TV BROADCASTING IN AUSTRALIA.

ANALOG TV In early December 2013, the last remaining Australian over-the-air analog TV transmissions ceased. It was concluded by many people that, from that point on, all analog TV reception equipment was rendered obsolete, and therefore of no further interest to the electronics industry.

Actually this is far from the truth. Although "Free to Air" analog TV is no longer being transmitted, a sizeable segment of the population are still watching TV delivered in analog form, either from a Digital set-top box, or a receiver box from a Pay-TV supplier. This might be delivered via the common red-white-yellow "A-V" cable, or even as an RF signal via an RF modulator, (built in to receiving equipment or an external one such as the Jaycar LM3880).

It is a little-appreciated fact that, in most countries that have converted to digital TV, for a significant segment of the population, the "analog switch-off" never really happened, as they had already been receiving their broadcast programs in analog form via Pay-TV. When digital broadcasts started up, the extra digital channels were simply added in to their existing range of analog-delivered Pay and Free-to-Air channels.

Another widespread "legacy" application of analog RF distribution is in large institutions such as hotels and hospitals, where, as well as the normal range of TV channels, they often want to provide additional in-house programming, such as movie and information channels.

Traditionally, this has been done by using professional-grade analog RF modulators to add the extra channels to the existing broadcast ones. In many cases, it was found more convenient to also re-encode the VHF and UHF free-to-air channels into a single group in the UHF band, to avoid the complication of installing high-powered VHF/UHF distribution amplifiers.

Even though analog TV transmissions have now finally ceased, many such installations still prefer not to provide digital TV distribution to the rooms for the following reasons:

1. Although Digital TV modulators are available, they are currently very expensive, so in-house programming is still most likely to be delivered as analog. Unfortunately most Digital TV sets require the user to select "Analog TV" before selecting an analog channel, and "Digital TV" if they want to go back to digital. This is regarded as being too confusing for most people, who are most likely only going to be using the system for a few days.
2. Large organizations may also have a huge investment in existing analog TV sets, which seem to work well enough for most people.

Apart from all the above, a huge amount of analog video is used by CCTV security cameras and the like, and this is unlikely to be changing anytime soon.

So, apart perhaps from Band I TV antennas, no analog TV product can be regarded as completely obsolete.

Below is a list of the Australian Analog TV channels that were in use at the time of final switch-off in December 2013. Virtually all in-house distribution was/is done on UHF channels, and usually on Band V, so the Bands I & II are mostly of academic interest now.

Australian Analog TV Bands and Channels

VHF		UHF			
Band I		Band IV		47	659 - 666MHz
0	45 - 52MHz	27	520 - 526MHz	48	666 - 673MHz
1	56 - 63MHz	28	526 - 533MHz	49	673 - 680MHz
2	63 - 70MHz	29	533 - 540MHz	50	680 - 687MHz
Band II		30	540 - 547MHz	51	687 - 694MHz
3	85 - 92MHz	31	547 - 554MHz	52	694 - 701MHz
4	94 - 101MHz	32	554 - 561MHz	53	701 - 708MHz
5	101 - 108MHz	33	561 - 568MHz	54	708 - 715MHz
Band III		34	568 - 575MHz	55	715 - 722MHz
5A	137 - 144MHz	35	575 - 582MHz	56	722 - 729MHz
6	174 - 181MHz	Band V		57	729 - 736MHz
7	181 - 188MHz	36	582 - 589MHz	58	736 - 743MHz
8	188 - 195MHz	37	589 - 596MHz	59	743 - 750MHz
9	195 - 202MHz	38	596 - 603MHz	60	750 - 757MHz
10	208 - 215MHz (old)	39	603 - 610MHz	61	757 - 764MHz
11	215 - 222MHz (old)	40	610 - 617MHz	62	764 - 771MHz
	Notes: 1. Digital Channels 10 & 11 are on different frequencies) 2. Channels 27, 68 & 69 were not used for analog TV	41	617 - 624MHz	63	771 - 778MHz
		42	624 - 631MHz	64	778 - 785MHz
		43	631 - 638MHz	65	785 - 792MHz
		44	638 - 645MHz	66	792 - 799MHz
		45	645 - 652MHz	67	799 - 806MHz
		46	652 - 659MHz	68	806 - 813MHz
				69	813 - 820MHz

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DIGITAL TV IN AUSTRALIA After the Analog shutdown, a number of changes were made to the Australian channel frequency allocations. Bands I & II are no longer used for TV transmission, and the following changes were made to the remaining bands III, IV & V:

1. Channel 5A was deleted
2. New channel frequencies 9A and 12 were added
3. The frequencies of Channels 10 and 11 were changed.
4. In Band V (UHF) two extra previously unused channel frequencies were released for Digital TV: 68 and 69.

