



Measuring Broadband New Zealand

Initial findings report, 2018

In 2018, the Commerce Commission appointed SamKnows to measure New Zealand's internet performance. The programme, called Measuring Broadband New Zealand, gives internet users in New Zealand access to SamKnows Whiteboxes to measure the quality of their fixed-line internet. The aim of the programme is to increase transparency about actual in-home broadband performance and provide consumers with independent information about internet performance across 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. The first report provides an overview of the initial findings from the data collected during the early stages of the project.



Revisions

This errata sheet lists errors and their correction for the first publication of the Measuring Broadband New Zealand Initial Findings Report, released on 21st December 2018. This report represents the second publication following identification and correction of errata. Although best efforts are made to ensure accuracy, from time to time revisions are published due to errors highlighted after the initial publication date. In this case, there was a calculation error meaning that specific charts were not aggregated by test agent. The error has been rectified in this publication.

Location	Error	Correction
Page 5, Fig. 3	ADSL Download Speed listed at; 24/7: 9.08 Mbps Peak: 9.04 Mbps	ADSL Download Speed corrected to; 24/7: 8.8 Mbps Peak: 8.93 Mbps
Page 5, Fig. 3	Fibre Download Speed listed at; 24/7: 246.94 Mbps Peak: 242.42 Mbps	Fibre Download Speed corrected to; 24/7: 262.18 Mbps Peak: 258.05 Mbps
Page 5, Fig. 3	VDSL Download Speed listed at; 24/7: 43.31 Mbps Peak: 42.67 Mbps	VDSL Download Speed corrected to; 24/7: 42.66 Mbps Peak: 42.39 Mbps
Page 6, Fig. 5	ADSL Upload Speed listed at; 24/7: 0.96 Mbps Peak: 0.95 Mbps	ADSL Upload Speed corrected to; 24/7: 0.97 Mbps Peak: 0.96 Mbps
Page 6, Fig. 5	Fibre Upload Speed listed at; 24/7: 147.79 Mbps Peak: 147.36 Mbps	Fibre Upload Speed corrected to; 24/7: 160.43 Mbps Peak: 160.91 Mbps
Page 6, Fig. 5	VDSL Upload Speed listed at; 24/7: 13.7 Mbps Peak: 13.45 Mbps	VDSL Upload Speed corrected to; 24/7: 13.34 Mbps Peak: 13.29 Mbps
Page 7, Fig. 8	ADSL Packet Loss listed at; 24/7: 0.45 ms Peak: 0.62 ms	ADSL Packet Loss corrected to; 24/7: 0.49 ms Peak: 0.65 ms
Page 7, Fig. 8	Fibre Packet Loss listed at; 24/7: 0.16 ms Peak: 0.18 ms	Fibre Packet Loss corrected to; 24/7: 0.24 ms Peak: 0.26 ms
Page 7, Fig. 8	VDSL Packet Loss listed at; Peak: 0.24 ms	VDSL Packet Loss corrected to; Peak: 0.24 ms

How we test

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.












The SamKnows Whitebox!

Measuring homes across New Zealand

- The SamKnows Whitebox is a purpose-built testing agent that connects to your router.
- Measures every aspect of your internet service delivered to your home.
- Runs at regular intervals when you're not using the internet.

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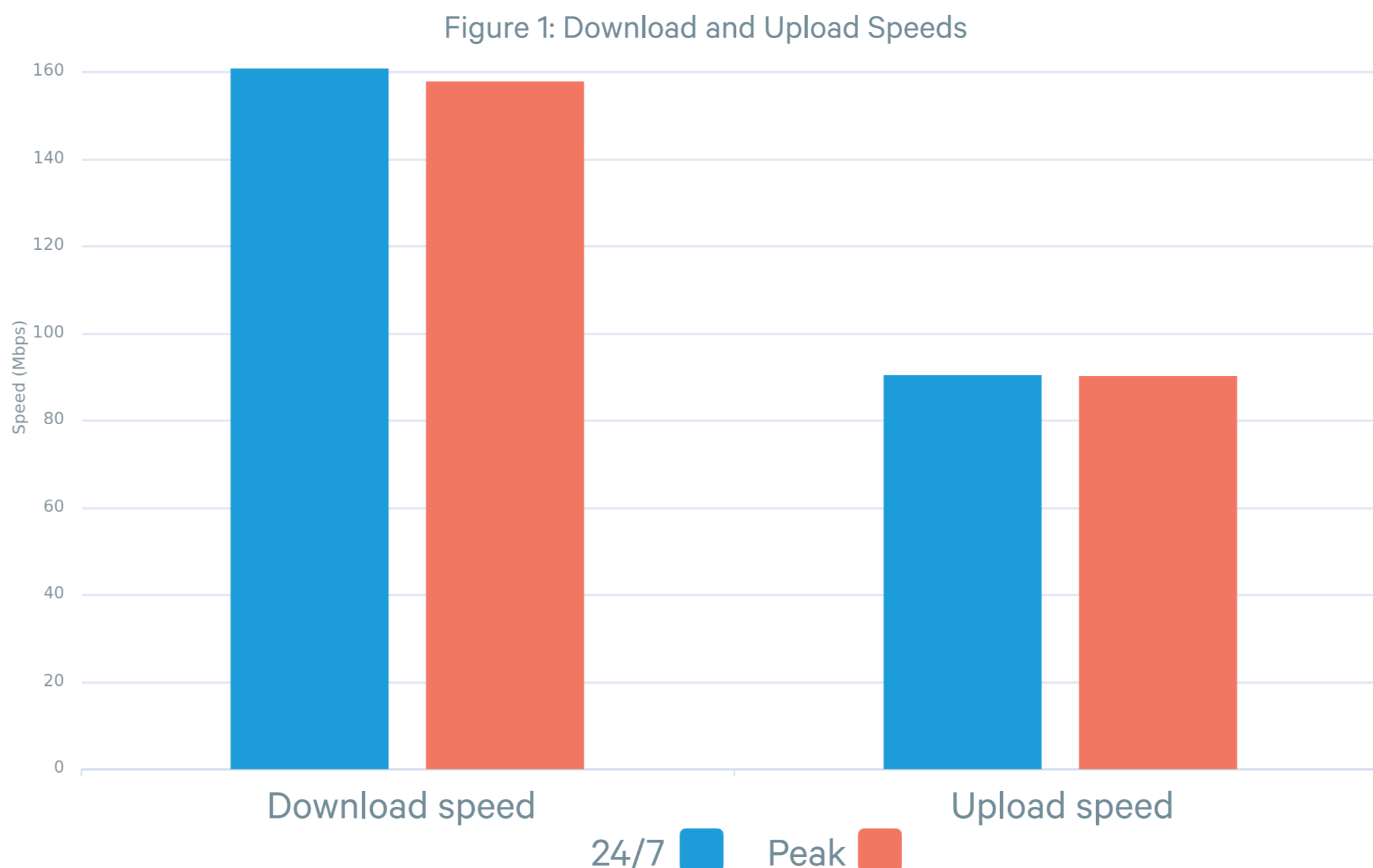
Our tests

