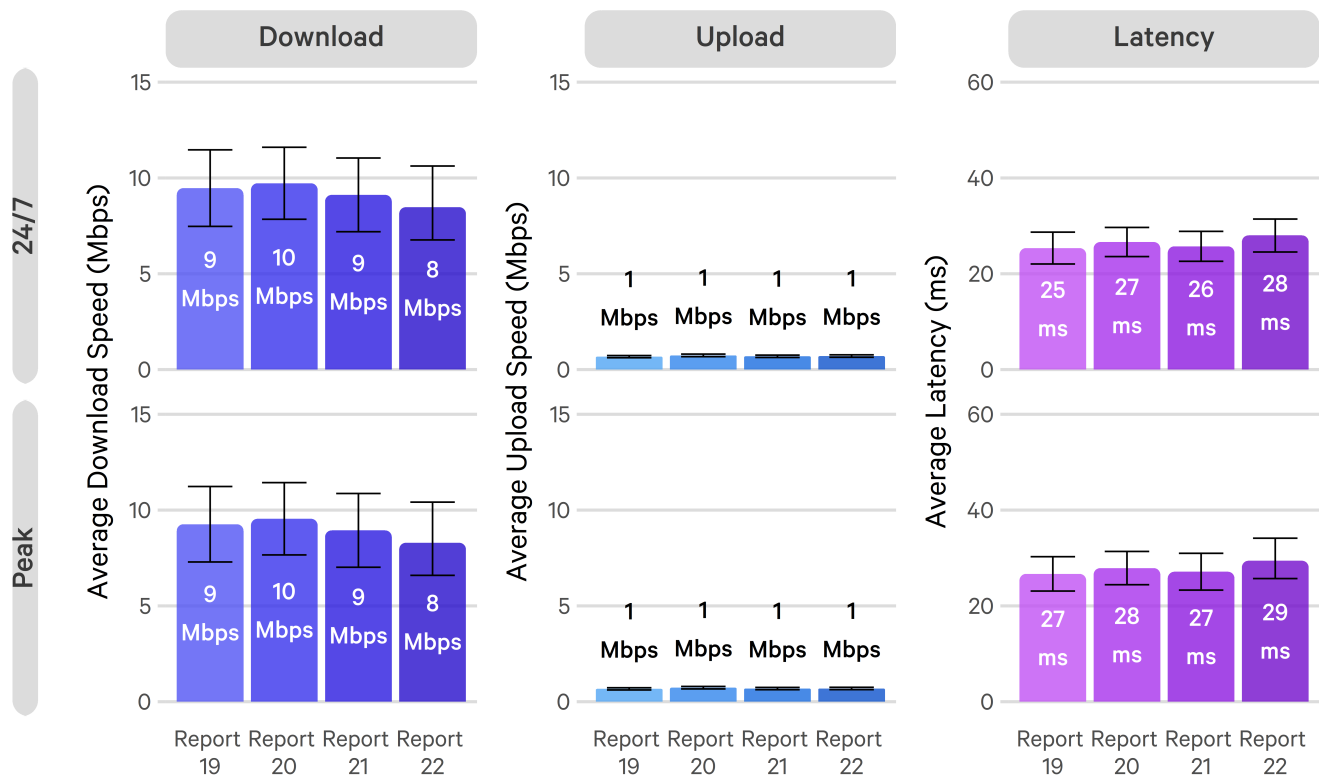
Previous Report Comparison

The following charts compare results from previous MBNZ reports across the past year for popular plans in New Zealand for quality of service metrics (download, upload and latency). ADSL, VDSL, Fibre 300 and Fibre Max plans have all seen consistent performance across reports. 4G Fixed Wireless and LEO Satellite plans have seen increases in average download speeds across the past year, with consistent upload and latency performance.

