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SATELLITE
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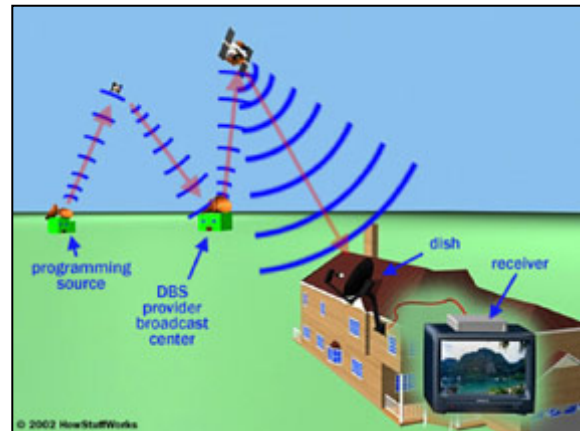
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INDIA'S LARGEST MAGAZINE EXCLUSIVELY FOR SATELLITE & CABLE TV

DTH – HOW IT WORKS

Early satellite TV viewers were explorers of sorts. They used their expensive S-Band, then C-Band dishes to discover unique programming that wasn't necessarily intended for mass audiences. The dish and receiving equipment gave viewers the tools to pick up foreign stations, live feeds between different broadcast stations and a lot of other stuff transmitted using satellites.

Some satellite owners still seek out this sort of programming on their own, but today, most satellite TV customers in developed television markets get their programming through a direct broadcast satellite (DBS) provider, such as DISH TV or the recently launched Doordarshan DTH platform. The provider selects programs and broadcasts them to subscribers as a set package. Basically, the provider's goal is to bring dozens or even hundreds of channels to the customers television in a form that approximates the competition from Cable TV. Unlike earlier programming, the provider's broadcast is completely digital, which means it has high picture and stereo sound quality.



Early satellite television was broadcast in C-band - radio in the 3.4-gigahertz (GHz) to 7-GHz frequency range. Digital broadcast satellite transmits programming in the Ku frequency range (10 GHz to 14 GHz).

There are five major components involved in a direct to home (DTH) satellite system: the programming source, the broadcast center, the satellite, the satellite dish and the receiver.

THE COMPONENTS

Programming sources are simply the channels that provide programming for broadcast. The provider (the DTH platform) doesn't create original programming itself; it pays other companies (HBO, for example, or ESPN or STAR TV or Sahara etc.) for the right to broadcast their content via satellite. In this way, the provider is kind of like a broker between the viewer and the actual programming sources. (Cable television networks also work on the same principle.)

The broadcast center is the central hub of the system. At the broadcast center or the Playout & Uplink location, the television provider receives signals from various programming sources, compresses it using digital compression, if necessary scrambles it and beams a broadcast signal to the satellite being used by it.

The satellites receive the signals from the broadcast station and rebroadcast them to the ground.

The viewer's dish picks up the signal from the satellite (or multiple satellites in the same part of the sky) and passes it on to the receiver in the viewer's house. The receiver processes the signal and

passes it on to a standard television.

Lets look at each step in the process in greater detail.

THE PROGRAMMING

Satellite TV providers get programming from two major sources: International turnaround channels (such as HBO, ESPN and CNN, STAR TV, SET, B4U etc) and various local channels (SaBe TV, Sahara TV, Doordarshan, etc). Most of the turnaround channels also provide programming for cable television, so sometimes some of the DTH platforms will ad in some special channels exclusive to itself to attract more subscriptions.

Turnaround channels usually have a distribution center that beams their programming to a geostationary satellite. The broadcast center uses large satellite dishes to pick up these analog and digital signals from several sources.

THE BROADCAST CENTER

The broadcast center converts all of this programming into a high-quality, uncompressed digital stream. At this point, the stream contains a vast quantity of data — about 270 megabits per second (Mbps) for each channel. In order to transmit the signal from there, the broadcast center has to compress it. Otherwise, it would be too big for the satellite to handle.

