

Installing digital television: houses

This document will assist you to upgrade your antenna system for your house to receive free-to-view digital television.

Owners and occupants of apartments, office or hotel complexes that share a common or Master Antenna television (MATV) system should refer to the companion document ***Installing digital televisions: apartments and offices***.

Overview

Most people living in houses will have excellent digital reception for a digital television set or digital set top box from the existing antenna—provided it is in good repair and is connected with good quality coaxial antenna cabling.

In developing Digital Channel Plans for different parts of Australia, the Australian Media and Communications Authority (ACMA) has given particular attention to ensuring that, as far as possible, consumers need not purchase an additional antenna. In some areas, however, this may prove necessary.

Therefore it is very likely that when digital transmissions start in a particular area the viewer will receive both the new digital services and the existing analog television broadcasts without the need to upgrade or replace their antenna.

Some very old VHF antennas in metropolitan areas may need to be re-tuned or replaced to receive digital television on channels 11 and 12.

Frequency bands antennas should receive

Analog and digital television services use the following:

- VHF television band 1 (channels 0, 1 and 2)
- VHF television band 2 (channels 3, 4 and 5)
- VHF television band 3 (channels 5A, 6, 7, 8, 9, 9A, 10, 11 and 12)
- UHF television band 4 (channels 28–38)
- UHF television band 5 (channels 39–69)

Typical VHF antenna configurations are:

- VHF band 1 (providing channels 0–2 (analog only))
- VHF band 3 (providing channels 6–12)
- VHF bands 1 and 3 (providing channels 2 and 6–12)

Typical UHF antenna configurations are:

- UHF band 4 only (providing channels 28–38)
- UHF band 4 and lower band 5 (providing channels 28–50)
- UHF band 5 only (providing channels 39–69)
- UHF bands 4 and 5 (providing channels 28–69)

Typical combined VHF/UHF antenna configurations are:

- VHF bands 1 and 3 and UHF band 4 (providing channels 2, 6–12 and 28–38)
- VHF bands 1 and 3 and UHF bands 4 and 5 (providing channels 2, 6–12 and 28–69)
- VHF band 3 and UHF band 4 (providing channels 6–12 and 28–38)

However, not all bands will be used in each area. Likewise, not all antennas receive all bands or channels.

The bands used and, therefore, the necessary antenna will depend on the transmitters that service your area.

Channels allocated to local television services

As a first step, ACMA recommends attempting to receive digital signals with existing antennas to determine whether it is necessary to replace or upgrade the antenna.

In some areas, ACMA has had to plan more than one transmitter—a main transmitter (high power) and a secondary transmitter (low power). The transmitter providing the better reception for your area will determine the antenna required.

In metropolitan areas with coverage from the main transmitters (high power)—antennas should receive band 1 (for analog services only) and bands 3 and 4 (for analog and digital services).

In metropolitan areas with coverage from the secondary transmitters (low power)—antennas should receive bands 4 and 5 (for analog and digital services).

In regional areas, antennas should receive band 4 and/or band 5 and, in some cases, band 3 (depending on the frequencies allocated to the local television services).

In areas where multiple bands are used, multi-band antennas or multiple antennas are necessary depending on the channels currently available.

Local digital television and datacasting services

ACMA publishes its digital television channels plans as it finalises them (see **Planning digital TV** on the ACMA website at www.acma.gov.au).

ACMA aims to ensure that all digital free-to-air television services are in the same frequency band as the current analog services in each area.

Wherever possible, if an analog channel is currently in one of the VHF bands then so will the equivalent digital channel.

Assistance with digital television installation

Seek advice about digital television from an experienced installer of antennas and/or audio/video equipment.

Dos and Don'ts for people living in houses

- **DO** use an antenna that will give reception on both channels 11 AND 12 where those channels are in use for digital transmissions.
- **DO** use an antenna with optimised coupling of the VHF/UHF sections for maximum signal transfer and best multiplex flatness.
- **DO** use double screened coaxial leads for the antenna download, use screened outlet plates and use double screened coaxial cable for the fly lead.
- **DO** use good quality screened connectors—only HEX crimp 360 degree concentric or compression connectors.
- **DO** ensure that all cable preparation is in accordance with the connector manufacturer's specifications.
- **DO** put the digital receiver (whether set top box or inbuilt tuner) as the first component in the receiving equipment connected at RF.
- **DO** use a signal level meter that is suitable for both digital and analog signals and measure the signal levels on all channels.
- **DO** use the S video or component video connections rather than the RF connections to achieve better video quality.
- **DO** prove that normal signal levels are at least 6dB above threshold by attenuating the signal and checking that the receiver still works on all channels.

- **DON'T** use twist on or soldered connectors.
- **DON'T** rely on that old antenna giving adequate reception on channels 11 and 12 under all conditions.
- **DON'T** use a masthead amplifier unless absolutely necessary.
- **DON'T** use excessive masthead amplifier gain—there should be just enough gain to compensate for the feeder loss.
- **DON'T** leave an installation with digital signal levels just above threshold.
- **DON'T** let any signal level applied to the receiver exceed 77dB μ V.
- **DON'T** measure digital signals with a meter that is only suitable for analog.
- **DON'T** forget to check the analog services.

Frequently asked questions about installing antennas for digital television reception

What is the digital cliff/threshold?

With analog television, as the signal strength is reduced so the pictures steadily become noisier. With digital transmission, the quality of the pictures remains unaffected until quite suddenly the pictures fail altogether. This point is known as the digital cliff or threshold.

Clearly, it is very important to make sure that a receiver normally operates well above the threshold so that variations in signal level (for example, due to the antenna moving in the wind to foliage growing on trees between the antenna and the transmitter) do not tip the signal over the cliff.

What is the 'operating window' of a receiver?

Two main factors limit the range of signal levels that should be present at the input to a digital television receiver. The first is the minimum level of the digital signal, which must not fall below the threshold (typically 35–40dB μ V, but in some cases higher). The second is the maximum level of signal that can be applied before the receiver overloads. The highest signal is usually an analog signal, and this should not exceed 77dB μ V.

All digital and analog signals at the input to a digital receiver must fall within this operating window.

Why is it important to measure signal levels, even in simple domestic installations?

Simply to ensure that all signal levels are within the operating window of the receiver. Signal levels that are too high can impair or prevent reception. Signal levels that are too low can sometimes go over the digital cliff.

For a reliable installation, avoid both of these conditions. Generally, installers who check signal levels have far fewer return visits.

Can I use my old analog signal level meter to measure digital signals?

NO! If you do, there will be an error in the measurement. It is important to only use a meter that is designed for use with digital transmission.

Why do I need to limit the use of masthead amplifiers?

Use of masthead amplifiers with too much gain can close a receiver's operating window to zero, making reception impossible. Use masthead amplifiers only where the feeder losses from the antenna to the receiver are unavoidably large and the gain of the amplifier is, at most, no more than 5dB greater than the feeder loss it has to overcome. Use only a masthead amplifier with an inter stage gain control.

In areas of very poor signal strength, a masthead amplifier can improve reception but it is still important to avoid excessive gain. Use the principle of 'minimum gain for maximum benefit'.