

Satellite TV Primer

This page is intended as an information page only.

We all know what a satellite dish looks like and that channels can be picked up from around the world. However, the most asked questions are generally, "what equipment do I need?", "what size dish do I need?" and "what channels can I pick up?".

I'll try to keep it nice and easy to understand as satellite TV should be no harder to install than a TV antenna - if you know a little about the equipment you are using and the satellite frequency you are trying to receive.

Firstly, there are two bands we are most interested in, C band and KU band. Each band covers a range of frequencies. C band reception has a very large footprint and as it spreads a much greater distance, it requires a large dish to receive the relatively weak signal. KU band is much higher in frequency and has a more controlled, tighter beamwidth. KU band tends to be targeted at a specific area and as such has a stronger signal. It is because of this stronger signal that smaller dishes can be used for KU reception. Pay TV companies in Australia and around the world tend to use KU band. Foxtel and Austar for example use the Optus C1 satellite. A small 65cm satellite dish is all that is required to receive the signal. Actually, a 35cm dish will work on the east coast of Australia. It won't perform well in poor weather, but it does demonstrate the power of the Optus C1 spot beams.

KU band Satellites of interest to us for TV reception in Australia are NSS6, Optus D1, Optus D2, Optus B3, Optus C1, Intelsat8, Intelsat2 and Intelsat701. These satellites carry mainly foreign TV channels with the exception of Intelsat8, Optus D1 and Optus C1. Optus B3 used to carry the pay TV channels however, the satellite was moved from 156 degrees east to 152 degrees east and was replaced with Optus C1. Optus D2 now carries Globecast and UBI broadcasts among others which are foreign language programs. Optus D1 carries New Zealand pay TV as well as digital feeds for ABC and SBS into Australian states. Intelsat8 now carries SelecTV subscription pay TV.

C band carries mainly Asian, Indian and Arabic programming as well as other foreign language programs. BBC World News and ABC Asia Pacific are still free to air but all C band in Australia requires a 1.8- 3.0metre dish for adequate reception.

What equipment do I need?

First decide on which 'band' you want to receive. Remember the two bands? KU band and C band. Let's first cover KU band equipment.

If you want to receive broadcasts on KU band, you probably won't need a bigger dish than 1.2 metres. In most cases, an 80 - 90cm dish will be more than enough. You'll then need an LNB (the device that clamps to the end of the dish, which receives, amplifies and down converts the signal). LNB stands for 'low noise block'. When we say 'low noise' it means that the electronics inside the LNB generate little heat and as such maintain a clean carrier signal with low amounts of interference from heat sources (active electronics) or 'noise'. This is referred to as carrier to noise or signal to noise (S/N ratio). Block refers to a block of frequencies. This is usually stated on the LNB ie 11.75 to 12.75 GHz.

You'll now need a mounting pole or bracket. There are many different types of brackets around but most installations can be covered with either a tile or tin roof bracket. These are inexpensive (around \$30 - \$70).

So now you've got your dish up, you'll need some cable. In most cases, RG6 quad shield cable is sufficient. The cable should be terminated with 'F' connectors. These connectors crimp onto the cable creating a tight, low loss, low resistance connection, very important for satellite frequencies. Add a wallplate to the end of the cable and a flylead (connecting the wallplate to the receiver) and it's down to the receiver/decoder.

Most receivers (decoders) can handle C band and KU band. All LNB have what is called a local oscillator or LO for short. KU frequencies are around 12GHz. If a provider is broadcasting at 12.407GHz and we are using an LNB which has a LO of 10.700GHz then the output frequency would be 1.707GHz or 1707MHz (12.407 - 10.700). C band frequencies are around 4GHz. If a C band LNB had a LO of 5.150 (very common) then the output (this time in reverse) would be 5.150 - 4.0 GHz = 1.150GHz.

The reason I explained that is because a satellite receiver (or decoder) is looking for an input frequency range between 950MHz - 2.150GHz. As long as you can provide a frequency within that range, the receiver couldn't care less whether it's from a C band satellite or a KU band satellite. So, in other words, if you purchase a new receiver, it will work for both bands!

While we are on the subject of receivers, you'll have to decide on whether you want a receiver that can take a smartcard, or whether a free to air 'FTA' receiver will be fine. A receiver with a smartcard slot will be able to decrypt an encrypted broadcast if an authorised and valid card is inserted in the slot. Of course, it will also display FTA broadcasts without a smartcard.