The providers use the MPEG-2 compressed video format — the same format used to store movies on DVDs. With MPEG-2 compression, the provider can reduce the 270-Mbps stream to about 3 or 10 Mbps (depending on the type of programming). This is the crucial step that has made DTH service a success. With digital compression, a typical satellite can transmit about 200 channels. Without digital compression, it can transmit about 30 channels.

At the broadcast center, the high-quality digital stream of video goes through an MPEG-2 encoder, which converts the programming to MPEG-2 video of the correct size and format for the satellite receiver in your house.

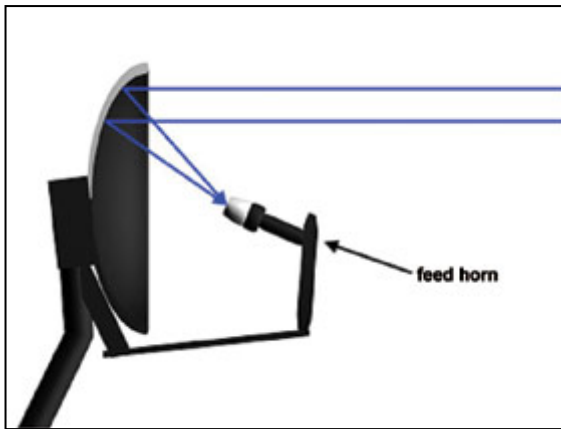
ENCRYPTION & TRANSMISION

After the video is compressed, the provider needs to encrypt it in order to keep people from accessing it for free. Encryption scrambles the digital data in such a way that it can only be decrypted (converted back into usable data) if the receiver has the correct decoding satellite receiver with decryption algorithm and security keys.

Once the signal is compressed and encrypted, the broadcast center beams it directly to one of its satellites. The satellite picks up the signal, amplifies it and beams it back to Earth, where viewers can pick it up.

THE DISH

A satellite dish is just a special kind of antenna designed to focus on a specific broadcast source. The standard dish consists of a parabolic (bowl-shaped) surface and a central feed horn. To transmit a signal, a controller sends it through the horn, and the dish focuses the signal into a relatively narrow beam.



The dish on the receiving end can't transmit information; it can only receive it. The receiving dish works in the exact opposite way of the transmitter. When a beam hits the curved dish, the parabola shape reflects the radio signal inward onto a particular point, just like a concave mirror focuses light onto a particular point.

The curved dish focuses incoming radio waves onto the feed horn.

In this case, the point is the dish's feed horn, which passes the signal onto the receiving equipment. In an ideal setup, there aren't any major obstacles between

the satellite and the dish, so the dish receives a clear signal.

In some systems, the dish needs to pick up signals from two or more satellites at the same time. The satellites may be close enough together that a regular dish with a single horn can pick up signals from both. This compromises quality somewhat, because the dish isn't aimed directly at one or more of the satellites. A new dish design uses two or more horns to pick up different satellite signals. As the beams from different satellites hit the curved dish, they reflect at different angles so that one beam hits one of the horns and another beam hits a different horn.

The central element in the feed horn is the low noise blockdown converter, or LNB. The LNB amplifies the signal bouncing off the dish and filters out the noise (signals not carrying programming). The LNB passes the amplified, filtered signal to the satellite receiver inside the viewer's house.

THE RECEIVER

The end component in the entire satellite TV system is the receiver. The receiver has four essential jobs:

It de-scrambles the encrypted signal. In order to unlock the signal, the receiver needs the proper decoder chip for that programming package. The provider can communicate with the chip, via the satellite signal, to make necessary adjustments to its decoding programs. The provider may occasionally send signals that disrupt illegal de-scramblers, as an electronic counter measure (ECM) against illegal users.

It takes the digital MPEG-2 signal and converts it into an analog format that a standard television can recognize. Since the receiver spits out only one channel at a time, you can't tape one program and watch another. You also can't watch two different programs on two TVs hooked up to the same receiver. In order to do these things, which are standard on conventional cable, you need to buy an additional receiver.

