

## Shopping for a free to view digital tv receiver?

As with many other types of modern electronic equipment, shopping for a digital television receiver can be a time-consuming business.

Information has to be absorbed by consumers from a variety of sources, while receivers available now have many different features, and, over time, will have even more.

### Two Types of Digital Receiver

A wide range of digital receivers is available now, but they all fall into one of two types. Consumers will be offered the option of choosing between either a digital Set Top Box (STB) or an Integrated Digital Television set (IDTV).

A digital STB, which contains a digital tuner, connects to a wide variety of TV screens and sets, including conventional cathode ray tube (CRT) TVs, plasma display panels (PDPs), front and rear projection sets, and liquid crystal display screens (LCDs).

All digital STBs will be capable of decoding Standard Definition programs (hence SD-STB) and some will be capable of decoding High Definition programs as well (hence HD-STB).

An iDTV, having a digital tuner integrated with its other components, does not need to be connected to a separate STB in order to receive and display digital TV.

### Connecting a Digital STB to a TV Screen

Digital STBs can be connected to any traditional analog TV set with a 4:3 aspect ratio<sup>1</sup>, and digital television programs can be viewed on that set. But there are some picture compromises that occur in order for widescreen pictures to be displayed on a 4:3 screen shape.

Digital STBs can also be connected to any analog widescreen 16:9 receiver as well, with the added advantage that the full screen area is filled with widescreen pictures.

And digital STBs can also be connected to monitors (screens that are not integrated with a tuner or decoder of any kind) so that digital TV programs are displayed on that screen or monitor.

The following answers to frequently asked questions might make shopping for a digital TV receiver a little easier.

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<sup>1</sup> The aspect ratio, or screen shape, of television sets (and programs) is often referred to by reference to its horizontal and vertical dimensions. In this context 4:3 or 1.33 to 1 ratio, signifies the old rectangular screen shape that is 4 units of measurement wide by 3 units high. The aspect ratio most commonly used for digital TV is the widescreen 16:9 or 1.78 to 1 ratio.

## Frequently Asked Questions

**Q. MY OLD ANALOG TV SET IS COMING TO THE END OF ITS LIFE. WHAT ARE MY OPTIONS FOR VIEWING DIGITAL FREE-TO-AIR TV?**

**A. YOU HAVE FOUR OPTIONS –**

- 1. BUY A NEW ANALOG WIDESCREEN 16:9 TV SET PLUS A DIGITAL STB.**
- 2. BUY A NEW CONVENTIONAL ANALOG 4:3 TV SET PLUS A DIGITAL STB.**
- 3. BUY A MONITOR OR SCREEN THAT IS CAPABLE OF DISPLAYING DIGITAL TV PLUS A DIGITAL STB.**
- 4. BUY AN INTEGRATED DIGITAL TV (IDTV) SET.**

### **Option 1**

With an analog widescreen 16:9 receiver connected to a digital STB you will benefit from excellent reception and picture quality, better sound, extra channels, multiple views of some sporting events, and other services, plus you will get the full benefits of viewing widescreen programs (from DTV and DVDs) – the whole of your wide screen will be filled with action.

### **Option 2**

With a conventional analog 4:3 TV set connected to a digital STB you will get all of the benefits in Option 1 above, with the exception that, as the 4:3 shape of your present TV does not match the 16:9 shape of digital programs, the widescreen pictures you will see will not use the full area of your screen but will display black bars top and bottom. In other words, the widescreen picture is shrunk in order to fit it into the width of your screen.

Accordingly, DBA recommends consumers contemplating the purchase of a new analog TV set give serious consideration to the purchase of an widescreen 16:9 receiver.

Widescreen is rapidly developing as a global standard for television programs – the great majority of new television programs from our traditional suppliers are now made in widescreen as the 4:3 aspect ratio for programs is being phased out around the world. As well, widescreen is the aspect ratio of many films made available on DVD, and DVD popularity in Australia and around the world is growing at a very high rate. In other words, a widescreen television receiver will future-proof your viewing options.

Nonetheless, if you decide to purchase an analog 4:3 TV set you can be assured that you will be able to use the set for the whole of its economic life.

Even after analog TV is turned off – something that will not happen for a minimum period of at least 8 years after the commencement of digital TV in an area, and very likely for quite some time longer than 8 years – you can continue to view TV programs on that TV set by connecting it to a digital STB.

### **Option 3**

Instead of an analog TV set (whether 4:3 or 16:9), you buy a free-standing monitor or screen (almost invariably 16:9 widescreen) which, when connected with a digital STB, will display digital TV programs to full effect, ie, using the whole of the screen.

### **Option 4**

Buy an iDTV set (almost invariably 16:9 widescreen) and you will receive and display digital TV programs to full effect, ie, using the whole of the screen, without the need for connection to a separate digital STB.

