

## Boosting your connection

### Description

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You can enhance your phone or internet connection using hardware like antennas, signal boosters, and repeaters, which amplify signals and extend coverage for improved connectivity.

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# . Aerials and antennas: key components



In many cases, you can improve, or even get, fixed wireless or mobile internet/phone access in your premises by using a passive antenna and/or pole. The key components of a passive antenna installation are:

- - 1How do I know if an antenna will work for me?
    - A desktop site survey can assist you with determining if there is mobile reception in your area, and what equipment might be needed to get connected.

Contact the Regional Tech Hub team for a free Desk Check to discuss if this option is right for you.

You can also get desk checks from private companies, however they will cost money:

- [Telco Antennas](#) desktop site survey cost is \$132.
- [OnWireless](#) desktop site survey cost is \$99.

These businesses can then put you in touch with a specialist in your area who understands the requirements for your state.

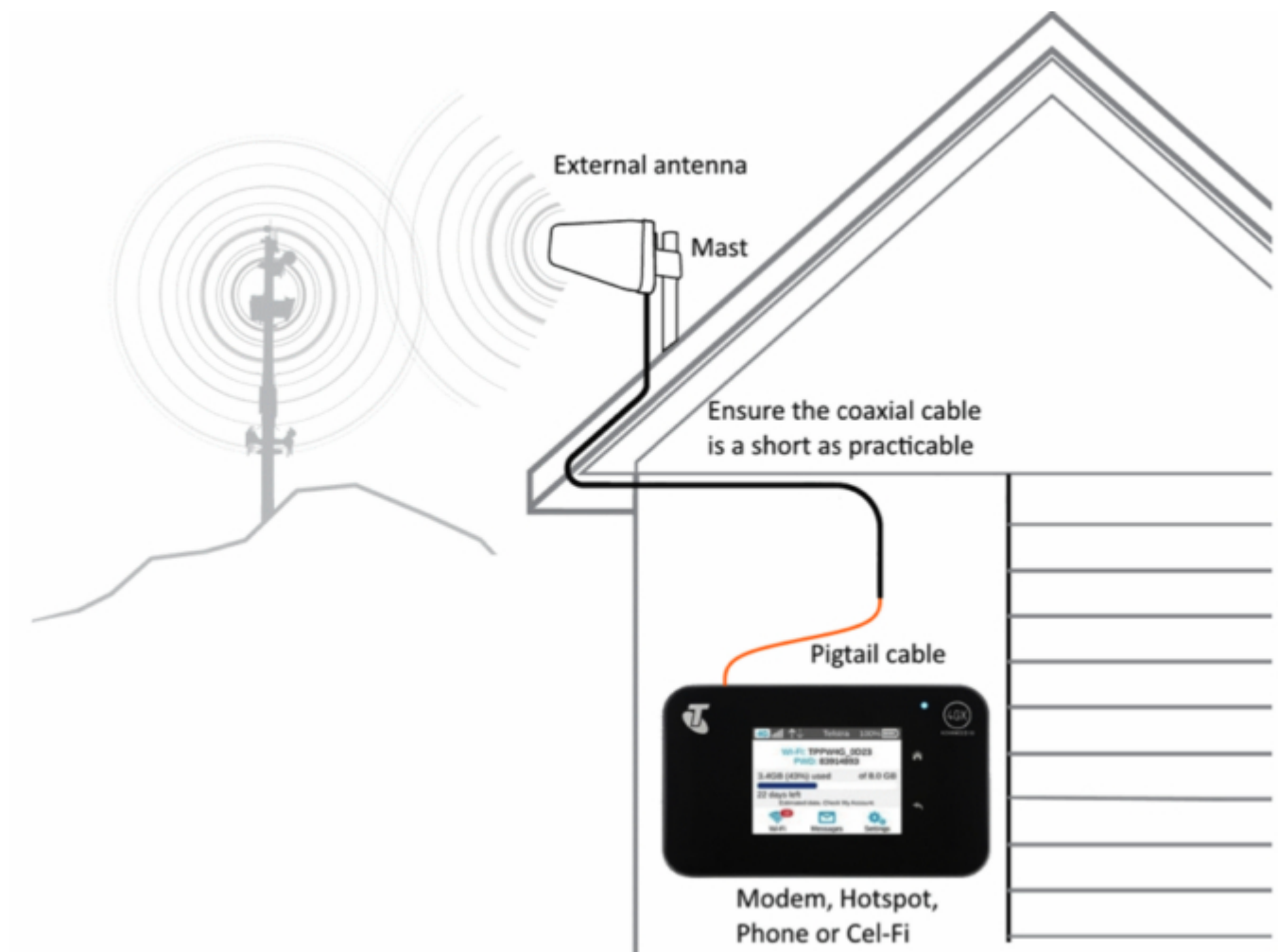
Their report will advise on likely signal levels, the sort of mobile services available, the best antenna and extension device for your location and where to point your antenna.