Some receivers have a number of other features as well. They pick up a programming schedule signal from the provider and present this information in an onscreen programming guide. Many receivers have parental lock-out options, and some have built-in Digital Video Recorders (DVRs), which let you pause live television or record it on a hard drive.

While digital broadcast satellite service is still lacking some of the basic features of conventional cable (the ability to easily split signals between different TVs and VCRs, for example), its high-quality picture, varied programming selection and extended service areas make it a good alternative for some. With the rise of digital cable, which also has improved picture quality and extended channel selection, the TV war is really heating up. Just about anything could happen in the next 10 years as all of these television providers battle it out.

WHAT IS AN LNB?

Low Noise Block-downconverter (so called because it converts a whole band or "block" of frequencies to a lower band).

An LNB sits on the end of an arm and faces the parabolic reflector ("dish") which focusses the signals from a satellite into the "feed horn" of the LNB (see pictures below). The LNB converts the signals to a lower frequency and sends them out to the cable connector, which you connect to your satellite receiver via coaxial cable.



HOW TO TEST AN LNB?

I think my LNB is faulty. How can I test it?

The only way to fully test an LNB is to fit it to a suitable dish, align the dish and LNB and connect a satellite receiver. Then check to make sure every channel is there. If no channels are missing and if it continues to work through a hot day and a cold night, the LNB is fine.

However, the reverse is not true. If some channels appear to be missing, this could be the fault of the cable, the receiver or the dish (distorted or misaligned). It does not prove that the LNB is faulty. So then you need to use a process of elimination by swapping the dish, the cable and the receiver (for a different make/model as some receivers won't work correctly with some LNBs).

CAN'T I TEST IT WITH A METER ?

A cheap satfinder meter simply looks at the average strength of all frequencies. It will not tell you if some frequencies are missing. An expensive meter looks at a specific frequency (sometimes more than one) but it will not tell you if some frequencies are missing.

Also, most meters rely on battery power. If the battery can not supply enough current to the LNB, it may give a false reading.

List of Universal LNB types:

"Universal" LNB 9.75 and 10.60 GHz L.O.

Works in 2 bands* 10.7-11.8 and 11.6 - 12.7 GHz. (22 kHz signal switched). Noise Figure usually 1.0 dB or better. It has an Integral feed horn with 40mm neck available in some models.

A Universal LNB requires a 22kHz signal at 0.5v p-p to switch its Local Oscillator to 10.6GHz ("high band"). Otherwise it uses its 9.75GHz oscillator ("low band").

Polarisation switching is controlled by dc voltage supplied by the receiver.

12.5v to 14.5v gives vertical and 15.5 to 18v gives horizontal polarisation.

A higher voltage than that may damage the LNB but most are OK up to 20v. A voltage that is too low (less than 12.5v) will prevent the LNB from working correctly. Most voltage settings are automatically controlled by the digital receiver, when it selects Vertical or Horizontal modes.



CONNECTING MORE THAN ONE SATELLITE RECEIVER TO A SINGLE DISH

"Twin-output" LNB

Currently available in most shops dealing in satellite receiving equipment, the twin output LNB provides two outputs to feed two separate receivers for independent working. Each output can be switched independently by 13/17 volt input by the individual receiver to change polarisation and by 22kHz to change the band.



“Dual LNB” or “Monobloc LNB”

This type of LNB has a single output and the actual satellite signal is selected by the receiver which sends a DisEqC (22kHz) pulsed tone up the LNB cable. So only one satellite transmission can be viewed at a time. This is in contrast with dish systems that have two or more separate LNBs where, with two receivers, both satellite transmissions can be viewed or recorded simultaneously.

“Quad-output” or “Quad universal” LNB

This can feed four separate receivers. Basically an LNB with four IF outputs. Each receiver has independent control of polarisation and

band via 13/17v switching and 22kHz on/off respectively.