These are the currently used Australian TV broadcasting frequencies:

Australian Digital TV Channels (Oct 2015)

VHF		UHF			
Band I		Band IV		47	659 - 666 MHz
	Not Used	27	(not currently used)	48	666 - 673 MHz
		28	526 - 533MHz	49	673 - 680 MHz
		29	533 - 540MHz	50	680 - 687 MHz
Band II		30	540 - 547MHz	51	687 - 694 MHz
	Not used	31	547 - 554MHz	52	694 - 701 MHz
		32	554 - 561MHz	53	701 - 708 MHz
		33	561 - 568MHz	54	708 - 715 MHz
Band III		34	568 - 575MHz	55	715 - 722 MHz
		35	575 - 582MHz	56	722 - 729 MHz
6	174 - 181MHz	Band V		57	729 - 736 MHz
7	181 - 188MHz	36	582 - 589MHz	58	736 - 743 MHz
8	188 - 195MHz	37	589 - 596MHz	59	743 - 750 MHz
9	195 - 202MHz	38	596 - 603MHz	60	750 - 757 MHz
9A	202 - 209MHz(1)	39	603 - 610MHz	61	757 - 764 MHz
10	-216MHz(2)	40	610 - 617MHz	62	764 - 771 MHz
11	216-223MHz (2)	41	617 - 624MHz	63	771 - 778 MHz
12	223 - 230MHz (1)	42	624 - 631MHz	64	778 - 785 MHz
		43	631 - 638MHz	65	785 - 792 MHz
	1. New channel	44	638 - 645MHz	66	792 - 799 MHz
	2. Frequency changed	45	645 - 652MHz	67	799 - 806 MHz
	from analog	46	652 - 659MHz	68	806 - 813 MHz
				69	813 - 820 MHz

Apart from the above changes, after the cessation of Analog TV the channels were "Re-Stacked", that is, the channel frequencies were changed to group them more closely together. In most Capital cities, the biggest change was moving SBS from UHF 28 down to the spot previously occupied by analog Ch 7. This then placed all the channels close together on Band III, simplifying antenna requirements. In country areas, which typically had their channels spread across the VHF and UHF bands, they were re-grouped either on VHF or UHF, depending on the area.

BASIC PRINCIPLES OF DIGITAL TV TRANSMISSION.

It is important to understand that digital TV transmission works on totally different principles to analog TV, even though the receiving equipment may look deceptively similar.

This is further complicated by the fact that DVB-T, the Digital Transmission system we use in Australia and Europe, is somewhat different to the ATSC system used in former NTSC countries such as the US and Canada. This is likely to cause confusion if you follow the advice given for ATSC installations when setting up DVB-T equipment.

As far as the studios themselves are concerned, there is no real difference between the way digital TV signals are handled internally for either DVB-T and ATSC. The various MPEG program data streams (from cameras, disc-based servers, videotape machines etc) are first broken up into "packets", usually 204 bytes in length. This is made up of 188 bytes of "Payload" (ie actual program data) and another 16 bytes of "metadata" which includes error correction references and other "housekeeping" information.

The actual packet transmission process is very much analogous to a postal service: Different people put envelopes at random into a mailbox at different times, each envelope being labelled with the information about where it is to go and to whom. Eventually all the envelopes get sorted out in the Post Office and delivered to the correct people.

In a similar way, there is no particular order in which Digital TV data packets must be transmitted; they are automatically sorted and re-assembled into the correct sequence in the receiver.

If you take the Seven network as an example, they currently (2016) have five sub-channels: The "Flagship" channel 71, plus 72, 73, 74, and 78. The individual data packets in the 7 network's "Transport Stream" will thus carry information telling the receiver that they belong to streams 71, 72, 73, 74, or 78 and so on. (It's rather like having an apartment block located at "Number 7 so-and-so street" with letters addressed to the residents of units 1, 2, 3, 4 and 8).

There can also be other types of data enclosed in the packet, for example the Electronic Program Guide, and the "Radio" programs provided by the ABC and SBS. Actually, just about any type of data could be carried by the packets, not just TV-related data. Again, using the Seven network as an example, the streams for 71, 72, 73 and 74 are MPEG2, while 78 is MPEG4.

Similarly, the Nine network's new "9HD" service (Channel 90) is 1080i MPEG4, while the rest of its programming is 576i MPEG2.

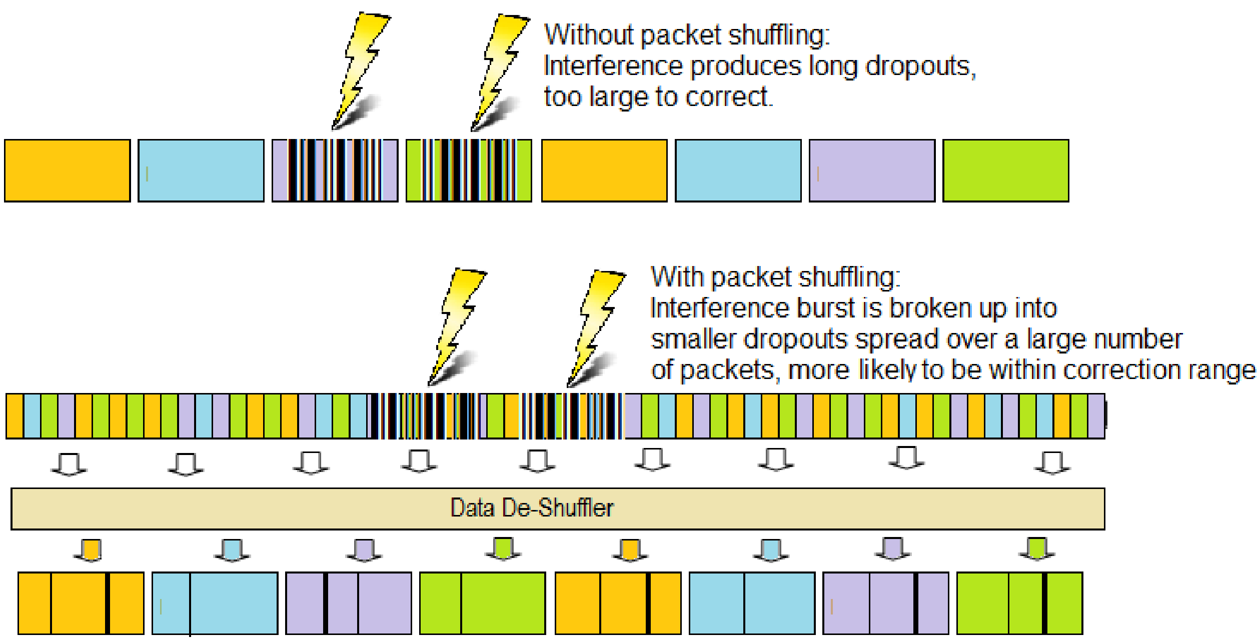
The higher the transmitted resolution, the greater the number of packets required, so the Seven network's HD channel 73 ("Seven Mate") will require more packets per second than 74, which is a fairly low-resolution shopping channel. They can also carry data for over-the-air software updates, which are normally done in the early hours of the morning.

