NODEONE

Broadband Education Package

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Introduction

Broadband is high speed access to the internet. It is not the same as a 'dial-up' connection.

This document provides information on Broadband as a general concept, the technologies that are used to deliver Broadband in Australia, Speeds and Performance, Service Types and understanding the type of service you require, Some Basic Troubleshooting and Consumer Rights.

Technologies used in Broadband Delivery

This section of the document contains detailed information regarding the technology types that are used to deliver broadband services to you, as well as information about speeds and other topics.

Your location will determine what service types and the speeds that are available to you. Node1 Internet delivers services through either our own Fixed Wireless network, the nbn™ network, the LBNCo network or the Seacrest network.

The speeds that you experience will be influenced by several factors, including but not limited to the plan you choose, and the delivery technology used to service your address and your internal network setup.

What is the nbn™ network?

The nbn™ network is a next generation broadband network that is owned by the Australian government. It is being rolled out in order to provide more Australians with access to Broadband. The network is created using the following technologies either FTTH/P, FTTN, FTTB, FTTC, HFC, Fixed Wireless or Satellite.

nbn™ is the company that is building the network and wholesaling services to Retail Service Providers (RSP's). Node1 Internet is an RSP. nbn™'s services cannot be purchased directly by consumers. You can visit the nbn™ website to find out more information about their network and how it gets to your address.

The nbn™ network delivers services in the following speed tiers: 12Mbps, 25Mbps, 50Mbps, 100Mbps and 250Mbps (The 250Mbps speed is only available on FTTH/P technology in certain areas).

FTTH/P (Fibre to the House/Premise)

Services delivered through FTTH/P are delivered using a fibre optic cable directly to your premise. Services on this delivery technology will usually deliver high speed with minimal factors that can impair the connection. The nbn™ network and the LBNCo network use this delivery technology in some locations.

FTTN (Fibre to the Node)

Services delivered through FTTN are delivered to you via a combination of new and existing technology (including VDSL). FTTN delivers fibre optic cabling to a node and from the node, the existing phone lines are used to bring the

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service to you. FTTN can deliver high speed access, however the speeds are variable depending upon the distance between your house and the node as well as the condition of the existing phone lines. Speeds on this technology can vary throughout the day as interference levels in the home and the environment can vary.

FTTB (Fibre to the Building)

The FTTB delivery technology is a variant of FTTN. It is commonly used to connect apartment blocks or similar. Generally, a fibre optic cable will deliver fibre into the basement of the apartment and then services are delivered from their using existing phone lines in the building.

FTTC (Fibre to the Curb)

The FTTC delivery technology is another variant of FTTN. FTTC delivers fibre optic cabling to the curb outside your house and from the curb, the existing phone lines are used to bring the service to you.

HFC (Hybrid Fibre/Co-axial)

This delivery type is also refereed to as 'cable'. HFC is delivered to you via the existing 'pay TV' network. Most HFC networks in Australia can deliver speeds above 30Mbps, however in some cases, there will be limitations to the technology and upgrades are planned and managed by the network owner (Such as nbn™).

ADSL and ADSL2+

The ADSL2+ delivery method can deliver speeds of upto 24Mbps. The ADSL delivery method can deliver speeds of upto 8Mbps. However, the speeds received will vary dependant upon your distance from your house to your nearest telephone exchange. These services are also affected by interference from other services or from devices, the condition of the copper cabling that leads into the property, and by cabling and equipment inside your home.

As the nbn™ network is activated, ADSL and ADSL2+ services will be withdrawn from sale and eventually will be discontinued.

Fixed Wireless

This type of service is delivered to you using a tower nearby your premise and a receiver on your roof or outside of the premise.

Fixed Wireless services delivered via the nbn™ network can deliver speeds of up to 50Mbps (Although performance is affected by multiple factors, including but not limited to your distance to the tower, environmental factors and tower capacity).