“OCTO” LNB

As above but with eight independent outputs. You can then connect up to eight satellite receivers to a single dish.

“Quattro universal LNB”

This has four fixed outputs and is used only in “head end” I.F. distribution systems for apartment blocks. One LNB supplies a head end unit that can provide (typically) up to 16 outputs for separate Digiboxes. The four outputs of the LNB are as follows: -

1. Horizontal polarisation low band
2. Horizontal polarisation high band
3. Vertical polarisation low band
4. Vertical polarisation high band

You should not connect any of the outputs, 1 - 4, directly to a receiver unless you want to restrict viewing to just one of the four options. Even if you do, the receiver may not work. It's not a good idea. Use the Quad instead.



If you “mix ‘n’ match” by picking a 90cm dish and a Universal LNB at random, the chances are that the performance could be no better than that of a regular minidish.

As a general rule, any standard LNB will work with a circular (prime focus) dish or an offset focus dish which is taller than it is wide (which “looks” circular when viewed by the LNB).

However, a dish which is wider than it is tall will need a special LNB.

Just to prove the point, here is a typical “Universal” LNB used with a “minidish”. The minidish is oval in shape, being much wider than it is high.

Inside that plastic rain cover is the actual LNB. Note the difference in scalar ring height (red arrows). The side projections allow the LNB to focus on a wide area in the horizontal plane, while the top and bottom projections are longer and focus the LNB on a narrower area in the vertical plane. This LNB is designed specifically for an oval dish and will give very poor results with a dish that is roughly circular or a dish that is taller than it is wide.

Here's another comparison. The LNBF on the left has circular scalar rings inside the feedhorn. It is designed to be used with a nearly circular dish.

The one on the right is designed specifically for a dish which is wider than its height.

"Minidish" upgrades

Here is a Quad output LNB as supplied with a system with adaptors for the minidish. The arrow points to the special oval shaped "scalar" steps in the feedhorn. These cause the LNB to focus exactly on the oval shape of the dish, using the full dish area but without picking up reflections from the wall behind.



Some dealers, who are either unscrupulous or simply know no better, are offering a standard Twin-output or Quad output LNB with an adaptor to fit the minidish. The adaptor fits very precisely, however unfortunately, the LNB will not give optimum performance - resulting in "rain drop-out" during bad weather.

Although the Quad output LNB kit may be available, it is rather expensive. If you must use the minidish (and there are good aesthetic and environmental reasons to do so) then you'll have to pay the price.

However, you may prefer to buy a standard dish of, say, 90cm diameter and use a standard 40mm neck twin-output or quad-output LNB with this. The match and fitting will be perfect and the "rain drop-out" will be very rare. The price of a 90cm dish with twin-output LNB will be less than that of a Quad output LNB kit.

CAN I CONNECT MORE THAN ONE TV TO A SINGLE SATELLITE RECEIVER?

The standard digital satellite receiver can tune in only one programme at a time and this programme can be routed around the house for viewing in other rooms. To assist in this, most satellite receivers have a RF Output (RF Outlet) socket. For an additional sum you can buy a remote extender. This plugs into the RF cable at the remote TV and can send handset signals back to the box. A wireless remote extenders and extra remotes are also available from shops. However you should note that you can only tune into and watch any one programme at a time on all TV sets connected to a single receiver.

CAN I CONNECT MORE THAN ONE DISH/LNB TO A SINGLE RECEIVER

2 X 1 DiSEqC SWITCHES

This type of switch easily available in the market, will enable you to connect two satellite dishes or two LNBs to a single satellite receiver. The DiSEqC switch will enable the user to select one LNB signal between any 2 different LNBs of any type. The 2 input ports marked SAT1 and SAT2 are connected to the 2 LNBs, which may be on 2 different dishes, and the output marked OUT is connected to the receiver. The selection of the LNBs is done by choosing the appropriate Tone Burst A or B in the LNB setup menu of the receiver. Check the user manual of the digital receiver for details.