The data packets are not transmitted directly; they undergo an intensive predetermined "shuffling" process which temporarily breaks up the packets into widely separated groups of a few bytes each. This is done for two reasons:

1. In the event of random electrical interference, when the bytes are de-shuffled in the receiver, the result tends to be a large number of small, correctable errors spread over a large number of packets, instead of a small number of packets with large, uncorrectable errors. (A similar system is used with CDs, DVDs and Blu-Ray discs).

2. When analog and digital TV programmers were simultaneously being broadcast, shuffling the data like this tended to randomize the bit patterns, so that any interference to adjacent analog transmissions tended to appear as random "snow" which was less noticeable than the original bit patterns.

On the next page is a basic block diagram of a Digital TV Transmitter.



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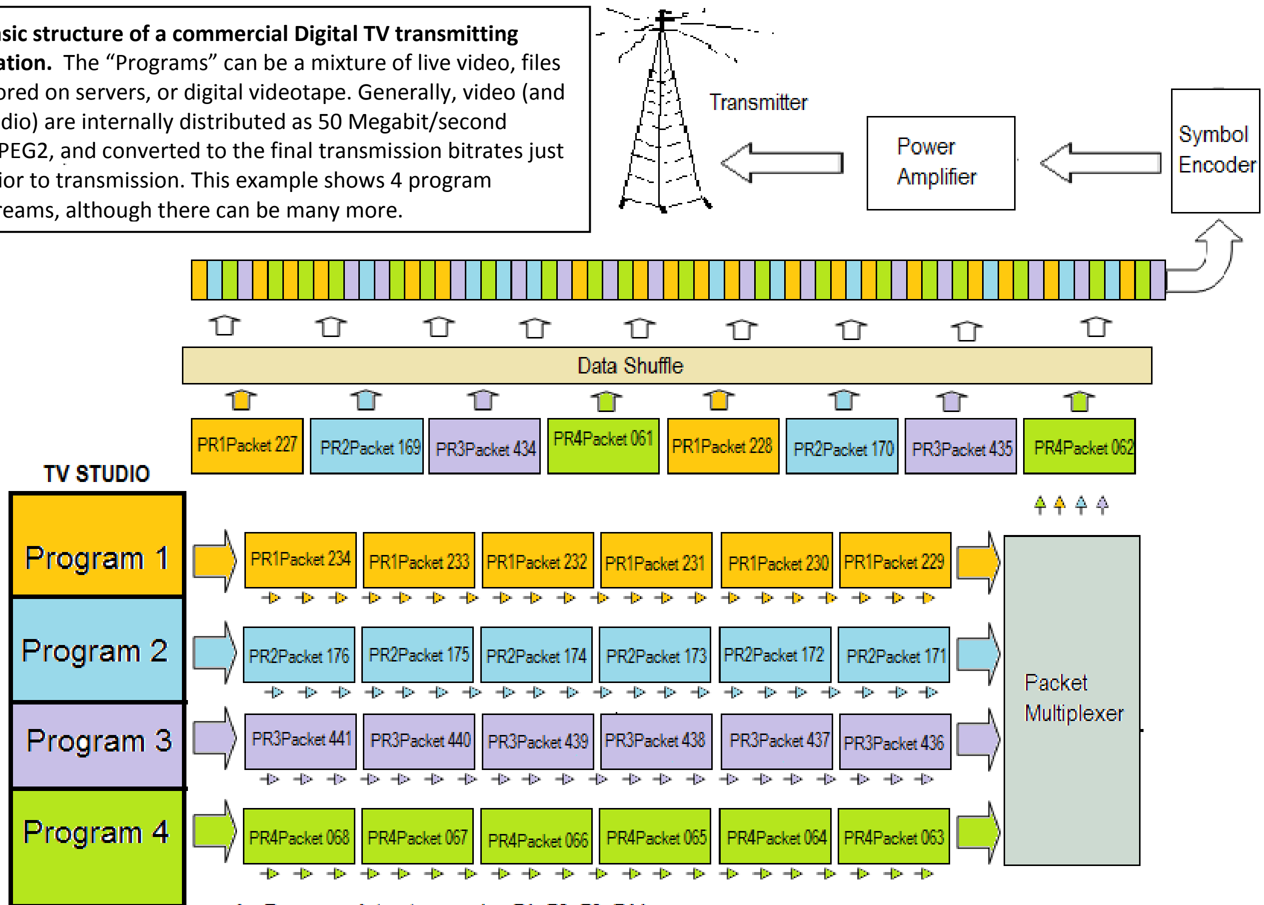
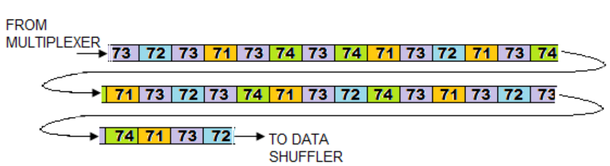
Basic structure of a commercial Digital TV transmitting station. The "Programs" can be a mixture of live video, files stored on servers, or digital videotape. Generally, video (and audio) are internally distributed as 50 Megabit/second MPEG2, and converted to the final transmission bitrates just prior to transmission. This example shows 4 program streams, although there can be many more.