-  **Download** The speed data travels from our test server to your device, measured in bits per second.
-  **Upload** The speed data travels from your device to our test server, measured in bits per second.
-  **Latency** How long it takes a data packet to go from your device to our test server and back to your device.
-  **Jitter** Measures the amount of difference between packet delays, or the stability of your latency.
-  **Packet Loss** When a packet of data becomes lost (does not arrive for two seconds) measured as a percentage of packets lost out of packets sent.
-  **You Tube** Measures the highest bitrate you can reliably stream of the most popular video in your country.
-  **Web browsing** Measures how long it takes to fetch the HTML and referenced resources of a popular website.
-  **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.

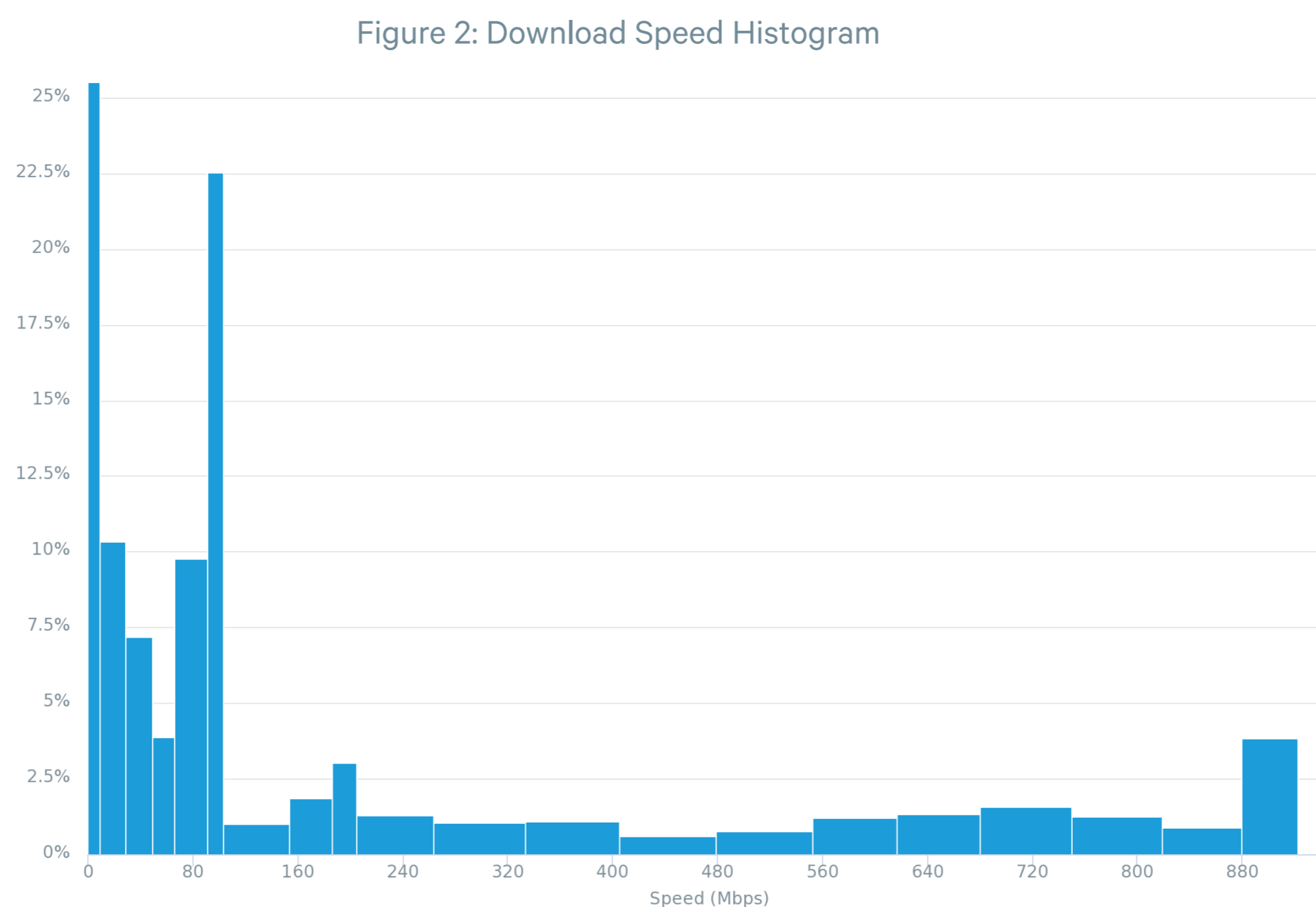
Initial findings

1st Oct 2018 - 31st Oct 2018

In this section of the report, we show results for overall performance tests of New Zealand broadband connections, including all suppliers, plans and technologies with sufficient data. This represents the overall performance across the country. All charts show results to test servers in New Zealand except where specified. The first chart shows average download and upload speeds, split by tests across the whole day, and tests at peak times (7pm to 11pm only). Overall download speeds are around 160Mbps, with upload averaging about 90Mbps. There is a small impact on performance at peak times, which will be looked at in more detail later.



The next chart shows the distribution of download speeds across New Zealand. It shows that under 4% of tests reach speeds above 880Mbps, with more than half between 0 and 100Mbps. This reflects the difference between faster fibre connections and slower products. In fact, we can see peaks that are likely to indicate ADSL products average around 10Mbps or below, and fibre products at 100Mbps. The differing widths of the bars signify the minimum and maximum results in each bucket of results.