4 X 1 DiSEqC SWITCHES

The DiSEqC switch will enable the user to select one LNB signal between 4 different LNBs of any type. The 4 input ports marked SAT1, SAT2, SAT3 or SAT4 are connected to the 4 LNBs, which may be on 4 different dishes, and the output marked OUT is connected to the receiver. Again as in the 2 X 1, the selection of the LNBs is done by choosing the appropriate Tone Burst A, B, C, or D in the setup menu of the receiver. ■

DISH TV DTH Channel List (Scrambled & Pay Service)				
Frequency	Polarity	Channels	SR	FEC
10977	Horizontal	ARY Digital India	40700	2/3
10977	Horizontal	ETV Gujarati	40700	2/3
10977	Horizontal	ETV Oriya	40700	2/3
10977	Horizontal	ETV Bihar	40700	2/3

10977	Horizontal	ETV UP	40700	2/3
10977	Horizontal	ETV MP	40700	2/3
10977	Horizontal	ETV Rajasthan	40700	2/3
10977	Horizontal	Zee Music	40700	2/3
10977	Horizontal	SS Music	40700	2/3
10977	Horizontal	The Musik	40700	2/3
10977	Horizontal	ARY One World	40700	2/3
10977	Horizontal	QTV	40700	2/3
10977	Horizontal	ETV Bangla	40700	2/3
10977	Horizontal	Euronews	40700	2/3
10977	Horizontal	ETV Marathi	40700	2/3
10977	Horizontal	ETV Marathi	40700	2/3
10977	Horizontal	ETV kannada	40700	2/3
10977	Horizontal	ETV Urdu	40700	2/3
10977	Horizontal	ETV 2	40700	2/3
11172	Horizontal	Smile TV	27500	3/4
11172	Horizontal	Star Sports India	27500	3/4
11172	Horizontal	MX	27500	3/4
11172	Horizontal	Action Cinema	27500	3/4
11172	Horizontal	Classic Cinema	27500	3/4
11172	Horizontal	Premeire Cinema	27500	3/4
11172	Horizontal	Pogo	27500	3/4
11172	Horizontal	NE TV	27500	3/4
11172	Horizontal	Aaj Tak	27500	3/4
11172	Horizontal	TCT Network	27500	3/4
11172	Horizontal	SaB TV	27500	3/4
11172	Horizontal	BBC World Service Radio	27500	3/4
12535	Vertical	Eurosport News	40700	2/3
12535	Vertical	Fashion TV India	40700	2/3
12535	Vertical	TCT Network	40700	2/3
12535	Vertical	India TV	40700	2/3
12535	Vertical	Jaya TV	40700	2/3
12535	Vertical	Asianet	40700	2/3
12535	Vertical	Sahara One	40700	2/3
12535	Vertical	Sahara Samay National	40700	2/3

12535	Vertical	Jeevan TV	40700	2/3
12535	Vertical	Jagran	40700	2/3
12535	Vertical	ESPN India	40700	2/3
12535	Vertical	Kairali Channel	40700	2/3
12535	Vertical	CNN Headline News	40700	2/3
12535	Vertical	CCTV 9	40700	2/3
12535	Vertical	NDTV 24 X 7	40700	2/3
12535	Vertical	Headlines Today	40700	2/3
12535	Vertical	TV 5 Asia	40700	2/3
12535	Vertical	MAA TV	40700	2/3
12535	Vertical	Geo TV	40700	2/3
12535	Vertical	Dish TV Promotional Channel	40700	2/3
12595	Vertical	B4U Music	40700	2/3
12595	Vertical	STC Music	40700	2/3
12595	Vertical	Nepal 1	40700	2/3
12595	Vertical	CNBC TV 18	40700	2/3
12595	Vertical	CNN International Asia	40700	2/3
12595	Vertical	Turner Classic Movies	40700	2/3
12595	Vertical	Balle Balle	40700	2/3
12595	Vertical	ETV Telugu	40700	2/3
12595	Vertical	BBC World India	40700	2/3
12595	Vertical	ETC Channel Punjabi	40700	2/3
12595	Vertical	Zee Cinema Asia	40700	2/3
12595	Vertical	ABC Asia Pacific	40700	2/3
12595	Vertical	Trace TV	40700	2/3
12595	Vertical	Aastha TV	40700	2/3
12595	Vertical	Sky Bangla	40700	2/3
12595	Vertical	NDTV India	40700	2/3
12595	Vertical	Reality TV India	40700	2/3
12595	Vertical	Cartoon Network Asia	40700	2/3
12595	Vertical	Alpha Telugu	40700	2/3
12595	Vertical	NTV Bangla	40700	2/3
12688	Vertical	Zee TV Asia	27500	3/4
12688	Vertical	Zee News	27500	3/4
12688	Vertical	Alpha Marathi	27500	3/4