4 x Program data streams (eg 71, 72, 73 ,74,)
In practice the HD channel (73) would have about twice as many packets as 71, about 4 times as many as 72 and so on.

You will notice how, (for example Program 1's data packets - orange) start out sequentially numbered: 234-233-232-231-230-229, but packets 228 and 227 are then separated and multiplexed into the data stream.

In reality, because of the sometimes widely differing data rates for the different program streams, the actual multiplexed stream would look more like this:



"73" (purple) being the HD channel, in this example it gets 13 data packets; "71" (orange) being the flagship SD Channel, gets 7 packets, and the two "lesser" services "72" (blue) and "74" (green) get 6 packets each. The new MPEG4 channel "78" (racing.com) isn't shown here but given its current data rate, there would probably be about three packets. In everyday TV transmission, the actual data rate varies enormously, depending on the source material. For example, an old 4:3 aspect ratio movie is likely to be shown "pillarboxed", so the black bars at the sides are not going to require much data to transmit, plus it may be an old, worn-out print with low contrast and resolution, which will lower the data rate even more.

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ATSC SYSTEM (ADVANCED TELEVISION SYSTEMS COMMITTEE)

The ATSC transmission uses a system known as "8VSB", which stands for "Eight-level Vestigial Sideband". (Since DVB-T is basically a more advanced version of ATSC, a discussion of how ATSC works will form the basis for understanding how DVB-T works, in the same way that understanding NTSC is a requirement for understanding PAL).

Each byte of the multiplexed and shuffled data stream is first broken into four pairs of two bits, and an extra bit is added to each 2-bit "word" for further error correction purposes.

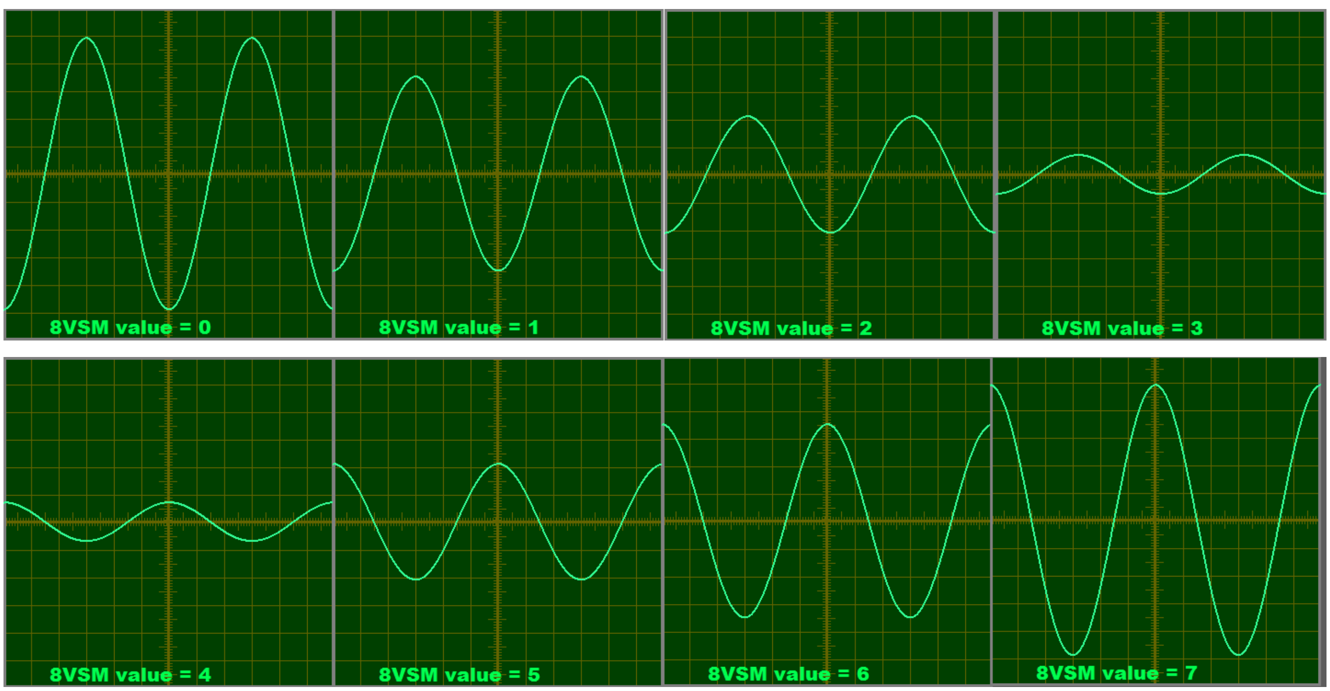
The resultant 3-bit words are used to modulate the TV carrier. Two of the bits select one of 4 possible carrier amplitudes, and the other bit switches the phase of the carrier by 180°. By having four possible levels and two possible phases, this gives 8 distinct amplitude and phase possibilities, which can be decoded in the receiver to recreate the 3-bit numbers 0 to 7.