Fixed Wireless services delivered to you using Node1 Internet's own network can deliver speeds up to 850Mbps (Although performance is affected by multiple factors, including but not limited to your distance to the tower and environmental factors).

Satellite

This type of service if delivered to you using the nbn™ Sky Muster satellite which connects to a smaller satellite on the outside of your house. Node1 Internet does not provide Satellite services at this time. Speeds delivered using this type of technology are variable up to a maximum of 25Mbps dependent upon the number of users connecting and other factors.

Broadband Speeds

The rate that data is transported on a network is measured in megabits per second (Mbps). The higher the broadband speed that is offered or available, the more data that can be delivered per second. Broadband speed is applicable to both 'download' (the rate that the data is delivered from the internet or server to your device) and 'upload' (the rate that the data is delivered from your device to the internet or server).

Broadband speeds are determined by the network access type (IE, which of the connection methods as above you are connected through) as well as a range of other factors. You may not always get the same speeds all the time due to variations within the network, either within our network or the wholesale access provider.

Broadband services are marketed and sold according to the line access speed, which is the theoretical speed which should be achieved (or very close to) in ideal circumstances. In many circumstances, the speeds which are achieved may be less. This is because consumer grade services in Australia are not a dedicated connection between you and the internet but rather, they are a shared connection to multiple users. Speeds may be affected when there is high demand from other users.

What can affect broadband speeds?

In a network, computers communicate with each other by sending packets (blocks of information). If any packets get lost or disrupted in the network that is delivering the internet to you, then this will affect the performance or speeds on your broadband service, for example your web browsing may error, or your viewing experience may drop out.

Factors that may affect the actual speeds that you experience may include but are not limited to: Your location in relation to the node or tower, your home wiring, your network setup, internet traffic congestion and whether the site you are trying to access is located in Australia or overseas.

When you open a website or a stream an online video, you are requesting to download information from a server. The speed and the performance of that download between you and the server is dependent on the network path between you and the server you are downloading from. The server you are downloading from may have multiple

users connecting and sharing resources or may have limited bandwidth available for downloads. These factors are common to all broadband technologies.

Other factors that can affect broadband performance include the capacity of the service providers network, the technology being used to deliver the service, the broader internet infrastructure and/or the content provider networks.

Peak Hours

Peak, or Busy hours are the times of the day when speeds that are experienced may be typically slower and/or more variable. These hours usually fall between 7pm and 10pm. During these hours, the largest demands are being placed on the internet networks and the servers that provide content and services. The speeds that are experienced during these hours can be significantly slower in some cases and speeds will vary widely based on the RSP.

Technology Types

All broadband networks are affected by constraints that are related to sharing the infrastructure with multiple consumers. Some factors that can affect speeds that are specific to the technology type being used are:

- On ADSL, ADSL2+, FTTN or FTTC: Your distance from the exchange or node.
- On HFC or FTTP: Congestion during busy hours. These services should perform at close to full speed during other times.
- FTTB: In some cases, performance and speeds may be affected by competing FTTB networks within the same building.

Your household setup and users

Within your household, the number of users accessing the internet may have a noticeable effect on service performance. The available speed will be shared between users and in households with many users or with a slower connection, this may cause a bottleneck.

Your modem and/or router will also have an impact on your speeds and performance. If you suspect this may be the case, you can discuss this further with our support team or you can contact the manufacturer.

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What speeds do different applications need?

Different applications need different broadband speeds in order to be able perform well.

Emails do not require much broadband speed and will usually work the same regardless of speed. Large attachments may take additional time to download.

Web Browsing do not require much broadband speed and will usually work the same regardless of speed. Speeds beyond 10Mbps will not provide much enhancement to the web browsing experience. Upload speed is relatively unimportant to web browsing, however high latency (if the site is hosted in another country) or on some broadband connections (Satellite) will affect the experience.