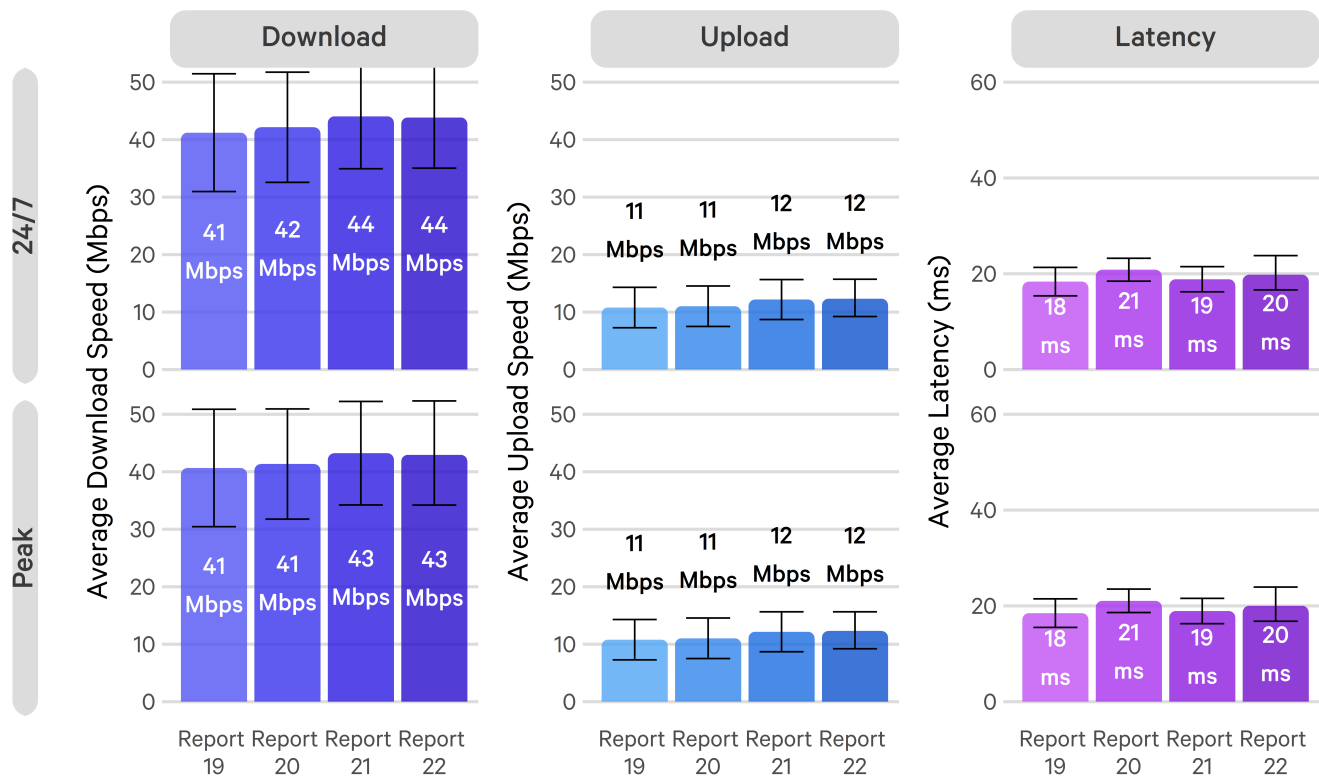
Table 1: Previous MBNZ Reports

MBNZ Report	Measurement Month	Publication Month
Report 19	January 2024	April 2024
Report 20	April 2024	July 2024
Report 21	July 2024	September 2024
Report 22	October 2024	December 2024