In the receiver's error correction process the extra bits are removed, recovering the original 2 bits with a high degree of accuracy. Each sequence of four pairs of bits is then reassembled into a string of 8-bit bytes, which are then de-shuffled in turn to recreate the original data packets.

The transmitted error correction bytes can 100% recover up to 8 bit-errors per packet; "diluting" any electrical interference via the shuffling process reduces the likelihood that any particular packet has more than 8 errors.

The ATSC carrier frequency is thus modulated with frequencies up to about 6MHz, which would normally create two 6MHz sidebands, requiring a 12MHz bandwidth. However, as with analog TV, most of one of the sidebands can be eliminated but (unlike analog TV), with ATSC almost the entire lower sideband is eliminated, and a "pilot" carrier is inserted.

Below are shown simulated oscilloscope waveforms of the ATSC carrier, for values 0 to 7. Note the eight distinct phase and amplitude combinations.



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DVB-T (DIGITAL VIDEO BROADCASTING – TERRESTRIAL)

DVB-T uses a significantly different transmission system, although its basic principles are similar to ATSC. The basic modulation system is the same, (as depicted above); the main difference is that DVB-T does not use a single carrier frequency; the system used in Australia normally uses 6,817 separate carriers, spaced at 2kHz intervals across the channel slot.

(Most receiver chipsets also allow reception of smaller numbers of carriers with wider channel spacing. This does not offer any improvement in transmission quality; it simply eases the design of modulators).

The system used by DVB-T is referred to as COFDM which stands for "Coded Orthogonal Frequency Division Multiplexing". "Coded" refers to the noise avoidance measures describer earlier; "Orthogonal" in telecommunications jargon refers to any method of selecting the carrier frequencies to minimize interference between them. How this actually works is rather complicated, but it allows each of the 6,817 carriers to be separately decoded without requiring any kind of filtering or tuned circuits.

In the 1990s, when ATSC was developed, the task of both generating such a huge number of carriers and making an affordable home receiver for decoding them was considered impractical. However tremendous advances in computer technology saw a 50-fold drop in receiver prices in just a few years, and now full-HD DVB-T boxes are available for well under $30. So, ironically, the system developed by the Advanced Television Systems Committee, is not particularly advanced…

At first glance, generating over 6,000 carrier frequencies, particularly in the UHF bands, would seem a near-impossible task, even with modern computer technology. However, the carrier frequencies are not generated directly; the set of carriers is generated at much lower frequencies, and heterodyned up to the desired transmission frequency.

The actual data pre-modulation processing itself is essentially the same as for ATSC, with the same data shuffling techniques used and so on.

An Australian TV channel allocation is 7MHz wide, so it might seem that 6,817 carriers at 2kHz spacing would add up to 13.634 MHz, or twice the available bandwidth. The vestigial sideband system used by ATSC is not an option in this case, because these are 6,817 actual carrier waves; they are not sidebands. However, because vestigial sideband operation is not used, it is possible to generate two separate carriers for each frequency, each phase-shifted from the other by 90 degrees. With the appropriate type of decoder circuitry, the two carriers can be made invisible to each other, which is the same principle used by analog TV chroma decoders.

For each of the eight possible ATSC-type phase and amplitude combinations of one carrier, there is another eight possibilities for the other carrier. That gives a total of 8 x 8 = 64 possible "symbols", so each carrier frequency is effectively directly modulated with 6-bit words. The technique is generally referred to as 64-level QAM - Quadrature Amplitude Modulation - "quadrature" referring to the 90 degree phase shift. (The "symbol rate" refers to number of analog changes to a carrier per second. In this case the bit-rate would be six times the symbol rate. By comparison, with an old-fashioned RS-232 signal, the symbol rate and the bit-rate are the same).

QAM cannot be used with ATSC, as the sideband filtering process produces considerable phase distortion, which makes separating the quadrature carriers virtually impossible.

As the COFDM carriers are only spaced 2 kHz apart, the maximum modulating frequency has to be less then 1kHz, otherwise the resulting sidebands will intrude into the sidebands of adjacent carrier frequencies. In practice the maximum symbol rate is about 850Hz, so with DVB-T the 6,817 carriers are each modulated with an effective signal bandwidth of 850Hz.