12688	Vertical	Alpha Punjabi	27500	3/4
12688	Vertical	Alpha Gujarati	27500	3/4
12688	Vertical	Alpha Bangla	27500	3/4
12688	Vertical	Trendz	27500	3/4
12688	Vertical	Zee Movie Zone	27500	3/4
12688	Vertical	Zee English	27500	3/4
12688	Vertical	Zee Business	27500	3/4
DOORDARSHAN DD DIRECT DTH package (Free Channels)				
12534	Horizontal	Kairali Channel	27500	3/4
12534	Horizontal	BBC World India	27500	3/4
12534	Horizontal	ETC Channel Punjabi	27500	3/4
12534	Horizontal	Smile TV	27500	3/4
12534	Horizontal	Aaj Tak	27500	3/4
12534	Horizontal	Zee Music	27500	3/4
12534	Horizontal	Headlines Today	27500	3/4
12534	Horizontal	Sun TV	27500	3/4
12534	Horizontal	TV 9	27500	3/4
12534	Horizontal	Star Utsav	27500	3/4
12534	Horizontal	STV Marathi	27500	3/4
12534	Horizontal	FM Gold Radio	27500	3/4
12534	Horizontal	AIR Kannada	27500	3/4
12534	Horizontal	AIR Bangla	27500	3/4
12534	Horizontal	AIR Hindi	27500	3/4
12534	Horizontal	AIR North East	27500	3/4
12534	Horizontal	AIR Punjabi	27500	3/4
12647	Vertical	DD National	27500	3/4
12647	Vertical	DD News	27500	3/4
12647	Vertical	DD Sports	27500	3/4
12647	Vertical	SS India	27500	3/4
12647	Vertical	DD Bharati	27500	3/4
12647	Vertical	DD bangla	27500	3/4
12647	Vertical	DD Chandana	27500	3/4
12647	Vertical	DD Gujarati	27500	3/4
12647	Vertical	DD Kashmir	27500	3/4

12647	Vertical	DD Malayalam	27500	3/4
12647	Vertical	DD Lok Sabha	27500	3/4
12647	Vertical	AIR Vividh Bharati	27500	3/4
12647	Vertical	FM Rainbow Radio	27500	3/4
12647	Vertical	AIR Telugu	27500	3/4
12647	Vertical	AIR Marathi	27500	3/4
12647	Vertical	AIR Tamil	27500	3/4
12647	Vertical	AIR Gujarati	27500	3/4
12729	Vertical	DD North East	27500	3/4
12729	Vertical	DD Oriya	27500	3/4
12729	Vertical	DD Podhigai	27500	3/4
12729	Vertical	DD Punjab	27500	3/4
12729	Vertical	DD Sahyadri	27500	3/4
12729	Vertical	DD Saptagiri	27500	3/4
12729	Vertical	Mh1 Music	27500	3/4
12729	Vertical	Jain TV	27500	3/4
12729	Vertical	Aakaash Bangla	27500	3/4
12729	Vertical	DD Rajya Sabha	27500	3/4

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