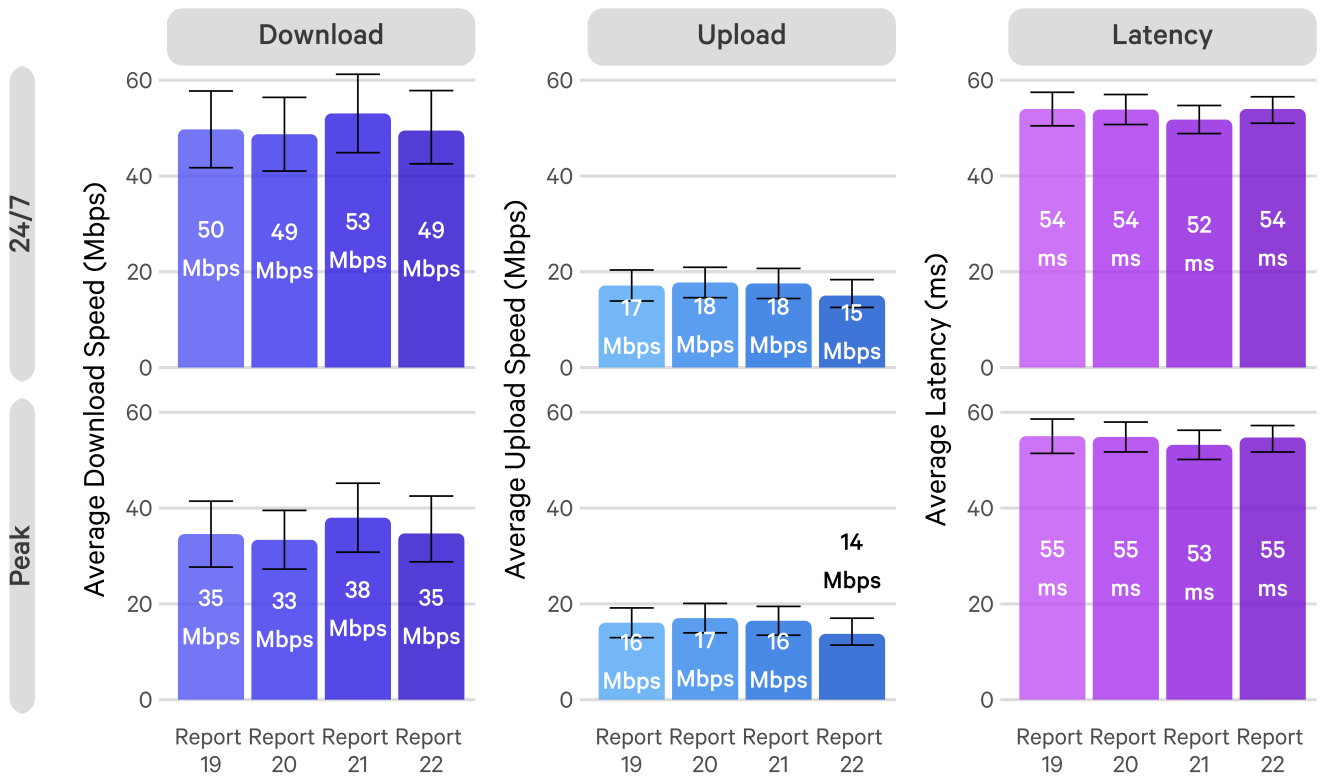
ADSL Performance across Reports