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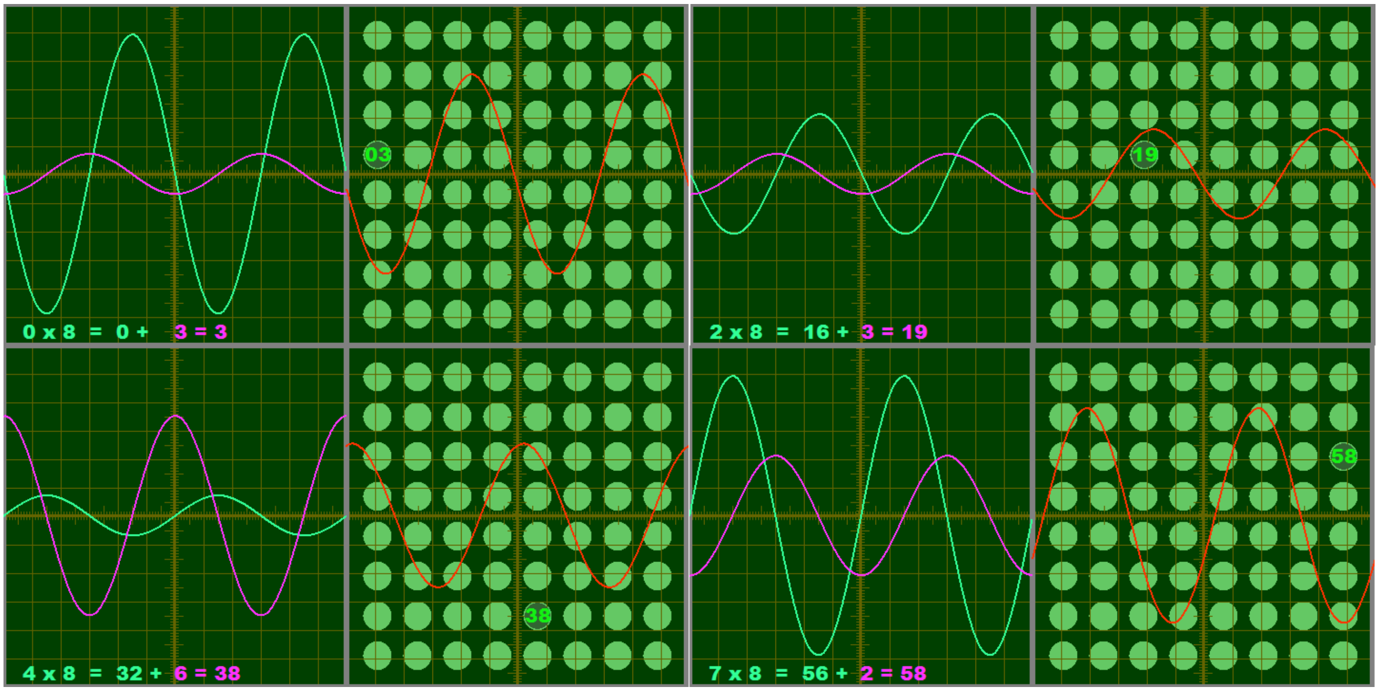

FOUR EXAMPLES OF 64QAM ENCODING (OUT OF A POSSIBLE 64). The actual numeric value is the sum of the purple carrier amplitude plus 8 times the green carrier amplitude (since for every green value there are 8 possible purple values). The red trace on the right is the actual resultant sinewave when the red and purple traces are mixed together. The green dots represent the 64 possible phase and amplitude values; this is known as a "Constellation" pattern. With a real 64QAM signal stream the green dots would be seen to "twinkle" like stars.

A "symbol rate" of 850Hz equates to a bit rate of 6 x 850 = about 5 kilobits per second, or about 10 kilobits total for the two quadrature carriers, giving around 30 megabits per second for all the carriers. However, about a third of that is "overhead", leaving about 20 megabits per second for actual program data.

The process is actually considerably more complex than this, since the data stream has to be continually distributed between the 6,000-odd carriers, and the receiver has to keep track of which data was sent where.

Not all of the carriers are used for signal data, some are reserved for carrying synchronization data, and others serves as "pilots"; fixed amplitude carriers used for automatic gain control and similar functions.

DRAWBACKS OF ATSC Now we come to the major operational difference between ATSC and DVB-T. With ATSC, the symbol rate, that is, the carrier modulating frequency, is typically around 6MHz. In other words, the symbols are being transmitted at a rate of 6 million per second, or one every 170 nanoseconds.

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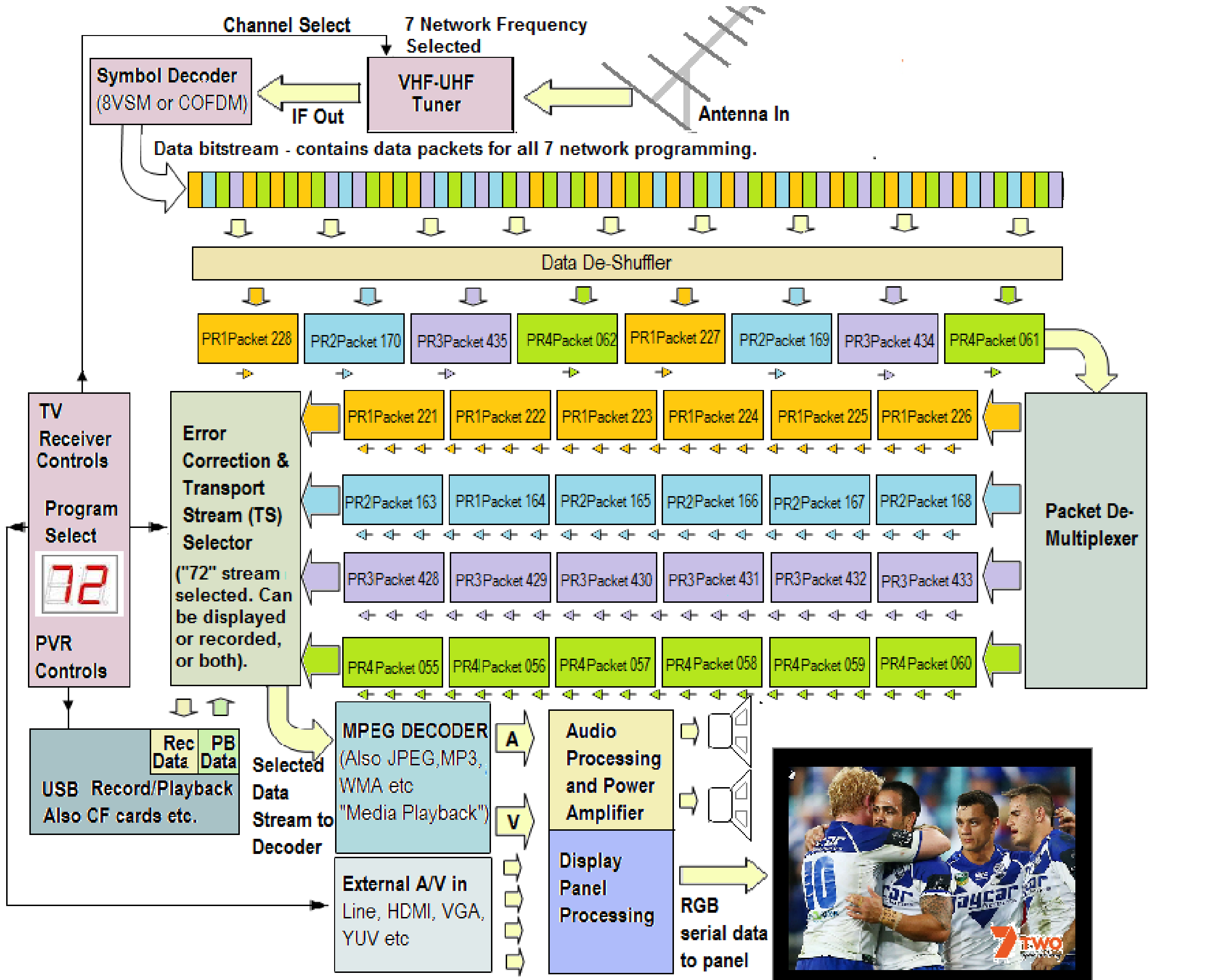