**Q. I HAVE A GOOD ANALOG 4:3 TV SET NOW. WHY SHOULD I BE LOOKING TO BUY A DIGITAL STB?**

**A. DIGITAL TV PROVIDES MORE AND BETTER SERVICES THAN ANALOG TV.**

Even if the 4:3 television set you are using now is still functioning well and has some years of life left in it, analog TV cannot match the quality and range of digital TV services.

You can connect a SD-STB to your present analog 4:3 TV set and, in addition to the analog TV services you presently receive, you will benefit<sup>2</sup> from

- (a) excellent reception and picture quality
- (b) widescreen pictures
- (c) better sound
- (d) extra channels, including program guides
- (e) multiple views of some sporting events, and
- (f) other services (now & next information, radio services)

However, as the 4:3 shape of your present TV is inconsistent with the 16:9 shape of widescreen digital programs, the widescreen pictures you will see will not utilise the whole of your screen and will have black bars top and bottom.

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<sup>2</sup> Please note that not all of these benefits are immediately available in all markets where digital TV broadcasting begins – but they will, over time, become available.

**Q. WHEN VIEWING DIGITAL TV HOW WILL I FIND THE NEW SERVICES?**

**A. IT'S BEST TO USE THE LOGICAL CHANNEL NUMBER FUNCTION PROVIDED BY AUSTRALIAN BROADCASTERS.**

Like your old TV, when first connected to your home TV antenna, a Digital TV receiver needs to be set up to "find" the channels available in your area – and also to set the receiver to what type of TV display it's connected to for correct picture shape (aspect ratio), and what time zone you're in (for correct on-screen clock).

The automatic channel scanning is usually found in the receiver's set-up menu. When the receiver "finds" a digital broadcast signal (in most areas there may be 5 or more), each one is from one of the local broadcasters and will contain several TV program services and, in the case of the ABC and SBS, also radio services. This is one of the advantages of digital TV – broadcasters could only broadcast one program to you on the old analog TV, but in digital mode they can send you several.

Because broadcasters from time to time may want to improve or change the type of digital programs services, it's good to have some idea how to re-scan your DTV receiver as not all receivers automatically recognise that a new service may have been introduced.

To cope with these extra services/channels, Australian broadcasters have included an extended system of channel numbering – called Logical Channel Numbers (LCNs) – necessary because the traditional analog channel numbering system is not comprehensive enough to cope.

The Logical Channel Number (LCN) system simplifies channel selection for viewers. All broadcasters have been allocated a range of numbers - in most cases using the number you're most familiar with for that particular channel, but also including double-digit and triple-digit numbers.

Not all DTV receivers have the LCN feature and those that don't will rely on you sorting the programs you're interested in by the program name and allowing you to assign "favourites" numbers, like in the the old analog TVs or VCRs. The broadcasters hope you will prefer the LCN approach as they believe it will be easier for you to find their programs with a number associated with their "brand" number. You should check out before purchase if your chosen DTV receiver has this feature, if you feel it's desirable.

As an example of how the LCN system works: the ABC has been allocated the numbers 2 (one single-digit number to be used for its main service), 20-29 (ten double-digit numbers to be used for multichannel, HD and other services) and 200-299 (one hundred triple-digit numbers to be used where necessary, eg, for radio services and in areas where there is an overlap of services).

The following Table outlines the way in which channel numbers have been allocated to Australian free-to-air broadcasters -

<b>Australian LCN Allocation</b>	
<b>Primary User</b>	<b>Allocated Service Numbers</b>
ABC	2, 20-29, 200-299
SBS	3, 30-39, 300-349
Seven Network	7, 70-79, 750-799
Nine Network	9, 90-99, 950-999
Network Ten	1, 10-19, 100-149
Seven Network Affiliates	6, 60-69, 650-699
Nine Network Affiliates	8, 80-89, 850-899
Network Ten Affiliates	5, 50-59, 550-599

Logical Channel Numbers should not be confused with the spectrum channel numbers allocated to sections of the radiofrequency spectrum within the television broadcasting services bands.

The Table immediately below contains an outline of the television broadcasting services bands, including the relevant spectrum parts and spectrum channel numbers within those spectrum parts -

<b>Television Broadcasting Services Bands<sup>3</sup></b>			
<b>Spectrum Part</b>	<b>Band</b>	<b>Spectrum Channel Numbers</b>	<b>Remarks</b>
45-52 MHz	VHF TV Band I	0	Not used for digital
56-70 MHz	VHF TV Band I	1 and 2	Not used for digital
85-108 MHz	VHF TV Band II*	3, 4 and 5	Part used for FM radio
137-144 MHz	VHF TV Band III	5A	Not used for digital
174-230 MHz	VHF TV Band III	6, 7, 8, 9, 9A, 10, 11 and 12	Used for analog and digital channels
520-820 MHz	UHF TV Bands IV and V	27 to 69	Used for analog and digital channels

\*Overlaps VHF-FM radio band (87.5-108 MHz)

When free-to-air television broadcasting services began in Australia in the 1950's, the spectrum channel numbers allocated to Australian broadcasters were often used as the basis for their brand names, eg, Channel Nine, Channel Seven, Channel Two etc. These brand names have become synonymous with various broadcasters, notwithstanding that the services they represented often came to be broadcast on other frequencies.