Audio Streaming does not require much broadband speed and will usually work the same regardless of speed. Typically, Streaming Audio requires between 0.1-0.3Mbps.

Video Streaming generally requires between 3-8Mbps of broadband speed in order to perform optimally. However, the quality of the video that is being streamed and the compression of the video will influence the required speed. Video streaming services employ a technique called 'buffering' in which a small amount of the content is downloaded and stored in advance to improve the experience. This means that the video stream can tolerate short pauses or speed decreases without affecting the playback. If the broadband speed is less than the rate at which the video is downloading, then the buffer will empty, and the video will pause or stop. Most streaming video services will adjust their video speed to avoid interrupting the video, however users may notice lower picture quality at those times.

To maintain acceptable quality video streaming, the requirements are: a broadband line speed that is significantly higher than the video streaming rate in order to let the buffer refill, an uncongested network path between your device and the server hosting the video, low packet loss and minimal or no drop outs.

Packet loss and congestion can result in video quality degradation. Dropouts will usually cause the video to stop, however some streaming services can tolerate drops of between 20-40 secs.

Downloading a video to a hard drive whilst playing the video

The speed requirements for downloading a video to a hard drive whilst also playing the video are the same as requirements for streaming video as above, except that the whole file is stored permanently on your hard drive rather than parts of the file being stored temporarily.

Voice over IP (VoIP)

VoIP only requires a low download speed. However, packet loss and latency can have a high impact on VoIP services. Conversations can be delayed or disrupted. VoIP may suffer during peak usage hours if the broadband service is being used by multiple users in the house at the same time.

Gaming

12Mbps is sufficient for most online games, however games will be adversely affected by any packet loss or dropouts and will affect the user experience.

Wholesale Network Speeds

As explained above, Node1 Internet is an RSP (Retail Service Provider). This means that in some cases, we use wholesale network providers such as nbn™ or LBNCo in order to deliver the service to you. Depending upon the service type being delivered to you, there may also be cases where we entirely own and operate the network that is used to deliver the service to you. For example, our fixed wireless services.

When we use a wholesale network provider, then it is them that provides the upper limits of attainable speeds under ideal conditions. Although the upper limit has been set by nbn™ (or the wholesale network provider), there are also additional factors that can affect the achievable speeds, such as the amount of CVC (Connectivity Virtual Circuit) we have purchased through nbn™ (or other wholesale provider), the access technology being used to deliver the service to you, your plan speed, your distance from the node or exchange, interference and your home equipment. If the CVC of an RSP is at capacity, then the achievable speeds will be affected.

Data

The broadband speed and the monthly data allowance will be shown in your plan. Your data allowance is measured in Megabytes (MB) or Gigabytes (GB). Your monthly allowance is the amount of data that you can download/upload before being subject to 'shaping' (the slowing down of your connection). Some of our plans have 'Unlimited' data, which means that there is no limit to the amount of data you can download/upload and you will not be shaped. All of our plans are subject to our Fair Use Policy.

Choosing a Broadband Service – What are your needs?

When choosing a broadband internet service, it is important to consider what your needs are. You should consider speeds, data allowances and monthly price.

If you are only going to use the internet for email, browsing and the occasional YouTube clip on your phone, then it unlikely that you will require the fastest speeds and large data allowances.

If you are going to use the internet to stream high definition video or enjoy online gaming, then you are probably a heavier user and should consider plans with faster speeds and more data allowance.

If you have many members of your family sharing the internet connection concurrently on multiple devices, then you are probably a heavier user and should consider plans with faster speeds and more data allowance.

If you need any more information to enable you to decide which plan may suit your needs the best, please do not hesitate to contact us by emailing info@node1.com.au or by calling 1300166331.

As we do not lock you into a fixed term contract here at Node1 Internet, you are free to change your plan to suit your needs at any time (for a once off small fee).