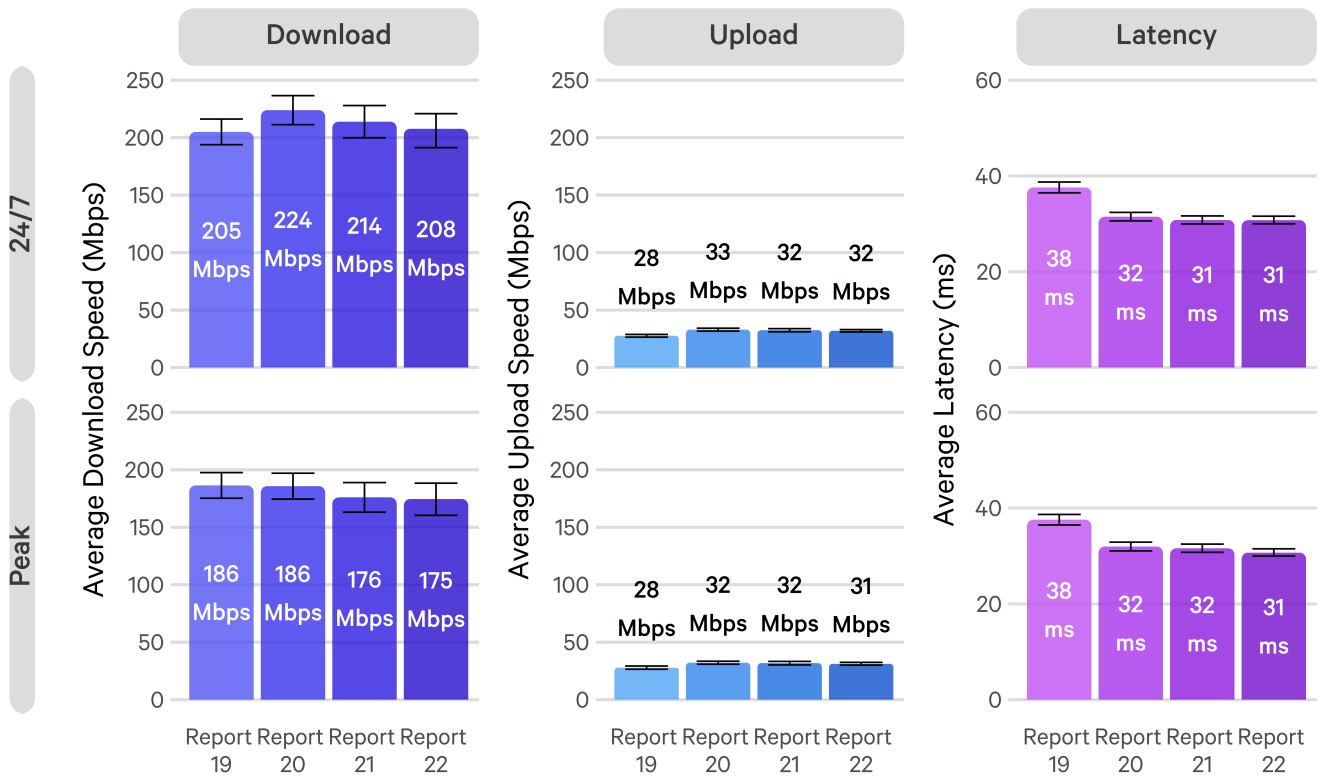
VDSL Performance across Reports



