# Demand for fixed-line broadband in Australia 2018–2028

Fact sheet
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## What is bandwidth?

Bandwidth measures the rate of data transfer, typically in megabits per second (Mbps). It can be used to describe the capacity of a connection or how much information can be transmitted at a point in time, or the requirement of an application.

## What is peak bandwidth demand?

Peak bandwidth is the maximum bandwidth households and businesses are likely to need for their internet-based applications and is required only for short periods. The BCAR focuses on peak bandwidth demand because if this can be met then the connection is also capable of satisfying bandwidth requirements for internet usage at all other times.

Other factors can also affect a user's peak bandwidth experience. These include WiFi capacity, in-home cabling or even application and webpage design.

## What are data downloads?

Data downloads are information that is transferred from the internet to a user to be saved onto a device when requested by the user. Data downloads are typically measured in gigabytes per month by adding up the volume of data downloaded by users at a premises.

In contrast, data uploads are information that is sent from the user to the cloud or internet. The sum of data downloaded and data uploaded is referred to as traffic.

## Why does bandwidth demand grow more slowly than data demand?

Bandwidth is the rate at which data is transferred, while data demand is the amount of data used by a device or application over a period of time.

Bandwidth requirements to meet demand from 95 per cent of households are estimated to more than double over the decade, from 24 Mbps in 2018, to 56 Mbps in 2028, while average household data demand is estimated to nearly quadruple from 199 gigabytes per month to 767 gigabytes over the same period.

The higher growth rate for data demand reflects a continuation of two trends—increased time spent online and use of more data-rich applications. These trends mainly affect the amount of data used.

By contrast, bandwidth mainly depends on the number of applications in use at the same time—and the bandwidth usage of these applications—in a household or business.

## How does the research differ from the Demand for fixed-line broadband in Australia paper released by the BCAR in 2018?

This paper updates and extends the analysis provided in the BCAR's 2018 publication. The main difference is that peak fixed-line bandwidth demand is now estimated based on the likelihood that individuals are using internet-based applications simultaneously. This means that the estimates in this paper are not directly comparable to those in 2018 because of the methodological change between the papers.

This paper also includes analysis of (employing) small businesses and takes a more comprehensive review of data sources including an examination of additional applications.

More information can be found in Appendix A: Modelling bandwidth demand.

## How do these estimates compare to speed tests?

The BCAR estimates bandwidth demand based on internet usage by people and devices within all households and small businesses across Australia.

Speed tests, on the other hand, reflect a household or business's supply of bandwidth and the amount of bandwidth purchased, which may also be influenced by factors such as the quality of in-home wiring and WiFi modem capabilities.

At a national level, speed tests report the average speed achieved by the subset of people in households and businesses who choose to do a speed test. This means nationwide average speed can be affected by the sample size and composition of households who do speed tests.

## How do these estimates relate to network usage of broadband?

The BCAR's analysis is focused on bandwidth demand at the individual premises rather than a network aggregation. There is limited evidence on broadband usage patterns at the premises level, so public evidence on network usage has been used to benchmark the BCAR's analysis.

There will be differences between premises and network broadband usage as a result of variation between households. For example, peak network usage is usually during the busy period between 8pm and 10pm. However, an individual household may have peak usage when children return from school, or a business operating during the day will likely have peak usage between 9am and 5pm. As a result, peak network usage cannot be directly compared with peak premises broadband usage.

Network usage also takes into account other factors that do not relate directly to individual premises usage such as additional bandwidth that may be required to support network performance during periods of high demand or reduced supply. For example, high network demand can be caused by new game releases or updates that many households download at the same time. Network design also takes into account and plans for network redundancies to limit the impact of unforeseen events on network capacity.

## Does this research include an analysis of uploads/upstream bandwidth?

The BCAR has focused on bandwidth for downstream traffic only, rather than for upstream traffic. This is because bandwidth requirements are asymmetric, as more data is used downstream than upstream. More evidence is also available on downstream bandwidth.