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The chart below provides information to help you decide what speeds you may require:

What will I use the service for?	Speed I may need
Web Surfing and Emails	5Mbps
Web Surfing, Emails and Occasional Streaming or Online Gaming (with a few devices connected)	5-10Mbps
A Moderate amount of High-Definition Streaming, Online Gaming or Downloading Files (with several devices connected)	10-25Mbps
A large amount of High-Definition Streaming, Online Gaming or Downloading Files (with many devices connected)	25-40Mbps
A very large amount of High-Definition Streaming, Online Gaming or Downloading Files (with a large number of devices connected)	40+Mbps

The chart below provides information to help you decide what data allowance you may require:

What will I use the service for?	Data I may need
Web Surfing and Emails	1-10GB per month
Web Surfing and Standard Definition Streaming	10-100GB per month
Web Surfing, High Definition Streaming, Movie and Music downloads	100-400GB per month
Web Surfing, High Definition Streaming, Movie and Music downloads and online gaming	400+GB per month

Usually, ordinary web surfing will use approximately 2.5MB a minute, whilst video streaming can use somewhere between 0.3GB-7GB per hour depending upon video resolution and compression. You can log into our 'My Account' feature on our website to find out how much data you are using on a monthly and daily basis.

Prices and Contracts

Broadband service prices vary dependent on the provider and the contract length. At Node1 Internet, we do not lock you into a fixed term contract. You can find out information regarding all our available plan options on Our Website.

You should consider the following factors carefully before deciding what broadband service plan is right for your needs:-

- Features such as speed, data and inclusions (such as email addresses).
- Whether the service needs to be bundled with other services.
    o Node1 Internet does not offer bundling
- What the once off setup/connection fee are.
- What the ongoing monthly plan charges are.
- If the broadband service is subject to a contact length and if so, what early termination fees are applicable if you close your service before the contract has expired.
    o Node1 Internet does not have fixed contract lengths at this time.
- Whether the plan is subject to extra charges once you have used your data allocation.
    o Node1 Internet 'shapes' your connection and does not charge you additional fees for usage.
- Whether the broadband plans has peak and off-peak data allowances.
    o Node1 Internet offers peak and off peak allowances. (Node1 Internet does) and during the different periods of time the data allocations are different.
- Whether the broadband plan will have included equipment such as a modem/router.
- Whether the broadband plan will not allow you to use a modem/router that is not supplied by the seller.
    o Node1 Internet will allow you to use any compatible modem/router, whether supplied by us or yourself.
- The level of technical support provided.

You should consider all the factors and differences in any broadband plan or provider carefully before deciding which one is right for you.

FAQs

Some of the most frequently asked questions regarding broadband speeds and plans are:

- What does 'up-to' mean when considering broadband speeds?
    o The term 'up-to' is used when advertising speeds because RSP's usually advertise plans according to the available connection speed, which in some cases can be confusing for consumers because not all technology types or customers can achieve the maximum theoretical speeds due to constraints as explained above.

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- Will I Always get the same broadband speed?
    - o Broadband speed will generally fluctuate over time and dependant on the time of the day. There are multiple other factors which can affect the speeds, including but not limited to:-
        - ▪ The number of people using the RSP's network at any given time;
        - ▪ The number of users/devices using the internet in your household;
        - ▪ The number of users that are accessing the particular website, content service or online game at the same time;
        - ▪ The capacity of the server that you are accessing content from.
    - o Busy Hours (or Peak times) typically fall between 7pm-10pm and are the period of the day in which the speeds are most likely to vary the most.