- 2Selection of the correct antenna
  - 1. The correct antenna is one that works for the bands/ frequencies that are broadcast by your service provider at your location.
    2. We recommend reading through the BIRRR [mobile network enhancement page](#).
    3. The chosen antenna must have appropriate directional gain.
    4. Where there are several competing towers, an omni-directional antenna might be suitable.
    5. For some locations, a good internal antenna placed in an optimum location by a window may be all that is required.
    6. Visit [Telco Antennas's Antenna Selection Guide](#) for an explanation of which antennas work best in various geographic locations.
- 3Antenna location
  - For example, how high, best location on roof etc. This can be a tedious task, but well worth the effort. It is known as the 'antenna dance'.



1. If you get signal outside, your mobile phone may be used to find the spot with strongest signal.
  2. Ensure that your phone supports the same bands as your modem and the service that you are chasing.
  3. The signal level will display in a negative value in dBm.
  4. The lower the negative value the stronger the signal e.g. -81dBm is stronger (better) than -89dBm.
- 4A suitable mast
    - Your TV antenna or your satellite dish mast may be suitable, but then again they may be in a poor location for mobile data. You may need to consider installing a separate pole/mast.
  - 5Where to best point a directional antenna
    - 1. Your desktop signal survey will have located the towers which service you.
      2. Use Google Earth or similar to determine the direction of these towers from your location.
      3. Point your antenna accurately by using local landmarks that indicate the direction of the required tower.
  - 6A gas arrestor may assist in lightning protection of your equipment
    - 1. Install a gas arrestor and grounding (as required).
      2. Seek professional advice for optimal installation of these devices. Contact your [equipment provider](#).
  - 7Once the installation is complete
    - Re-check the signal level and fine tune the antenna direction by using your indoor modem, hotspot mobile phone or Cel-Fi repeater signal level screen. This will also check that your coaxial connections are solid and correct.
  - 8Coaxial connectors cause signal loss
    - 1. Use N-type connectors where possible; for example, in the antenna to cable connector.
      2. See this guide for further information on [Telco Antennas coaxial cable types and connectors](#).
      3. Ensure that all external connections are waterproofed with self-amalgamating butyl rubber tape.
  - 9Ensure that the coaxial cable run from antenna to equipment is as short as possible
    - It is the best lowest loss cable that you can afford. It is no good installing a great antenna only to lose precious signal and potential performance by using poor quality, high loss coaxial cable.
  - 10Location of the devices

- Locate the phone, modem or Cel-Fi device as close as possible to the antenna.
- 11 Choose the correct pigtail to interface your coaxial cable to your modem, hotspot, phone or Cel-Fi repeater
  - 1. The pigtail is a short flexible piece of coaxial cable which adapts to your device.
  - 2. If a MIMO installation is used, youâ??ll need to install two cable runs.
- A diagram of a typical external antenna installation, which identifies the key components, follows (Image: BIRRR).