It is now technologically possible that, within a single spectrum channel, Australian free-to-air broadcasters can transmit an array of different digital TV services in addition to their main services.

One broadcaster might transmit the following digital TV services from time to time –

- a main service (virtually identical to its analog service)
- a HD service (of HD programs when available)

<sup>3</sup> Pursuant to international convention, the same spectrum bands have been allocated for the purposes of broadcasting by a large number of national governments around the world. Receivers can thereby be efficiently manufactured to a globally consistent reception standard, although different national spectrum planning and power differences mean that complete global consistency is not possible.

- several multiview services (as many as four separate views of the same event, usually a sporting event, when available)
- a program guide service (containing information about coming programs, as well as brief weather, news and other information)
- in the case of the ABC or the SBS, another channel of programs that is quite different from the main channel (SBS presently broadcasts a World News Service)
- in the case of the ABC or SBS, various radio services (the ABC and SBS presently broadcast radio services via digital TV)

In order that viewers can choose between them, digital receivers should ideally use the broadcast Logical Channel Numbering of services to simplify channel selection.

It is highly desirable therefore that you buy a digital receiver with Logical Channel Number (LCN) capability.

**Q. WHAT DO I NEED TO BUY SO I CAN WATCH HIGH DEFINITION PROGRAMS?**

**A. THERE ARE TWO ESSENTIAL PREREQUISITES FOR RECEIVING AND WATCHING HIGH DEFINITION PROGRAMS. FIRSTLY, YOU NEED A DIGITAL TUNER CAPABLE OF DECODING A HD SIGNAL TRANSMITTED BY A BROADCASTER, AND, SECONDLY, YOU NEED A SCREEN THAT IS CAPABLE OF DISPLAYING HD PROGRAMS.**

The HD Tuner

HD tuners are presently found only in HD Set Top Boxes. A HD-STB must be able to decode at least one of the three Australian HD picture formats, ie, 576p, 720p and 1080i<sup>4</sup>.

As at June 2004, there is no HD-IDTV (High Definition - Integrated Digital TV) receiver yet available on the Australian market.<sup>5</sup>

The HD Screen

A screen that is capable of displaying HD programs must be able to receive any of the three Australian HD picture formats and display them.

In technical terms, they must replicate broadcasts originating from an MPEG2 MP@HL (Main Profile @ High Level) video data stream, able to be displayed as 576p lines or better at a vertical refresh rate of 50Hz (ie, 50 times per second) as specified in the Australian Standard "Digital television-Requirements for Receivers. Part 1 VHF/UHF DVB-T television broadcasts. AS4933-1999" as amended from time to time.

The following table illustrates the requirements of HD display devices.

<b>Australian HD Display Formats<sup>6</sup></b>				
<b>Format</b>	<b>Active Lines x Active Pixels</b>	<b>Total Lines</b>	<b>Vertical Frequency</b>	<b>Horizontal Scan Frequency</b>
HD 576p	576 x 720	625	50Hz progressive	31.250 kHz
HD 720p	720 x 1280	750	50Hz progressive	37.500 kHz
HD 1152i*	1152 x 1280 1080(+72) x 1920	1250	50Hz interlaced	31.250 kHz
HD 1080i	1080 x 1920	1125	50Hz progressive	28.125 kHz

\* For CRT TVs only

Due to the nature of HD decoders and a variety of HD display devices, HD-STB manufacturers have various design options when decoding high definition broadcasts.

<sup>4</sup> There are three High Definition picture resolution formats in the Australian standards. They are known as 576p (576 active lines, with 720 pixels per line, in 50 frames per second progressive scan format), 720p (720 active lines, with 1280 pixels per line, in 50 frames per second progressive scan format) and 1080i (1080 active lines, with 1920 or 1440 pixels per line, at 50 fields per second interlaced scan format).

<sup>5</sup> See Types of Digital Receiver above (p1).

<sup>6</sup> The information in this table has been taken from the DTV Marketing Code.



They may either choose to decode and output the resolution as transmitted or use a fixed picture resolution approach where resolutions other than the fixed resolution are converted to the fixed resolution. This process is known as up-conversion or down-conversion.

By example, if the fixed output resolution is 1080i, broadcasts received either at 720p or 576p are 'up-converted' to 1080i.

The reverse is true for a fixed output resolution of 576p. In that case broadcast picture resolutions of 720p and 1080i are 'down-converted' to 576p.