- Where can I find information about the speed of my broadband service?
    - o There are many websites that you can use to test the speed that your device is receiving on the internet. Some of these sites are:
        - ▪ www.speedtest.net
        - ▪ www.fast.com
        - ▪ www.speedof.me
        - ▪ www.testmy.net

        You should remember that the speeds test results that you receive on these websites may be affected by any of the factors as explained in this document and that they will only test the speed at the particular time that you run the test. You should run regular tests at varying times throughout the day in order to better understand the performance of your broadband service.
    - o You could use a broadband monitoring program in order to monitor characteristics such as speeds, latency and packet loss. Some of these products are (None of these products are directly endorsed by Node1 Internet. Any damage that may result to your devices as a result of the use of these products is your own responsibility and Node1 Internet accepts no responsibility. Some of these products may attract charges):
        - ▪ Beagle Software
        - ▪ Smoke Ping
        - ▪ Think Broadband

        These programs will also be affected by any of the factors explained throughout this document.
    - o You can visit broadband user forums such as Whirlpool to enquire about the performance of competing providers.

- What is the difference between advertised speeds?
    - o Because an RSP will use a combination of their own networks and a wholesale network provider such as nbn™, the achievable speeds offered by the wholesaler may not reflect the actual speeds delivered by the RSP on a broadband service. You should consider the typical evening speeds when assessing whether a service may be suitable for your needs. A retail broadband service is made up of many factors as discussed throughout this document and these will influence the speeds that a broadband service will receive. Some of these factors include:
        - ▪ The wholesale network used;

- The technology being used to deliver the service;
- Your equipment quality (modems and routers);
- Your equipment location within your house;
- Your selected broadband plan;
- How many devices you use at once;
- The amount of traffic on the website or service that you are visiting;
- How the RSP's network is configured;
- Whether you are connected to your modem/router via WiFi or ethernet cable;
- The location of your device in relation to your modem/router.

- What should I consider when setting up my internet?
  - You should consider whether the technology type you are using (FTTN (And Variants) or ADSL) may be affected by interference from older home wiring.
  - Whether you have any home devices that may interfere with your service or your Wi-Fi performance.
  - The most optimal location for your Modem/Router to increase overall performance. Take the following into consideration:
    - Do not place the router near other electrical devices (such as light switches, lamps, microwaves, TV's, Monitors, Stereos, Speakers or Wi-Fi emitting devices such as cordless phones or baby monitors.)
    - The modem/router should be placed on a shelf or table rather than low to the ground or on the floor.
    - You should consider the placement of your /modem/router in relation to obstructions in your house (such as internal solid brick walls).
    - You should try to place the modem/router in a central location that will provide Wi-Fi coverage evenly around the house.
    - Whether it may be best to use cabling between the modem/router and certain devices (such as TV's).
    - If your house if very long or has multiple stories, then you should consider purchasing one or more Wi-Fi extenders.

If you are experiencing any speed related issues with your service, the information below may help you address them. These are some of the most common factors that can affect speeds. Alternatively, you will find more information further down in this document under the Troubleshooting Section.

- Are you using Wi-Fi or are your devices connected via a cable?
  - Wi-Fi connected devices are subject to additional factors such as your distance from your modem/router, interference or equipment or obstructions between you and your modem/router.
- Are you using a modem/router that is suitable and capable of performing at the speeds of your broadband service?

- Is your computer and/or device free from malware and viruses?

- What content are you trying to access?
    o Some content is cached (stored) in Australia and other content needs to be downloaded from overseas servers.
        ▪ Congestion affecting overseas networks can adversely impact your speed, performance and latency.

- Is the server that you are downloading content or information from capable of fast speeds?

- Are you accessing the internet at peak times?
    o Peak internet traffic is a lot like peak hour road traffic. The more users, the slower everyone can go.

- Do you have a lot of users in your house concurrently using the internet?
    o The more users in your house, the more likely to affect the performance.

Troubleshooting

You can use the following table to troubleshoot and identify some of the most common issues that may affect the speed and performance of your broadband service.

Issue	Impact	What you can do
Slow Wi-Fi or Wi-Fi Drop-Outs	There may be certain areas in your home where you cannot receive signal from your WiFi router/modem due to the layout of your house.	- Move your Wi-Fi modem/router to a central point in your home. - Re-Start your modem/router. - Position your modem/router well above the floor. - Position your modem/router away from thick walls and other obstructions. - Connect via an ethernet cable.