## • What is 4G MIMO and why might I need it?



MIMO (multiple input, multiple output) is an antenna technology for wireless communications in which multiple antennas are used at both the source (transmitter) and the destination (receiver). It uses a clever radio frequency technique that effectively doubles the bandwidth of a radiated 4G carrier. It is not available for 3G in Australia.

Note: An example of the use of MIMO is on wifi routers inside your house. It's used to increase the speed of local wifi transmission. Those two (or three or four or more) antennas on your wireless router use MIMO.

- See Telco Antennas for further details on [MIMO](#).
- Still need more info? Check out Telco Antennas [Frequently Asked Questions](#)

*NB: Telstra will be switching off 3G in 2024. It is not recommended to spend large amounts of money on boosting 3G service. 3G is being replaced with 4G so if you're spending any money on antennas or repeating equipment, please ensure these are 4G compatible.*

*Be aware that boosting 3G services may not deliver faster speeds or reliability.*

## • What are mobile repeaters?

- ◦ 1What are mobile repeaters?

Mobile repeaters are devices that capture a strong mobile signal, typically via a passive antenna mounted on your roof, and rebroadcast it to improve coverage in areas with weak signal. The repeated signal is broadcast in a circular range around the repeater, typically covering an area between 20 to 60 meters, depending on the unit and any interference from walls or furniture.

- 2Licensing and legal requirements

Repeaters must be licensed by the mobile network they are boosting. Each repeater can only broadcast one network, meaning you cannot use a Cel-Fi device to amplify both Telstra and Optus signals simultaneously.

It's important to note that unlicensed signal boosters are illegal in Australia. Their use can interfere with the mobile network and result in severe penalties, including fines and imprisonment under the Radiocommunications Act 1992. Offenders can face up to two years in prison or a corporate fine of up to \$270,000 per offence. Visit [here](#) for more information on illegal boosters and repeaters.

- 3Legal devices in Australia

Cel-Fi Pro, Cel-Fi GO, and Telstra Branded Smart Antennas (Cel-Fi GO) are the only licensed and legal mobile repeaters approved for use in Australia. These devices are distributed by Powertec Telecommunications and RFI Technology Solutions, outside of Telstra's branded products.

Ensure you use licensed repeaters to avoid penalties and ensure compliance with Australian regulations.

NB: Cel-Fi Pro and GO Repeaters and Telstra Branded Smart Antennas/Cel-Fi Go are the same devices, with the Telstra supplied one being different in colour, with Telstra branding.

[Powertec Telecommunications](#) and [RFI Technology Solutions](#) are the Australian distribution partners of [Nextivity Cel-Fi](#) (outside of Telstra's branded Smart Antenna products).