Block diagram of a Digital TV receiver. The basic layout is the same for ATSC or DVB-T, and LCD, Plasma and OLED displays. Most current model TVs can also receive analog TV, as the processing is done entirely in software, adding little to the cost. Virtually all current models allow recording of the currently selected data stream onto a USB Flash or Hard Drive, for later "lossless" playback.

Because radio waves travel at about 300,000 km per second, it follows that ATSC symbols are physically spaced about 50 metres apart.

Suppose the receiver is picking up both the direct signal from the transmitter, and a reflected (ghost) signal that adds another 50 metres to the path length. With analog TV that would produce a barely noticeable ghost; with ATSC it would mean that both the current symbol, and the time-delayed previous symbol would be picked up simultaneously. Because the decoder has to reliably distinguish between eight distinct carrier/phase combinations, it only takes a small amount of ghosting to totally scramble an ATSC signal.

The upshot of all this is that the signal quality requirements for ATSC are similar to those for analog NTSC. For reliable reception you need a directional antenna, and if you are relying on an antenna

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distribution system, it must be well-engineered and maintained. Indoor antennas also tend to perform poorly with ATSC. More recent ATSC decoder chips have featured ghost-cancelling technology, but little can be done about moving ghosts (from aircraft etc).

With COFDM, the symbol rate is much lower for each carrier frequency, around 850 symbols per second. That means the symbols are physically spaced about 350kM apart, not 50 metres. For a reflected signal to interfere with the current signal, that would require a ghost with an extra path length of 350km, which in Sydney would mean it would need to be bouncing off a structure somewhere near Newcastle! Each COFDM carrier is effectively a separate radio transmitter, modulated in the lower audio range. Multipath reception (ghosting) that would make analog TV almost unwatchable simply has no effect on DVB-T. The situation is very much like receiving AM on a car radio; signal dropouts rarely, if ever, occur on AM even when driving at high speed.

With a traditional Yagi TV antenna, the extra elements serve two quite separate purposes. They increase the gain of the antenna, to lift the signal up above the electrical noise generated in the TV receiver, and they also provide the required directionality needed for analog TV (and ATSC).

However, with COFDM, the directionality requirement is largely removed. All that is required is a sufficient level of antenna gain, which often can be more economically provided by a simple preamplifier.

You may have been puzzled by some of the unusual "Amplified Indoor Digital TV Antennas" that have appeared on the market in recent years. Internally many of them seem to consist of little more than an antenna amplifier connected to an ordinary piece of wire (or alternatively, an imaginatively-shaped piece of printed circuit board track).

Possibly the oddest thing about these devices is that they actually work! The answer is that for COFDM signals at least, virtually any stray piece of wire is capable of picking up enough signal energy to be useable in a Digital TV receiver; the hard part is efficiently transferring that signal energy into the antenna socket.

In a strong signal area, it is often possible to receive Digital TV with nothing more than a short piece of wire (or a coat hanger) pushed into the antenna socket. In weaker signal areas, you could also do that, but usually, only if you mounted the TV set on your roof! Because of the severe impedance mismatch, the signal from such a rudimentary "antenna" would definitely not survive the trip through more than a metre or so of antenna cable, without assistance from an amplifier.

So the pre-amplifier is actually used more as an impedance-matching device than an actual amplifier. Most DVB-T Digital Set Top boxes and many Digital TV sets are actually designed to work with such a setup, providing a 5 Volt supply superimposed on the antenna socket, specifically for powering such preamplifiers.

In many cases the antenna may be a simple flat plate that hangs on the wall like a picture or on the balcony of a unit.