Issue	Impact	What you can do
Device Issues (e.g. tablet, phone, P.C.)	Slow speeds may be due to: - Malware - Viruses - Older Computers/Devices - Faulty Devices	- Protect your computers and devices against malicious attacks. - Test the speeds on a different device. - Check your PC storage. - Check your Security/Anti-Virus software.
Multiple Devices Sharing Data	If you have multiple devices connection through your internet service at the same time then they will all be sharing the same bandwidth which could cause slower speeds.	You should disconnect any devices you are not using.
Excessive Uploading/Downloading	When some devices connect to Wi-Fi networks, files can be automatically uploaded to platforms such as Facebook or Dropbox. This can affect your download speeds.	Check your device settings. Check if you have exceeded your data allowance.
Unknown Background Applications	Background applications such as automated updates, security updates/scans or cloud backups may have an impact on your speeds.	- Check your device settings. You may want to disable non-essential automatic updates.
Interference	Interference sources can be either internal and/or external. Internally these can be devices such as Baby Monitors or Faulty electrical devices. Externally these can be from a number of sources that can introduce either impulse noise or continuous noise from electrical machinery, solar inverters, LED lighting etc. See	- Check if there are any other radio emitting devices that are experiencing problems. You can do this using an AM radio. See reference for further instructions. - If you identify a source, you should turn it off and remove it.

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	below for more common interference causes.	- If you have a PLT (Powerline Telecommunications Device) you should remove it and test further. These devices are known to interfere with FTTN (VDSL or ADSL) services. - Unplug each device and test again. - Look for patterns, IE, is the broadband performance worse whilst the microwave is in use?

Sometimes people will change their broadband plan expecting upgraded speed and performance, but they will find that it is not the case. While the plan may be upgraded, the technology type will remain the same and you may not be able to perform at the upgraded speeds through the technology that connects you.

Interference can occur from a power source which generates interference in the frequencies used by a DSL or FTTN broadband service. This interference will affect the stability and performance of the service.

Some possible causes of electrical interference with services can be: -

- Solar Power Inverter
- LED Lighting
- Building wiring
- Power Supply for laptop
- LCD Monitor
- Mobile Phone Charger
- Charging devices
- Set Top Boxes
- Satellite Devices
- Lighting
- Video Player
- DVD Player
- Television
- Light dimmer switches
- Christmas lighting
- Display lighting
- Fax Machine

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- Printer
- Masthead Amplifier
- Powerline telecommunications devices
- Street lighting

WiFi specific possible interference causes: -

- Baby Monitors
- Cordless Phones
- Microwave Ovens
- Your neighbours Wi-Fi modem/router (even from a few hundred metres away)

Consumer Rights

All providers are required to publish key information about broadband services that they offer in a document called a Critical Information Summary (CIS). You can view Node1 Internet's CIS documents on our website. A CIS includes information such as a description of the service, data allowances, prices and setup costs and termination fees (if applicable). They are designed to be an overview of the service.

Providers also apply terms and conditions to a service, typically in the form of a Standard Form of Agreement. You can view ours here. A standard form of agreement details all of the applicable information such as the circumstances under which your service may be disconnected, billing and payment information and terms that relate to privacy of your information.

Most providers also apply a 'Fair Use' (also known as an 'acceptable use' or 'fair go') policy to their services. You can view ours here. This policy is designed to define what is reasonable use of the service and what is not reasonable use of the service. These policies will usually contain terms related to data usage.

All consumers are also guaranteed statutory rights under the Australian Consumer Law (ACL). You can find further information regarding ACL at www.accc.gov.au. If you have a dispute with your provider about the quality of your service and are unable to resolve it with them directly, you can complain to the Telecommunications Industry Ombudsman (TIO): www.tio.com.au.