## • Licensed and legal repeater equipment

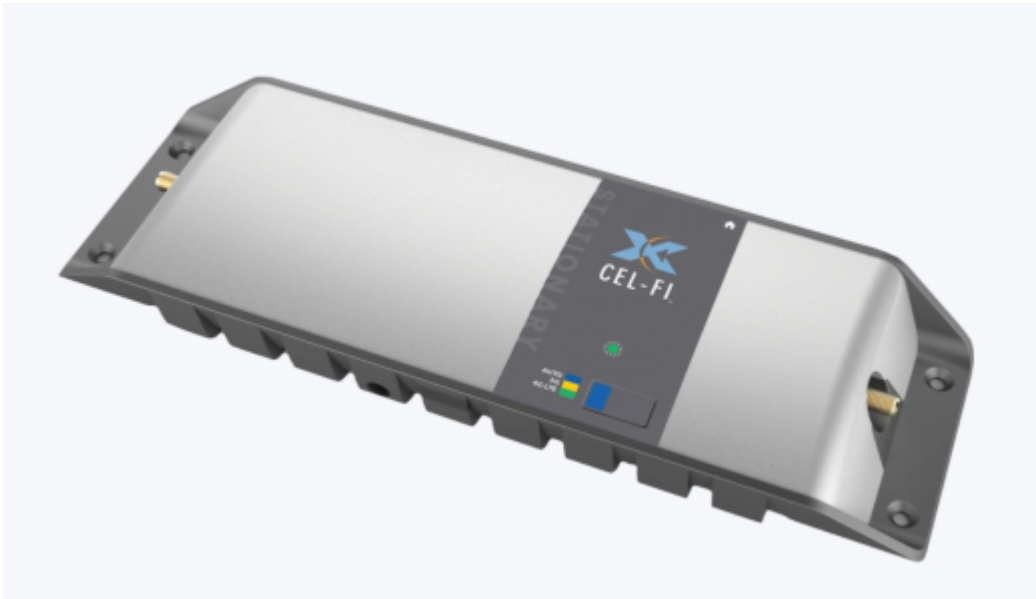
- - 1Cel-Fi Pro



[CEL-Fi Pro](#) is an indoor smart signal repeater. Available for the Telstra, Optus or Vodaphone networks.

To get help with setting up a Cel-Fi Pro or Smart Antenna visit the [Cel-Fi page](#) or see the notes below. To purchase a Cel-Fi Pro in Australia, help with installation and compatible antenna advice visit [Powertec](#).

- 2Cel-Fi Go Stationary



[CEL-Fi Go Stationary](#) is a smart signal repeater. Available for the Telstra, Optus or Vodaphone networks. This multi-band solution is ideal for use in commercial properties, government buildings, agricultural settings, small manufacturing operations, rural areas, businesses, and large homes.

To get help with setting up a Cel-Fi Go Stationary visit the [Cel-Fi page](#).

To purchase a Cel-Fi Go Stationary in Australia, help with installation and compatible antenna advice visit [Powertec](#).

It is highly recommended to use surge protectors with the Cel-Fi Pro and Go Stationary devices, and a UPS unit to power the repeater during general mains power failures or when the generator is off. They're designed to power a desktop for 15 minutes or so, but are large enough to power a CelFi repeater for much longer.

- 3Cel-Fi GO/GO+/mobile



The [CEL-Fi Go Mobile](#) is a Smart Signal booster for addressing the challenge of poor cellular coverage on the road. Ideal for vehicles and boats, a suitable antenna is needed and these are recommended to be installed by a professional.

To purchase a Cel-Fi Go in Australia, help with installation and compatible antenna advice visit [Powertec](#).

## • Signal levels and dBm

Your phone or modem can be used to display signal levels in dBm. It is important to understand the differences between a 3G signal level and a 4G signal level and how this translates to quality of service.

- ○ 1GSM & 3G networks

The 3G signal level is identified by a measure called RSSI (Received Signal Strength Indication) and is measured in dBm. RSSI is a measure of the available signal plus the noise in band. A level of -50dBm is a perfect signal and at -110dBm (usually earlier) youâ??ll lose the 3G connection.

- -50dBm to -75 dBm â?? High Signal (good voice and data)
- -76dBm to -90 dBm â?? Medium Signal (good voice and data)



- -91dBm to -100 dBm â?? Poor Signal (good voice data, marginal data with drop-outs)
- -101dBm to -109 dBm â?? Very poor Signal ( voice may be OK, no data)
- -110dBm to -113 dBm â?? No signal
- 24G/LTE

LTE signal strength is measured in RSRP (Reference Signal Received Power). The 4G RSRP signal level measure is as a â??rule of thumbâ?? around -20dBm lower than the 3G RSSI measure, such that 100dBm (RSSI) would equate to around -120dbm (RSRP). RSRP is a more accurate measure of signal strength than RSSI, as it excludes noise and interference on the network. It measures just the usable portion of the signal. Although the 4G RSRP signals appear lower, it does not mean your signal level is worse.