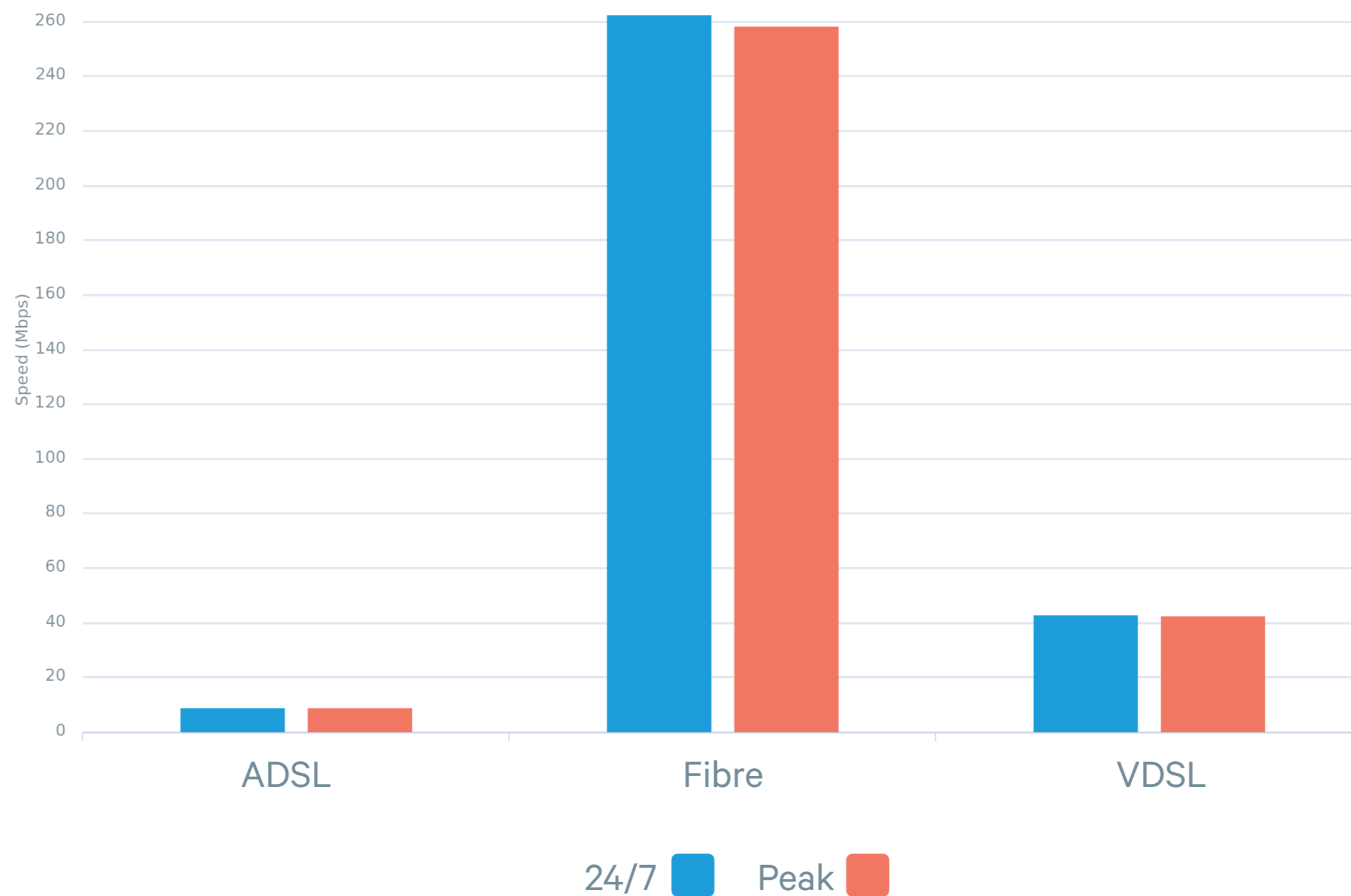


Download speeds

1st Oct 2018 - 31st Oct 2018

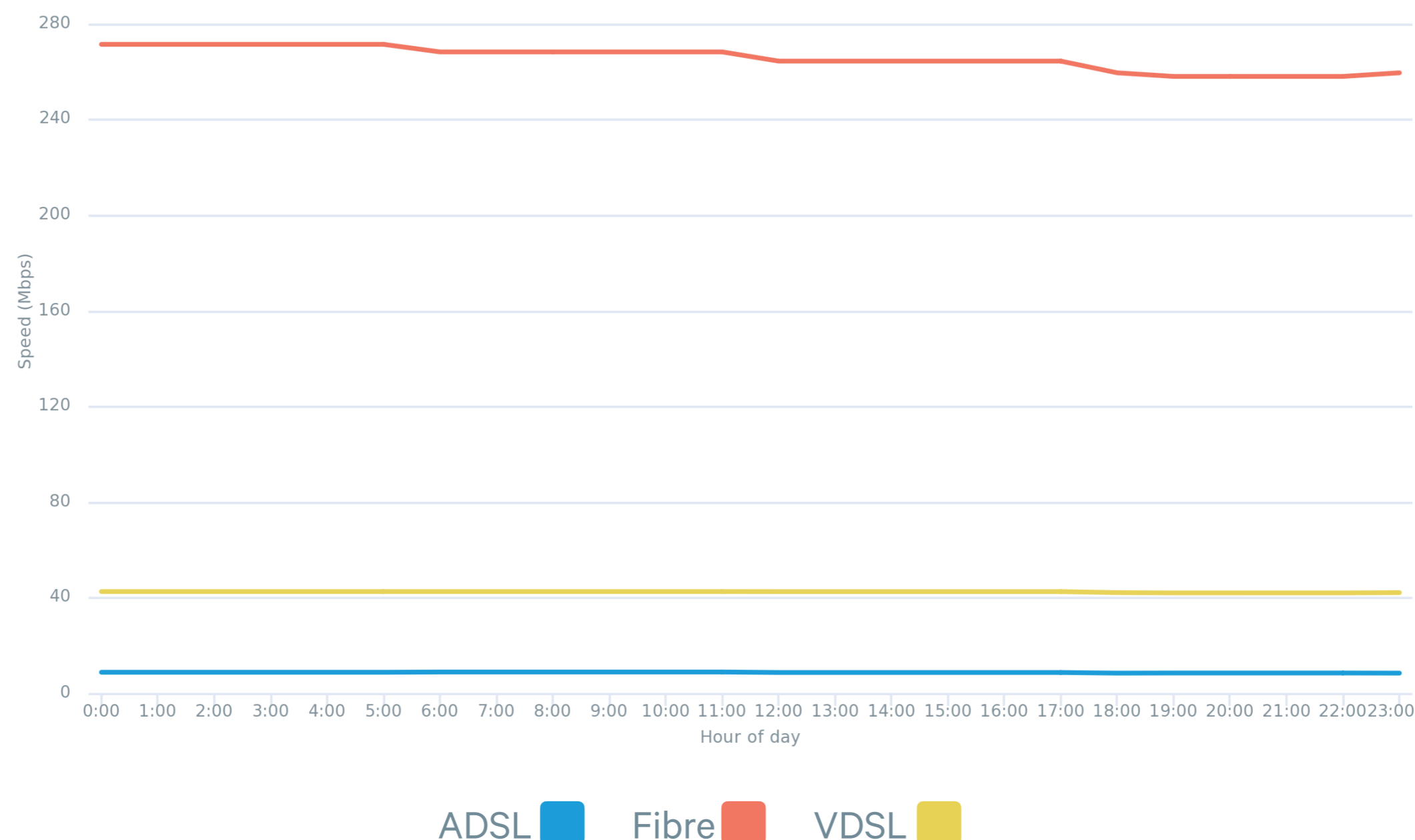
This chart shows download speeds split by technology. The technologies analysed in this report are ADSL, Fibre, and VDSL. Across all technologies, the impact of peak hours on speed is minimal. Download speeds are significantly faster on fibre products, with averages above 240Mbps. We would expect to see this given the significantly faster speeds represented by fibre products. VDSL products reach average speeds over 40Mbps, with ADSL speeds under 10Mbps.