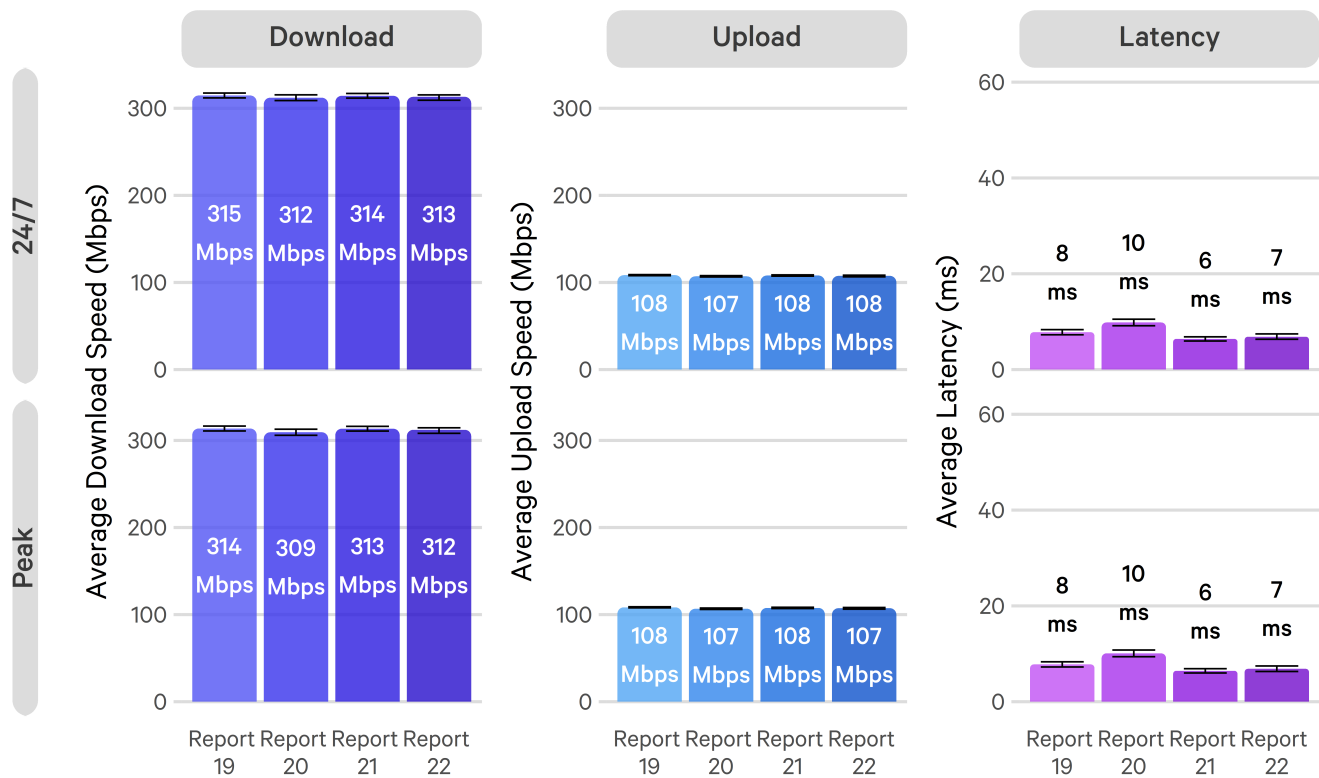
4G Fixed Wireless Performance across Reports