CURRENT ANTENNA RECOMMENDATIONS If your current antenna is providing a good enough signal, there is no particular need to change anything. In most metropolitan areas now, any Band I, Band II and UHF elements of an existing antenna will most likely no longer be serving any particular purpose (unless the Band II elements are used for FM radio reception). All that is required now is a Band III antenna.

In some metropolitan areas, however, extra channels have been assigned for difficult reception areas. In North-West Sydney for example, the Gore Hill VHF channels are also replicated on UHF from a new transmitter at Kurrajong Heights, removing the need for the tall antenna masts previously typical of the area. A similar service has been set up at Razorback Range to service the South-West. It is worthwhile occasionally

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checking the ACMA website to see if there is anything similar in your area.

"DIGITAL" TV ANTENNAS

Generally, a "digital" antenna does not do all that much that an older analog one did not; in fact it most likely does less, as many of the frequencies an analog antenna needed to cover are no longer used!

The main difference is that "Digital" Band III antennas have been specifically re-designed to cover the previously unused VHF Channel 12. This does not however, mean that older analog antennas are not capable of receiving Channel 12, just that they were not specifically designed to do so. In a fringe area, the situation might arise where there is just enough signal to get reliable reception on the 7, 9, 10 & SBS networks, but the ABC (on Channel 12) might suffer dropouts because the antenna does not have as good a response around 230MHz.

In a stronger signal area on the other hand, even with the reduced Channel 12 response, the antenna may still be able to pick up enough signal for reliable reception.

With the outstanding ghost immunity of DVB-T, the main purpose of using a traditional multi-element antenna now is to provide enough signal to ensure reliable reception. Although a compact antenna with a built-in amplifier can now theoretically do much the same job, the simplicity and reliability of a correctly-aimed "passive" antenna still has a lot going for it.

THE "DIGITAL DIVIDEND" AND 4G

The main reason the ACMA has been re-stacking broadcast TV channels is to clear out certain parts of the UHF bands for auctioning off to telecommunications companies. A consequence of this is that TV antennas are likely to be picking up signals other than digital TV, and there is potential for this to cause interference to TV reception.

In such cases a special filter may be required, basically designed to remove frequencies in the 720-1000MHz 4G LTE ("Long Term Evolution") band.

An example is the Jaycar LT3062:

4G interference is most likely to be a problem where distribution amplifiers are used, which may suffer overload from strong 4G signals. A particular problem is that the transmission power level used by portable transmitting devices is largely determined by their distance from the Cell tower, which means there is no way of predicting when such interference will occur. Also, unlike the case of analog TV, when this happens, the only symptom is that the picture and sound simply disappear, which could have any number of possible causes.

For this reason, LTE filters are now being routinely fitted to new installations.

THE FUTURE

No digital technology stands still for long, and ever-increasing computer power has enabled the same amount of data to be carried on increasingly smaller bandwidths. Of course the perennial problem is that the "New, Improved" technology is usually not compatible with the existing equipment infrastructure. This has always been a politically sensitive issue with TV broadcasting, and until recently the major networks were inhibited from using their HDTV channel for their "Flagship" programming, because of a relatively small number of Digital TV sets, Set Top boxes and Personal Video Recorders (PVRs) that cannot receive HD channels.

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MPEG4 (H264) Since all digital transmissions are broken into essentially "data agnostic" packets, virtually any sort of digital data could be fed into the DVB-T (or ATSC) data stream. This means in turn that just about any digital video encoding system could be used; the problem is that most of these could not be decoded by the majority of existing receivers. Most older and many current low-cost Digital TV receivers either cannot decode MPEG4 at all, or only at sub-broadcast resolutions. So, for example, 9HD and the Racing.com service currently being broadcast of the 7 network's channel 78, cannot be displayed by a lot of current digital TV sets, unless a set-top box is used.

MPEG4 (H264) delivers roughly the same image and sound quality as an otherwise identical MPEG2 transmission with twice the data rate, so in many countries, it is used for all HDTV transmissions. In fact, Australia is the only country in the world that uses MPEG2 for DVB-T HD transmissions.

There have been proposals to assign extra channels to the existing networks to allow more HDTV transmissions, but at present there seems to be little point to this, given that the bulk of current "HD" transmissions are simply standard definition data rates broadcast over High Definition channels.

DVB-T2

A second and more controversial proposal is to change the transmission standard from DVB-T to DVB-T2. By using more advanced error correction systems, DVB-T2 can achieve approximately 50% more data throughput than an equal bandwidth of DVB-T, and can also be more reliably received by mobile receivers.

The basic principles of DVB-T2 are much the same as for DVB-T, but it does everything more efficiently. For example, as well as allowing the same 64-level QAM encoding as DVB-T, it also permits 256-level QAM (that is each symbol encodes as a full byte instead of just 6 bits).

Since there is not much difference in equipment cost, DVB-T2 with all-MPEG4 transmissions is almost universally being installed in so-called "green field" installations, where there is no pre-existing digital broadcast infrastructure. However in countries like Australia, with a large Digital TV infrastructure dating back to 2000 exists, the argument is less compelling.

There have also been proposals to introduce "UHD" TV services (ie 3840 x 2160 or "4K") on new channels using an advanced version of MPEG4 called H265 and DVB-T2, but so far, consumer interest in UHD TV has been virtually non-existent, as is 4K material with entertainment value.

Australia
www.jaycar.com.au
techstore@jaycar.com.au
1800 022 888

New Zealand
www.jaycar.co.nz
techstore@jaycar.co.nz
800 452 922