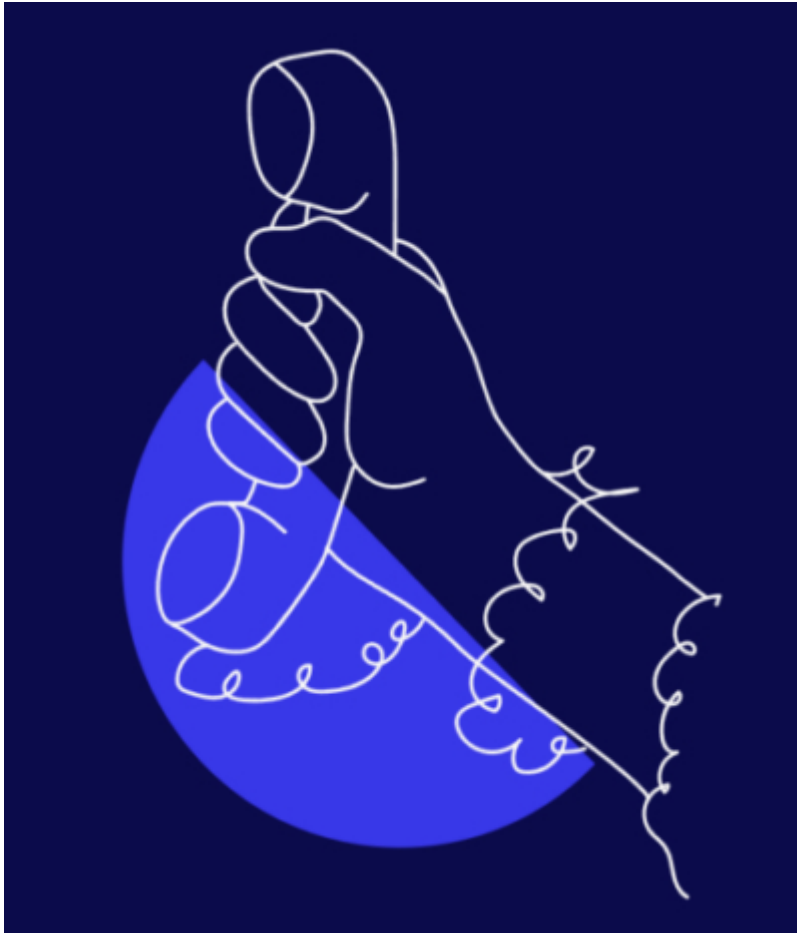
- -50dBm to -90dBm strong signal (stronger signals are possible), fast data
- -91dBm to -105dBm good signal, fast data
- -106dBm to -112dBm fair signal, useful and reliable data speeds may be attained
- -113dBm to -125dBm reliable data possible, performance may be slower, increased latency
- -126dBm to -136dBm performance will drop dramatically
- -136dBm to -140dBm â?? Disconnection

Read [this guide](#) to learn more.

## • Equipment and advice on boosters and repeaters?

The following list includes some of the companies who can assist you with finding the right solution for your needs. You can also check with Telstra and other network carriers.

- [Telco Antennas](#) â?? Advice, equipment and installation
- [OnWireless](#) â?? Advice, equipment and installation
- [Powertec Technologies](#)â?? Equipment provider
- [NB Tec](#) â?? Equipment provider â?? offers a licensed solution that is a modem/antenna & booster in one that can connect to Telstra, Optus or Vodafone mobile networks.
- [Connected Farms](#) â?? Advice, equipment and installation.
- [Zetifi](#) â?? Advice, equipment and installation.
- [Network Hoist](#) â?? Advice, equipment and installation.



## Disclaimer

This page features information originally prepared by Better Internet for Rural, Regional and Remote Australia (BIRRR) in conjunction with John Kitchener and [Telco Antennas](#).

Please note that while all care is taken by BIRRR and the Regional Tech Hub when collating information, we recommend you check with your service provider, local government and local installer regarding your own connection issues and infrastructure needed.

[Contact our helpdesk](#)

### Category

1. Guides

### Date

16/01/2026

### Date Created



08/11/2023