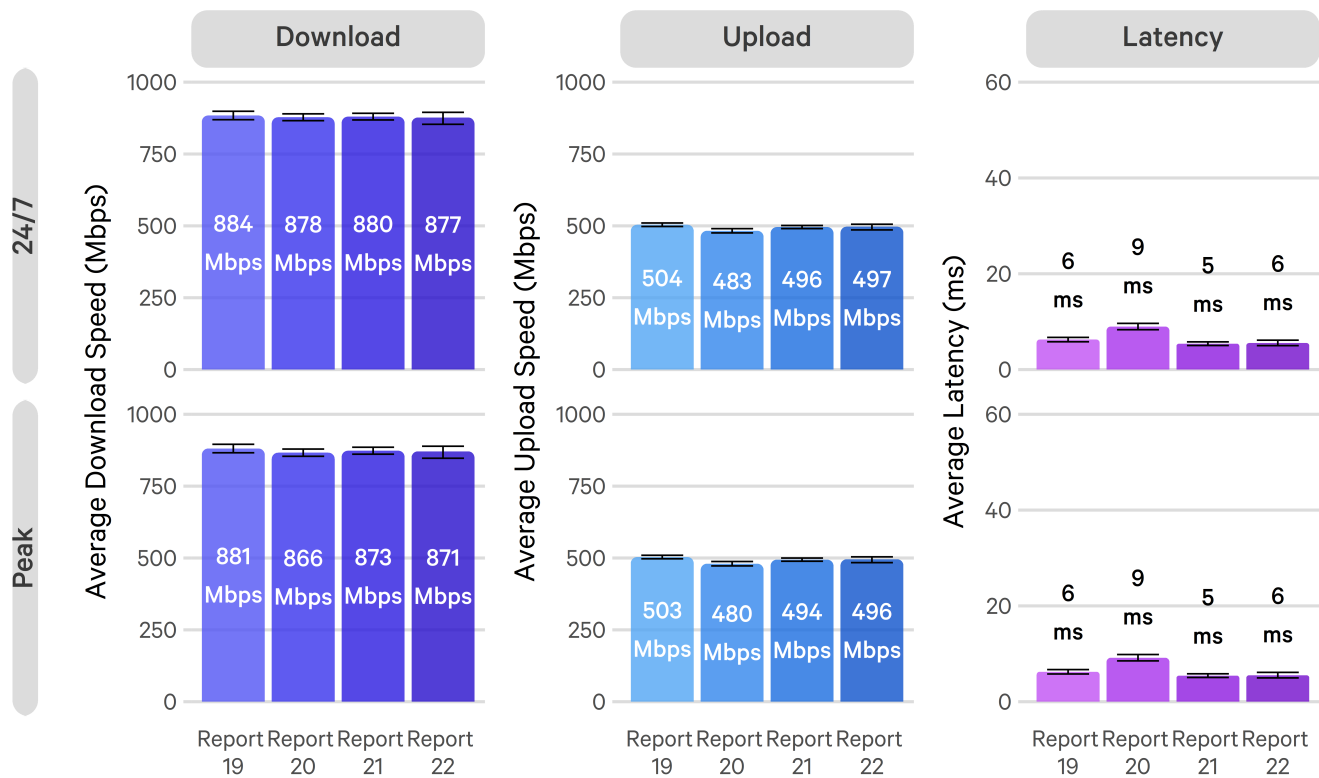
LEO Satellite Performance across Reports



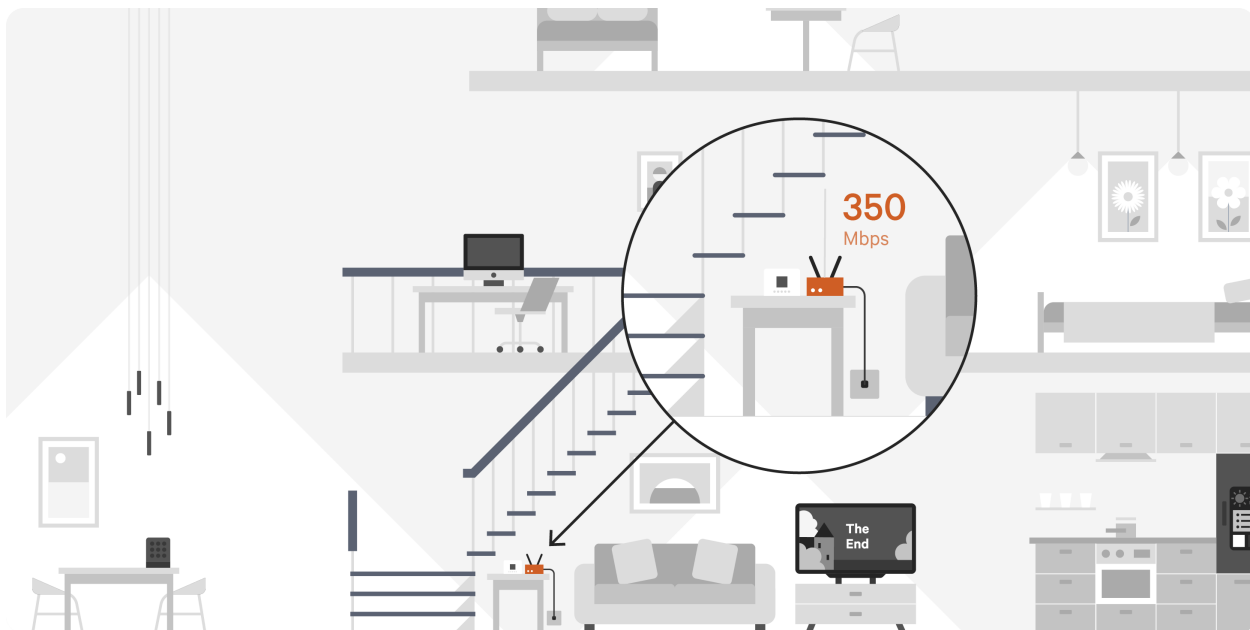
Fibre 300 Performance across Reports



Fibre Max Performance across Reports



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.