## Why do these estimates exclude the busiest minute of each day?

The BCAR has excluded 1 minute each day (equivalent to 30 minutes per month for households and 20 minutes per month for small businesses). Excluding 1 minute per day equates to meeting bandwidth demand for 99.93 per cent of the whole month for households (99.77 per cent for small businesses).

By excluding 1 minute per day while still focusing on peak bandwidth, the estimates reflect sustained peak bandwidth demand. The peak estimates therefore exclude rare cases of high bandwidth demand for which consumers may be willing to tolerate reduced speeds or experience a service that is not materially different due to adaptive bit rates and throttled downloads.

Extending the amount of time excluded will reduce the reported peak bandwidth requirements, while shortening the amount of time excluded will increase peak bandwidth requirements.

More information can be found in Appendix G: Sensitivity analysis.

## Why are assumptions required about waiting times for downloads?

Downloads tend to use any available bandwidth to reduce the wait time before the downloaded files can be used. The BCAR analysis required an assumption of this wait time, which will vary depending on the individual and the application used.

The BCAR assumptions for wait time for different types of files are based on the content they are downloading. Where bandwidth demand at a premises is less than the amount of bandwidth available, any 'left over' bandwidth will reduce the wait times to below those assumed in the BCAR's analysis. In simpler terms, the assumed wait time is a maximum—in reality downloads would often be quicker.

More information on willingness to wait can be found in Appendix E: Applications.

## Does this research incorporate other aspects of a user's internet experience?

This research examines bandwidth as a measure of broadband capacity for Australian households and small businesses. Some internet applications may also have latency, jitter, packet loss and connection reliability requirements which can also affect a user's broadband experience. The BCAR has not examined these aspects.

More information can be found in Appendix F: Caveats to the analysis.

## Why doesn't this research include all internet applications?

The estimates aim to reflect typical household or business use of applications. This does not include special-purpose applications such as development tools or data centres.

The BCAR has only included applications that affect peak bandwidth demand. There are other applications that will affect overall data downloads but are less likely to drive peak bandwidth. For example, software patches such as operating system updates can be scheduled to occur outside busy periods or use only idle bandwidth. Additionally, applications that require only minimal download bandwidth but may need more significant upload bandwidth were not included in the analysis.

More information on the applications that were examined can be found in Appendix E: Applications.

## How are new bandwidth-intensive applications such as virtual reality/Internet of Things (IoT) devices/8K captured in the analysis?

Provision for the update of new applications is included in the forecasts, although there is limited information available on the extent to which new technologies and future applications will be adopted.

An increased uptake of IoT devices is unlikely to drive bandwidth demand because these generally require low bandwidth. However, rapidly increased usage of IoT devices would have an impact on data downloads (and potentially data uploads).

Increases in streamed virtual reality or downloaded virtual reality files, as well as 8K viewing would have a greater impact on bandwidth. These applications require much higher bandwidth due to the transmission of large amounts of data.

The BCAR estimates that 8K will use 37 Mbps in 2028 and an hour of 8K video could transmit approximately 17 gigabytes, while an hour of streamed virtual reality would consume around 7 gigabytes.

The BCAR estimates that 8K devices will be in 12 per cent of households in 2028. A rapid increase in the uptake of 8K devices as well as growth in the amount of 8K content that is available would raise peak bandwidth demand. Similarly, significant improvements in virtual reality technology could drive large increases in uptake. If this usage is additional to (rather than instead of) other applications such as game downloads or streamed video, this could increase peak bandwidth and data demand for households.

The BCAR will continue to monitor developments and update its estimates.

## What if a business or household has more devices than presented in these forecasts?

With the exception of IoT, the BCAR's analysis does not depend on the number of devices owned by a business or household. This is because the forecasts are developed based on the concurrent usage of applications by a business or household.

The BCAR has assumed that the average household has 9 IoT devices in 2018, increasing to 44 devices in 2028 and that the average amount of IoT devices is based on the number of employees within a business, increasing from 3.3 to 17.6 devices per employee.