Figure 3: Download Speed by Technology



The chart below shows average speed across the hours of the day, split by technology. The lower peak average of fibre products is clearly visible here, with performance dropping progressively throughout the day, with the lowest points between 7pm and 11pm. VDSL packages show no reduction in performance at peak hours, and given that even a 4K video stream will consume around 25Mbps at most, an average VDSL or fibre user receiving over 250Mbps during peak hours will have no issues with streaming video.

Figure 4: Download Speed by Hour of Day

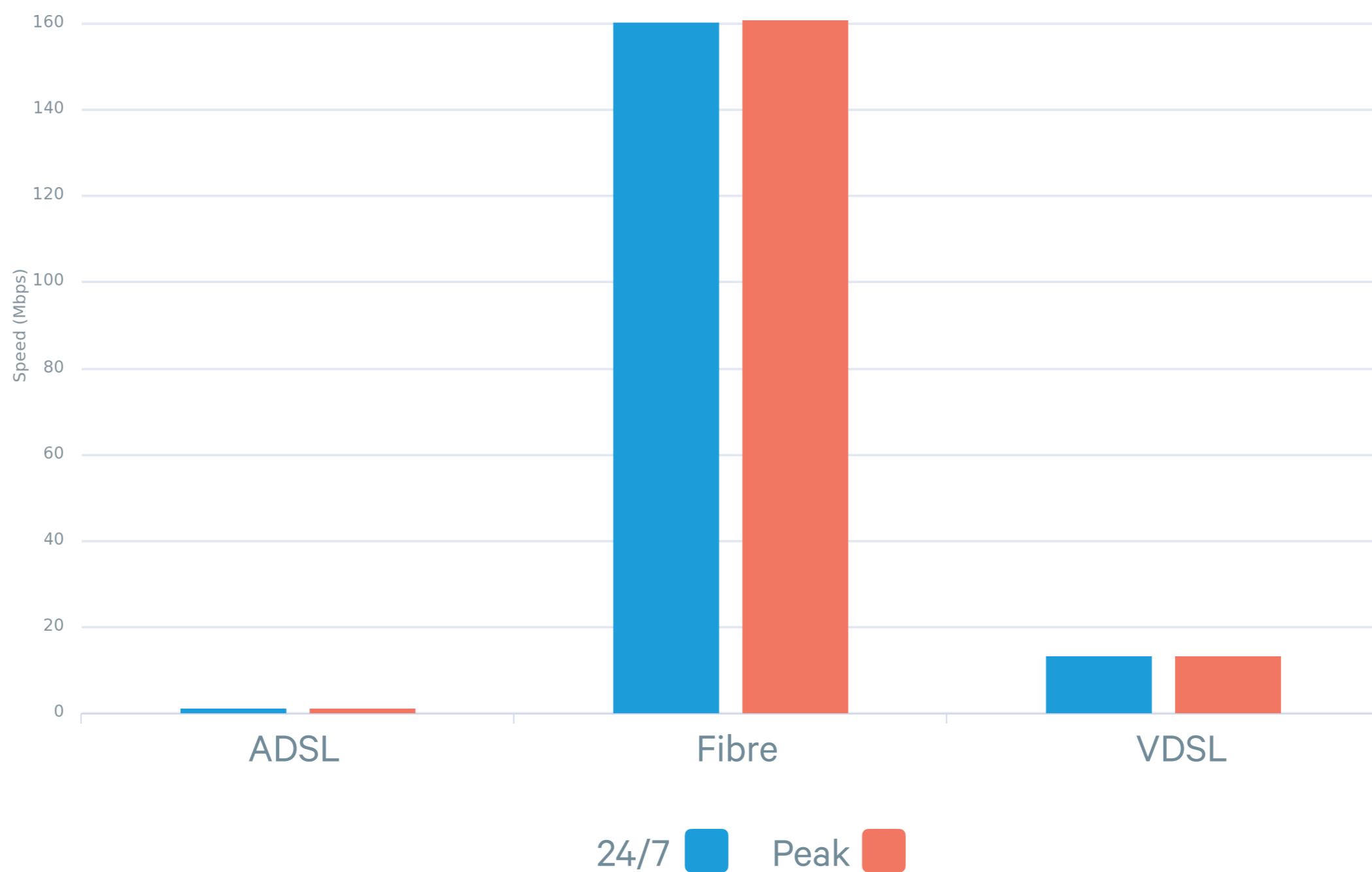


Upload speeds

1st Oct 2018 - 31st Oct 2018