Join the MBNZ Programme!

We are always on the hunt for more volunteers to help us expand on the technologies reported on in the MBNZ programme. Joining our awesome volunteer network enables us to gather even more data so we can continue shining a light on different technologies, RSPs and regions in New Zealand! Sign up at the [following link](https://www.measuringbroadbandnewzealand.com/sign-up)¹, and if you're already a volunteer, encourage your friends and family to join too!

- Have 24/7 access to your own data.
- View all your data in one place via the SamKnows One platform.
- Create customised charts and save the results that mean the most to you.
- Track changes in your connection over time.

¹ <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.
LEO Satellite	Low Earth Orbit Satellite. A broadband connection that is transmitted wirelessly using a satellite and ground based satellite dish.
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.

Table 2: All RSPs Included in MBNZ Programme

All RSPs Included in MBNZ
2degrees, Stuff Fibre, Orcon & Slingshot
One New Zealand (Including Farmside)
Spark (Including Skinny & Bigpipe)
Starlink
Sky New Zealand
Mercury
Contact Energy
Electric Kiwi
Inspire Net
Wireless Nation
WIZwireless
Lightwire
Ultimate Broadband
WheroNet
Yrless
Evolution Networks
Full Flavour
Primo
PureLink
UniFone
Evolution Wireless
Evolution Network
Vorco

Table 3: Download, Upload and Latency Performance by Plan

Plan	SFA Area	Peak or Off-Peak	Number of Units	Average Download (Mbps)	Average Upload (Mbps)	Average Latency (ms)
ADSL	All Areas	24/7	31	9 Mbps	1 Mbps	27 ms
	All Areas	Peak	31	9 Mbps	1 Mbps	28 ms
	Non-Fibre Areas	24/7	29	8 Mbps	1 Mbps	28 ms
	Non-Fibre Areas	Peak	29	8 Mbps	1 Mbps	29 ms
VDSL	All Areas	24/7	38	44 Mbps	12 Mbps	19 ms
	All Areas	Peak	38	43 Mbps	12 Mbps	19 ms
	Non-Fibre Areas	24/7	36	44 Mbps	12 Mbps	20 ms
	Non-Fibre Areas	Peak	36	43 Mbps	12 Mbps	20 ms
LEO Satellite	Non-Fibre Areas	24/7	69	208 Mbps	32 Mbps	31 ms
	Non-Fibre Areas	Peak	69	175 Mbps	31 Mbps	31 ms
LEO Satellite (Lite)	Non-Fibre Areas	24/7	50	196 Mbps	31 Mbps	30 ms
	Non-Fibre Areas	Peak	50	151 Mbps	30 Mbps	31 ms
4G Fixed Wireless	All Areas	24/7	70	49 Mbps	15 Mbps	54 ms
	All Areas	Peak	70	35 Mbps	14 Mbps	55 ms
	Non-Fibre Areas	24/7	55	48 Mbps	13 Mbps	55 ms
	Non-Fibre Areas	Peak	55	34 Mbps	12 Mbps	55 ms
Fibre 300	Fibre Areas	24/7	337	313 Mbps	108 Mbps	7 ms
	Fibre Areas	Peak	337	312 Mbps	107 Mbps	7 ms
Fibre Max	Fibre Areas	24/7	399	877 Mbps	497 Mbps	6 ms
	Fibre Areas	Peak	399	871 Mbps	496 Mbps	6 ms
HFC	Fibre Areas	24/7	25	893 Mbps	102 Mbps	13 ms
	Fibre Areas	Peak	25	893 Mbps	102 Mbps	13 ms
Fibre 50	Fibre Areas	24/7	28	52 Mbps	13 Mbps	7 ms