Households and small businesses with higher than average numbers of IoT devices would not be likely to have much higher bandwidth demand than what is presented in the BCAR's estimates because these applications have minimal impact on peak bandwidth demand. However, machine (such as IoT) usage of data is expected to drive increases in data downloads over the next decade, and therefore small businesses with vastly higher numbers of devices may consume more data.

## Does this research suggest that Australian households do not need high speed broadband services?

The research shows that most Australian households are small, with almost 60 per cent of households having only 1 or 2 people, and tend not to require high speed broadband services. Some larger households are estimated to demand higher broadband speeds which are upwards of 50 Mbps, especially those that frequently stream video in 4K or 8K.

The forecasts reflect the bandwidth requirements of end users based on anticipated application usage and do not take into account a consumer's willingness to pay for that bandwidth. For example, a consumer with peak bandwidth requirements of 60 Mbps could choose a 50 Mbps plan or a higher-priced 100 Mbps plan. As peak bandwidth demand may occur only for short periods, a consumer may prefer to pay less for a lower speed plan and either moderate their application usage or tolerate slightly slower performance during these peak times.

As the BCAR has not modelled willingness to pay, bandwidth demand was estimated at different thresholds to account for different tolerances for slightly slower application performance.

## Why do small businesses need less bandwidth than households?

Typically, small businesses use internet applications that have lower bandwidth and data needs than households. For example, high bandwidth applications such as streamed video and virtual reality or game downloads are unlikely to drive bandwidth demand in most small businesses, but these applications can be significant in households.

While there are scenarios where businesses download large files, many businesses use internet primarily for web browsing, document management, cloud storage, emails and to make voice and video calls. Businesses may also have other internet requirements, such as access to broadband with symmetrical speeds for greater upload capacity, increased resilience and security, or reliability.

Further, while almost everyone is an internet user when at home, many people are not when at work. Some occupations will use minimal bandwidth in their employment or will have greater use of mobile broadband.

## Will the National Broadband Network (NBN) be able to support bandwidth demand for the next decade?

The NBN has demonstrated its capability during times of high demand for bandwidth. As this demand continues to grow over the coming decade, the network has considerable capacity to be upgraded to support increased demand on the NBN.

# What impact does COVID-19 have on these estimates?

The analysis for this paper was carried out prior to the spread of COVID-19, and as such does not examine the impact of COVID-19 on bandwidth and data demand. At this stage it is unclear the extent to which the pandemic will have an enduring effect on household peak bandwidth demand. Should COVID-19 lead to lasting changes in peak bandwidth demand or data downloads for households and small businesses, these will be incorporated in future releases of this publication.

However, COVID-19 may result in a number of short-term impacts:

› People are spending more time online at home which will drive growth in data downloads throughout the day as offline social activities are substituted for online activity. However, recent decisions by application providers to lower video streaming resolutions during the pandemic will offset some of the growth in data downloads and help to constrain peak bandwidth demand.

› The short-term impact on peak bandwidth demand for households is less obvious, as peak bandwidth is set by rare scenarios when multiple people use multiple applications at the same time. COVID-19 will only increase peak household bandwidth demand if additional applications are used simultaneously, rather than if people are using applications more frequently.

› More people are working from home, however the busy period is unlikely to change for most households. This is because most business applications are less bandwidth intensive than household applications. For example, high definition video conferencing through an application like Skype or Zoom requires 1.5 Mbps while high definition video streaming through an application such as Netflix or Amazon Prime requires 5 Mbps.

› Peak network usage is increasing under COVID-19. NBN Co has observed a 25 per cent increase in peak network usage during the busy period from late February to late March. However, while peak network usage has increased, this does not indicate increases in peak household bandwidth demand. Peak household demand varies by the profile of the individual household, and households may have peak usage at a different period from the aggregated network.

› The BCAR will monitor ongoing impacts and update its estimates for future publications.