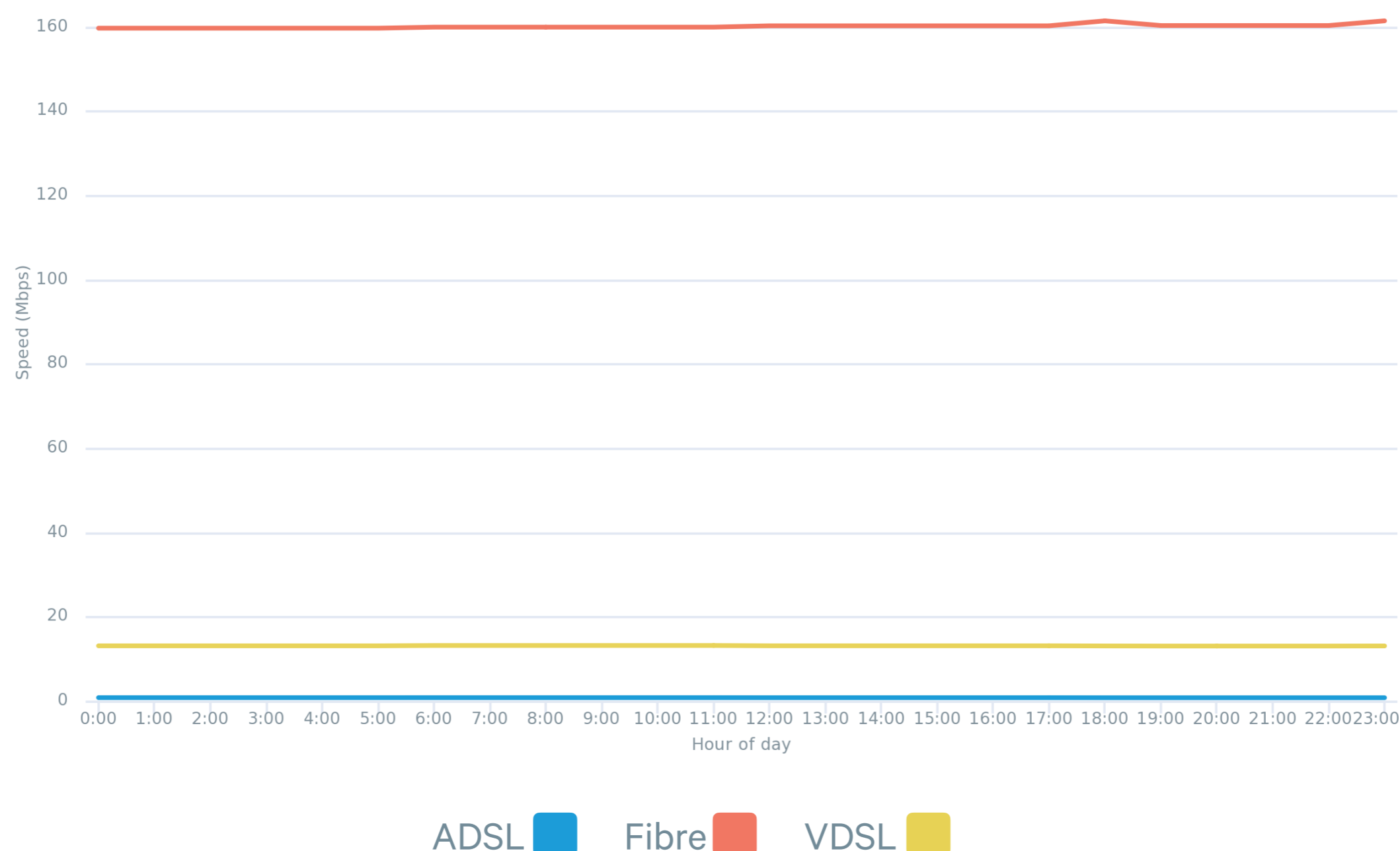
Upload speeds are significantly lower than download speeds, as to be expected in any market. Once again, fibre products represent the highest performing products, with average VDSL performance under 16Mbps and ADSL under 5Mbps. Upload speeds affect how fast users can upload content to social media and other services, and can also impact gaming performance.

Figure 5: Upload Speed by Technology



Upload speeds by hour of day show that performance remains stable across the day. There are no significant drop-offs in upload speed, which is probably a reflection of usage during peak times mainly involving downloading, like streaming video.