If it's C band you're after then you'll need a bigger dish and a C band LNB. Dish sizes are usually in the range of 1.8 to 3.0 metre with the most common size being 2.3m. You'll need a suitable mounting pole as well. The mounting poles are usually either in the ground or on a wall. If you don't want to motorise your dish, you'll be able to point to one satellite only. If you choose to motorise, you'll need an actuator (motor) as well as a positioner and low voltage cable. The positioner moves the satellite dish and stores the satellite position. The positioner connects to the receiver via RG6 cable and the receiver then sends commands to the positioner when the user changes the channel, this in turn moves the dish to the correct position. It's all very impressive and allows the user to access around 200 channels from multiple satellites (Australia). You can of course motorise a KU band dish as well. Keep in mind though that setting up motorised systems does require a level of technical expertise so do your research first!

A great site (the satellite channel bible) that should be looked at is Lyngsat. This site shows the frequencies and channels on particular satellites. An example of a typical lyngsat page is shown below. Firstly, look at the transponder frequency 12525. This tells you that the signal is 12.525 GHz which is KU band and will require at least a 65cm satellite dish. The V means that the signal is broadcast vertically. I won't get into vertical, horizontal and circular polarities, you just need to know to enter 'vertical' into your receiver if you want to scan for the Hope Channel, Oman TV etc etc. Now look at the 'F' under video encryption. The 'F' indicates that the channel is a free to air channel and is not encrypted so no smartcard is required. Sun TV however uses Irdeto 2 encryption and does require a valid Irdeto 2 smartcard from the broadcaster to view the channel. S/R and FEC again is not something I'm going to get into either, you just need to know to enter the correct symbol rate and FEC into your receiver to download the channel. Now check the beam to ensure that the beam pattern actually covers your geographic location.

Optus B3 © Lyngemark Satellite, last updated 2004-11-28 - <http://www.lyngsat.com/optusb3.html>

Freq. Tp	Provider Name Channel Name	Video Encryption	SR - FEC SID - VPID	NID - TID Audio	Beam	
12525 V tp 5	 GlobeCast World TV	A U	DVB	30000 - 2/3	?-2	Australia & New Zealand
	Sun TV (India)	A	Irdeto 2	1660	1620 Ta	
	Daystar TV	A N F		2060	2020 E	
	[test card]			2081	2082	
	The Hope Channel	A N F		2161	2122 E	
	Oman TV Satellite	A N F		2260	2220 A	
	Sigaram Movie Channel	A F		2360	2320 Ta	
	Abu Dhabi TV Europe	A F		2460	2420 A	
	Sigaram	A F		1 1160	1120 Ta	
	(GlobeCast feeds)			2 1360	1320	
	ERT Sat	A N F		3 1860	1820 Gr	
	Thai TV Global Network	A F		4 1460	1420 Th	
	3ABN	A N F		11 2160	2120 E	
	AssyriaSat	A N F		21 1260	1220	
	ATBC	A F			1122 Ta	
	Suryan FM		F		1622 Ta	
	Radio Greece	A N F			1822 Gr	
	Radio 16 NTC		F		2093 E	
Emarat FM	A N F			2421 A		
Radio Oman	A N F			2422 A		

Now go to www.lyngsat.com and click "Asia" next to frequencies. This will take you to a list of satellites. If you live in Australia, the satellites of interest are Telstar10 (C Band), Thaicom3 (C), Insat2E (C), NSS6 (KU), Asiasat2 (C), Asiasat3s (C), Apstar6 (C), PalapaC2 (C), Telstar 18 (C), Optus D1 (KU), Optus D2 (KU), Optus C1 (KU), Optus D3 (KU), GE23 (KU), Intelsat8 (KU and C), Intelsat5 (KU and C), NSS5 (C) and Intelsat 701 (KU and C). Other satellite are available in Western Australia. Remember to checkout the beams by clicking on them.

Aligning satellite dishes is not difficult if you apply some logic. Firstly, know your latitude and longitude so that you can calculate the angle (elevation) and azimuth (direction) to the satellite. Use the receivers signal quality screen to align the satellite dish. Remember that if you are looking for a satellite, the parameters must be entered into the search screen or no signal quality will ever show. Make sure you have line of sight to the satellite and that your pole/mast is vertical. Try to use a satellite finder. The sat finder won't tell you which satellite you are on but it will tell you you're on one and you can work from there. Also, aligning a dish takes patience, slow and steady - move it SLOW and keep an eye on your screen all the time.

A word of caution. If you are not slightly technically minded and do not have much patience then steer well clear of installing your own C band satellite dish. If you have never installed a fixed C band dish, don't even think about motorised systems. We use spectrum analysers to align big motorised C band dishes. If you must, install as per instructions all of the equipment, then call in an experienced tech to align your dish properly.

Best of Luck!!

SatPlus Communications