Plan	SFA Area	Peak or Off-Peak	Number of Units	Average Download (Mbps)	Average Upload (Mbps)	Average Latency (ms)
	Fibre Areas	Peak	28	51 Mbps	13 Mbps	7 ms
5G Fixed Wireless	All Areas		9			
WISP Fixed Wireless	All Areas		21			

Table 4: Fibre 300 and Fibre Max Download, Upload and Latency Summary by RSP

Plan	RSP	Peak or Off-Peak	Number of Units	Average Download (Mbps)	Average Upload (Mbps)	Average Latency (ms)
Fibre 300	2degrees, Orcon & Slingshot	24/7	99	318 Mbps	106 Mbps	9 ms
		Peak	99	318 Mbps	105 Mbps	9 ms
	Mercury	24/7	39	305 Mbps	114 Mbps	6 ms
		Peak	39	304 Mbps	114 Mbps	6 ms
	One New Zealand	24/7	54	321 Mbps	112 Mbps	6 ms
		Peak	54	319 Mbps	112 Mbps	6 ms
	Spark	24/7	63	318 Mbps	109 Mbps	6 ms
		Peak	63	317 Mbps	109 Mbps	6 ms
Fibre Max	2degrees, Orcon & Slingshot	24/7	143	888 Mbps	498 Mbps	7 ms
		Peak	143	882 Mbps	495 Mbps	7 ms
	Mercury	24/7	43	853 Mbps	490 Mbps	5 ms
		Peak	43	843 Mbps	490 Mbps	5 ms
	One New Zealand	24/7	53	907 Mbps	495 Mbps	5 ms
		Peak	53	901 Mbps	495 Mbps	5 ms
	Sky New Zealand	24/7	76	917 Mbps	521 Mbps	6 ms
		Peak	76	913 Mbps	521 Mbps	6 ms
	Spark	24/7	49	895 Mbps	513 Mbps	4 ms
		Peak	49	891 Mbps	510 Mbps	4 ms

Table 5: Latency to Various Video Conferencing Services by RSP, Fibre Plans Only

Video Conferencing Service	RSP	Number of Units	Average Latency
Cisco-Webex	2degrees, Orcon & Slingshot	251	36 ms
	One New Zealand	118	35 ms
	Spark	118	36 ms
	Sky New Zealand	96	35 ms
	Mercury	89	34 ms
GoToMeeting	2degrees, Orcon & Slingshot	251	158 ms
	One New Zealand	118	155 ms
	Spark	118	155 ms
	Sky New Zealand	96	159 ms
	Mercury	89	143 ms
Google-Meet	2degrees, Orcon & Slingshot	251	36 ms
	One New Zealand	118	35 ms
	Spark	118	36 ms
	Sky New Zealand	96	35 ms
	Mercury	89	34 ms
Microsoft-Teams	2degrees, Orcon & Slingshot	251	45 ms
	One New Zealand	118	42 ms
	Spark	118	45 ms
	Sky New Zealand	96	45 ms
	Mercury	89	43 ms
Skype	2degrees, Orcon & Slingshot	251	49 ms
	One New Zealand	118	46 ms
	Spark	118	49 ms
	Sky New Zealand	96	49 ms
	Mercury	89	48 ms
Zoom	2degrees, Orcon & Slingshot	251	202 ms
	One New Zealand	118	195 ms
	Spark	118	203 ms

Video Conferencing Service	RSP	Number of Units	Average Latency
	Sky New Zealand	95	203 ms
	Mercury	89	216 ms