Figure 6: Upload Speed by Hour of Day

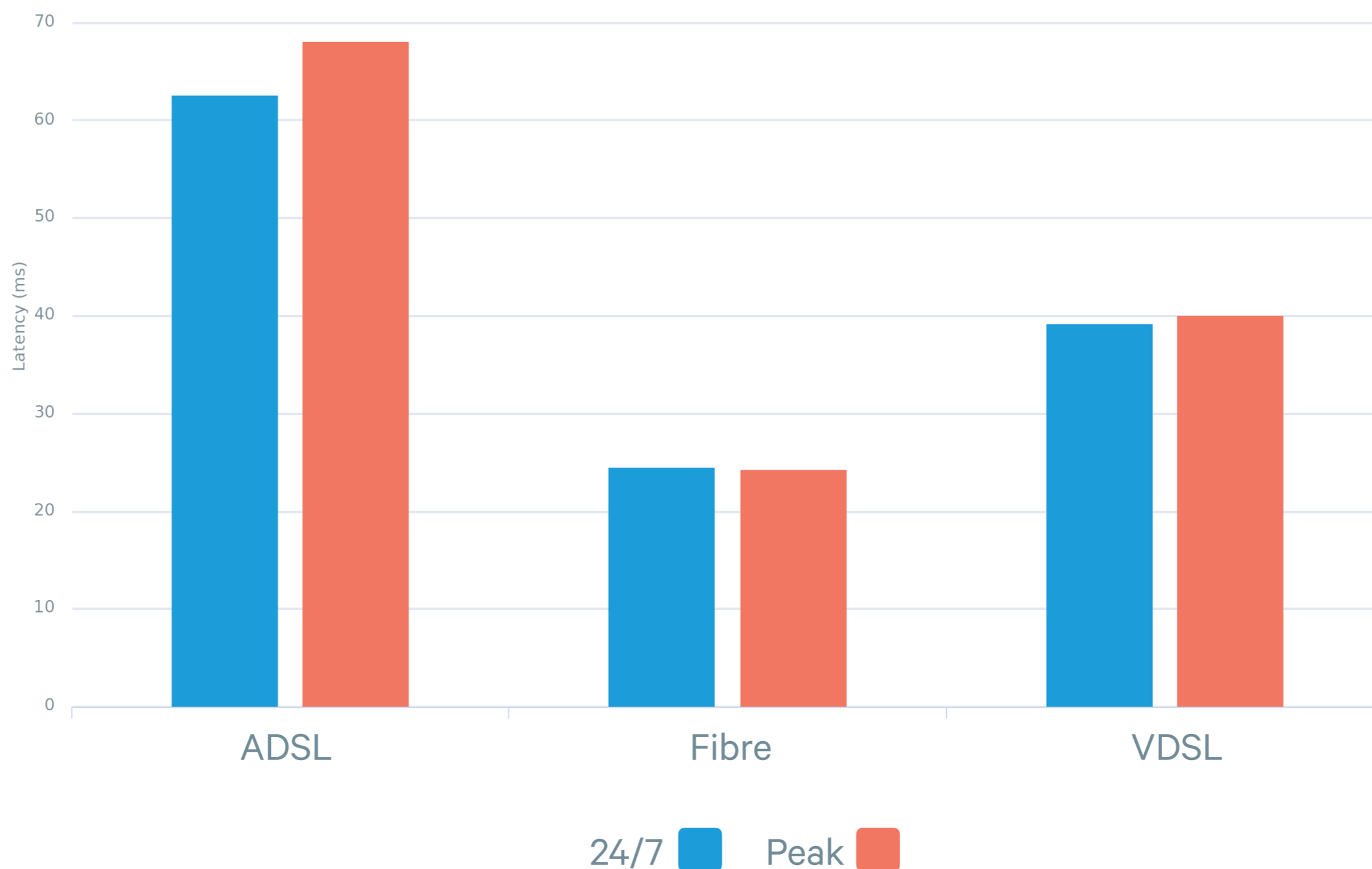


Latency and packet loss

1st Oct 2018 - 31st Oct 2018

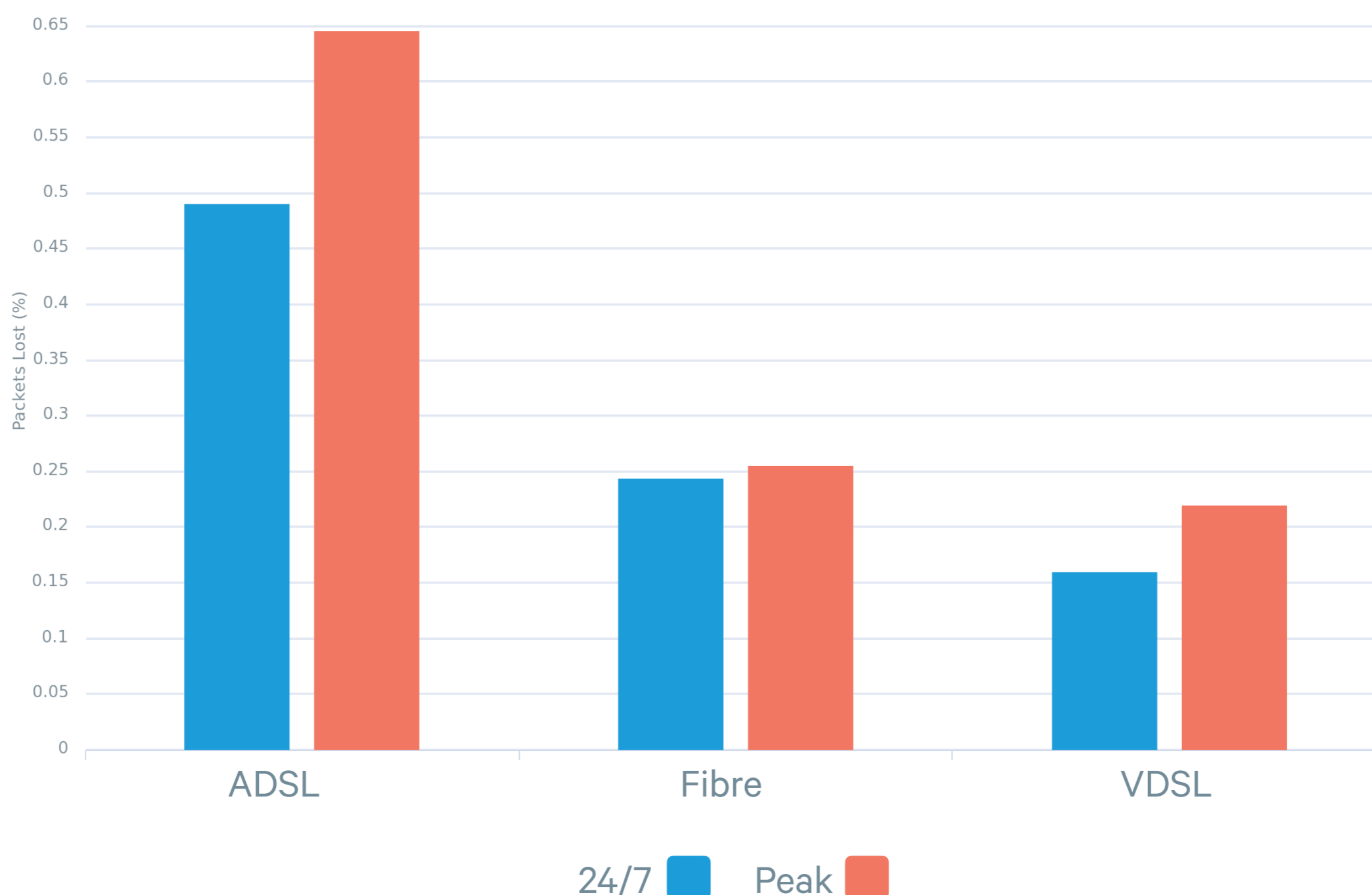
Average latency by technology shows the differences in time for a test data packet to transit the network to a remote server and return to the user's device. Fibre services perform the best having the lowest latency to our New Zealand test servers at around 25ms. VDSL averages 40ms, with ADSL significantly slower at between 60 and 70ms. The impact of peak times is also most severe on ADSL products. This indicates that services like gaming are likely to run most smoothly on fibre products.

Figure 7: Latency by Technology



Packet loss shows the percentage of packets that were lost between the Whitebox and the New Zealand server. It should be noted that the vast majority of tests show 0% packet loss, as expected. Packet loss rises noticeably on ADSL services during peak hours. These levels are unlikely to have a noticeable negative impact on every day internet usage. But it is important to bear in mind that these are averages, and may mask more significant - but brief - interruptions that would harm VoIP or online gaming services.

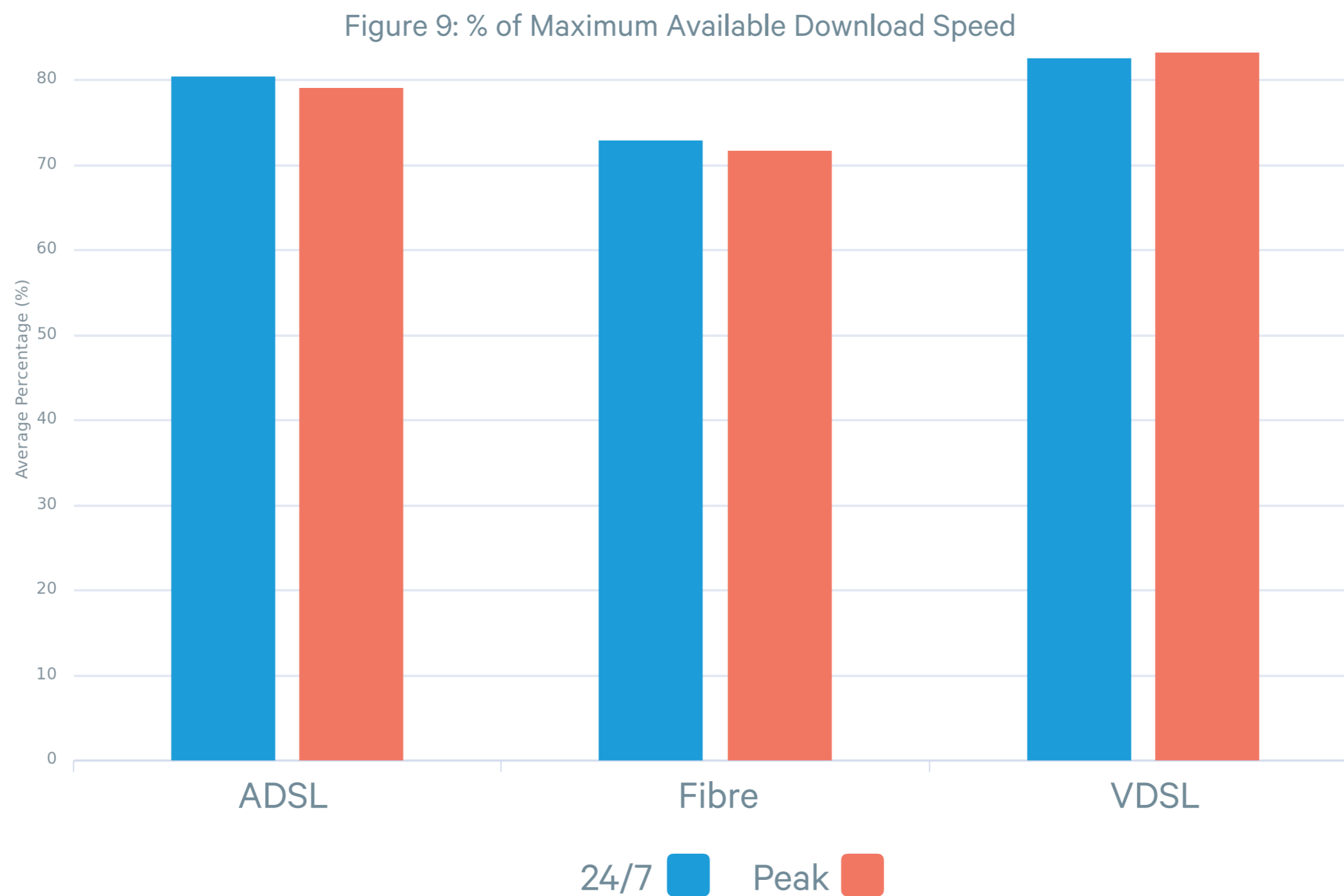
Figure 8: Packet Loss by Technology



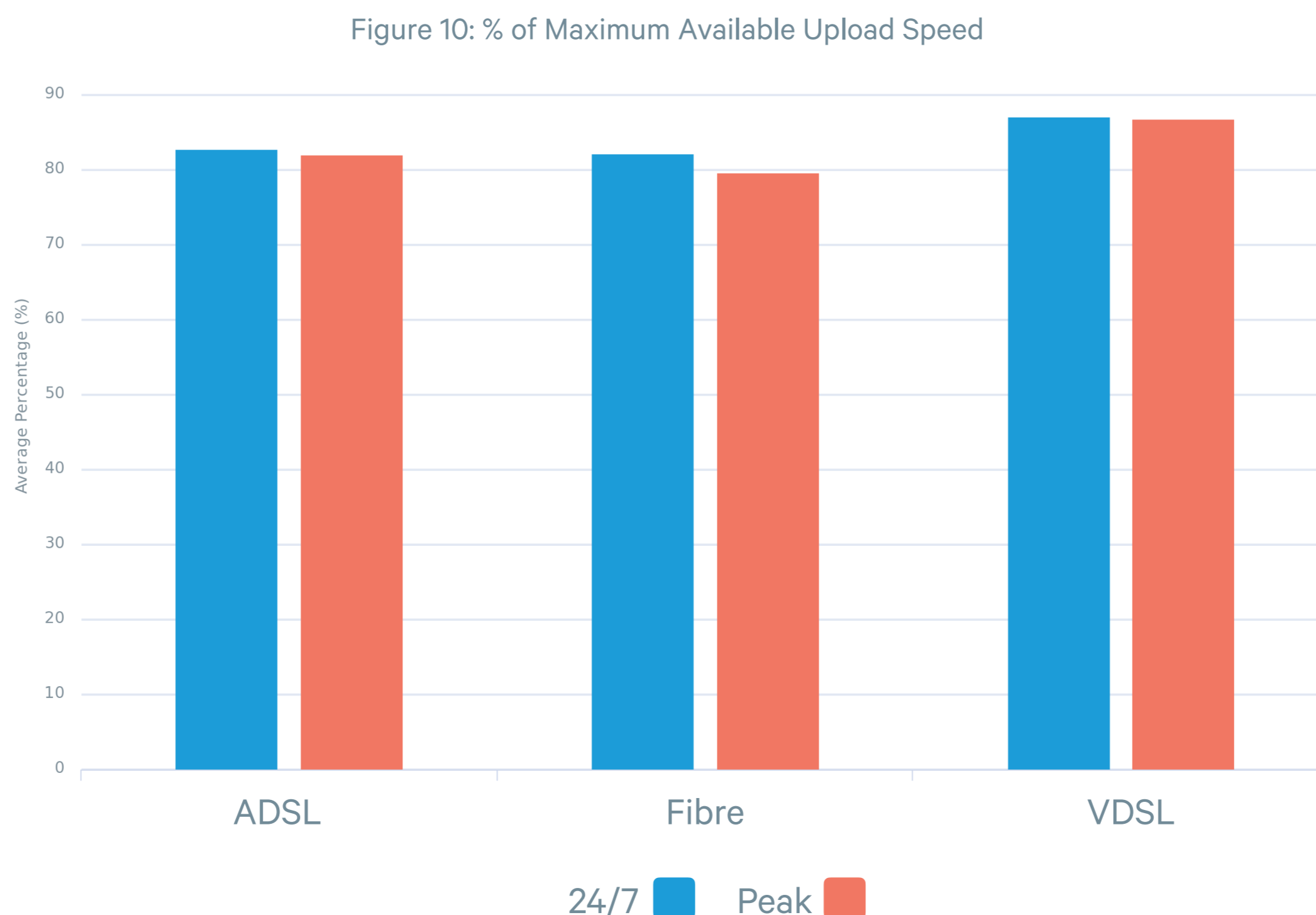
Percentage of maximum available

1st Oct 2018 - 31st Oct 2018

These charts show download and upload speeds as the percentage of the maximum speed available given the line and technology. The maximum available speed has been provided by service providers for this metric, and we compare this with the actual test results. The average percentage across technologies for download performance ranges from 71% of maximum available during peak hours on fibre to just over 83% on VDSL. This indicates that provision is fairly consistent across technologies given the limitations of, for example, ADSL connections. It also highlights that fibre products, and specifically higher speed fibre plans, on average deliver less than 75% of maximum speeds available.



For upload tests, performance as a percentage of maximum available was more consistent. VDSL products once again showed the highest level of performance at around 87%, with very little change between peak and 24 hour results. Fibre products were delivered at 82% of maximum available over 24 hours, dropping to around 79% at peak.

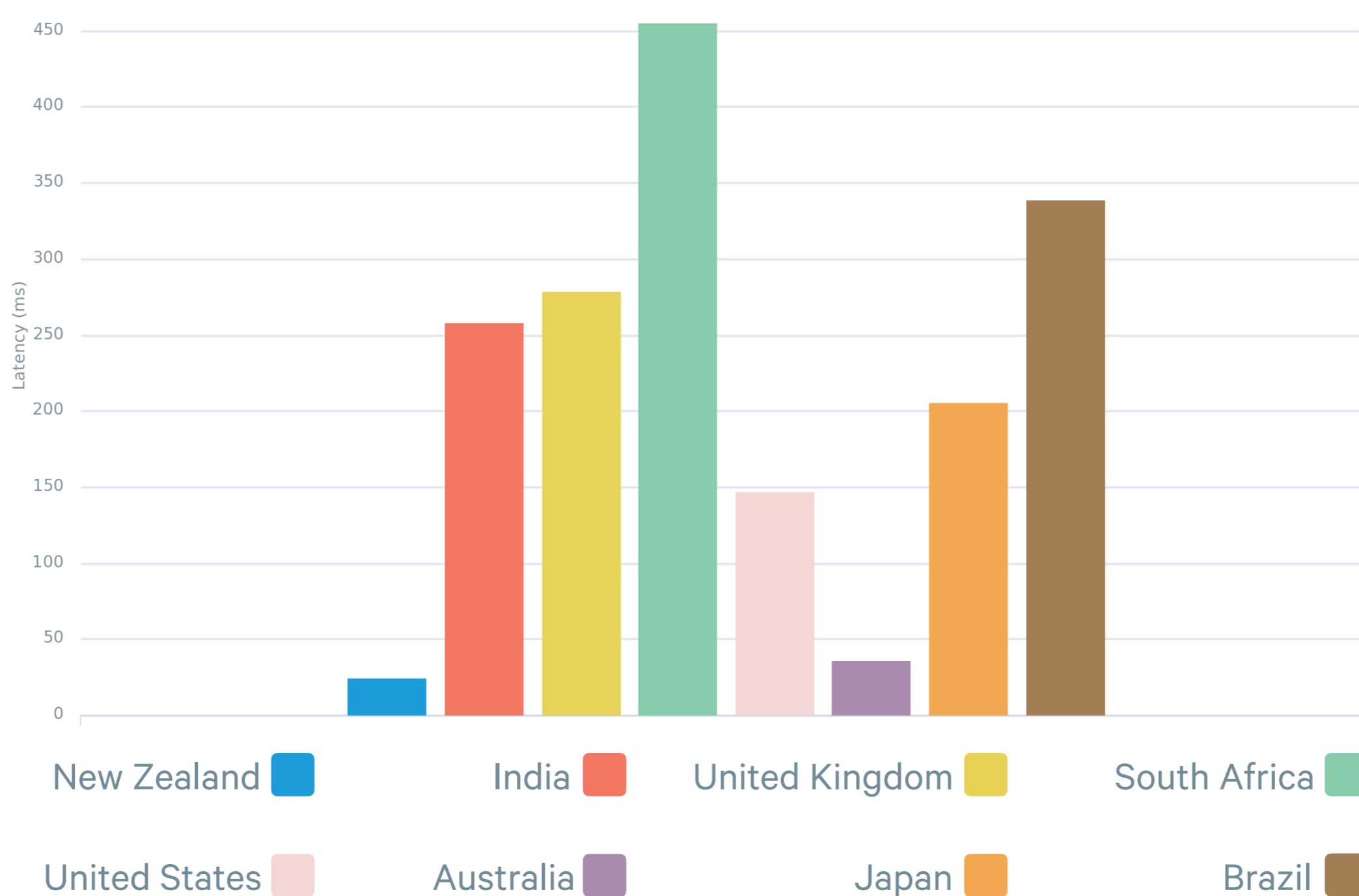


International latency

Finally, this chart shows latency to different target servers around the world from Fibre products. As part of the Measuring Broadband New Zealand project, Whiteboxes are testing to servers in 8 locations. The latency measurements here indicate performance to content in these locations. Although large-scale content providers like Google or Facebook are likely to host content in New Zealand, other providers of websites or services like gaming may not, forcing users to connect to Australia or elsewhere. This has the potential to affect any user in New Zealand when connecting to these services.

This chart demonstrates that hosting content in New Zealand is hugely beneficial to Kiwi consumers. Although latency to Australia (Sydney) is not high, the increase to content hosted in the United States (San Francisco) is substantial at nearly 150ms. All other locations, including the United Kingdom, have latency slower than 200ms. This means that content hosted outside New Zealand and Australia is likely to take a noticeable amount of time for users in New Zealand to access. These latency results are approximately what you would expect given New Zealand's remoteness from these measurement locations. South Africa is higher than expected, but this will likely be due to traffic taking an indirect route. International routing is a topic that will be explored further in future reports.

Figure 11: Mean Connection Time to International Servers



What's next

This is the first of many reports which will be released quarterly by the MBNZ project and will track improvements in internet performance over time. In future reports, we will aim to include fixed wireless and cable products, and will aim to break results down by provider.

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www.measuringbroadbandnewzealand.com

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