

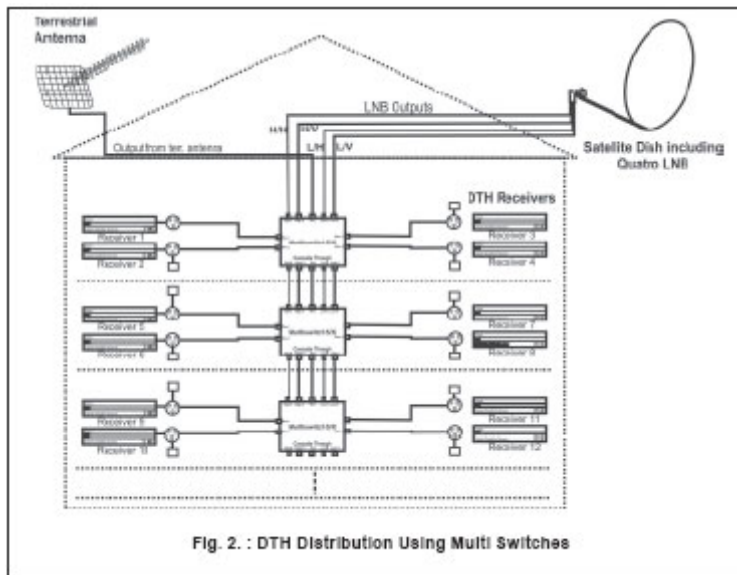


## INDIA'S LARGEST MAGAZINE EXCLUSIVELY FOR SATELLITE & CABLE TV

# MULTI SWITCHES FOR DTH DISTRIBUTION

*Multi Switches Provide An Ideal Solution For Housing Societies To Distribute DTH Signals To All Its Members.*

### INTRODUCTION



Television signals are distributed to consumers, usually in two different methods.

Cable TV, the most popular method in India, China, USA, Germany and other countries requires the services of cable operator who receive this signal via satellite and then distribute them using a high bandwidth coaxial or fibre optic connection. Cable TV remains the dominant mode of TV channel distribution, worldwide.

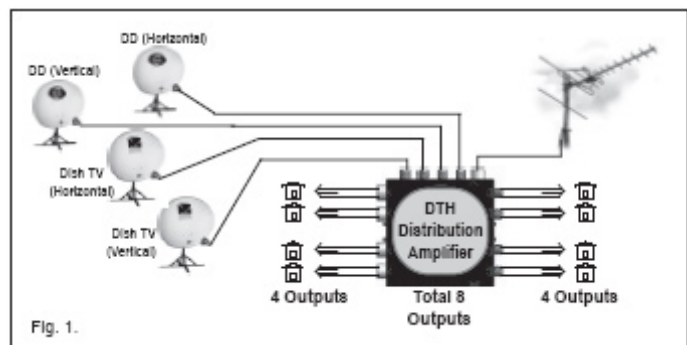
The alternate method is "Direct-To-Home" or DTH. In this method, Ku Band (10 GHz to 12.5 GHz) satellite transmissions are received directly by each consumer/subscriber using a small

dish antenna. The DTH dish antenna typically ranges in size from 18 inches to 24 inches diameter. The DTH dish must have a clear Line-of-sight with the satellite from which it receives these transmissions.

In urban centres such as densely populated cities with tall buildings, it is often not possible for each consumer to have a clear line-of-sight view from his window / balcony to the satellite.

Further, mounting of a large number of DTH dish antennae on a building appears unsightly.

Also, a poorly mounted dish antenna can cause hazard to life and property if it falls off a tall building.



As a result of these constraints to DTH, particularly in densely populated towns and cities, engineers have developed "Multi Switches" for distribution of DTH signals from a single set of DTH antennae,

mounted on the terrace of a building, to all residents of the building.

In effect a Multi Switch DTH distribution system provides buildings and cooperative housing societies an option to cable Television.

Let us take a closer look at the DTH Multi Switch.

## MULTI SWITCH BASICS



Dual LNB

A Multi Switch is basically a box that contains signal splitters and A/B switches.

A outputs of group of DTH LNBS are connected to the A and B inputs of the Multi Switch, as shown in figure1.

In a Multi Switch DTH distribution system, dedicated LNBS are required to separately receive the 2 signal polarisations (LHCP & RHCP or Horizontal & Vertical).

The Multi Switch then locks one of the LNBS to always look at the Horizontal transponders and the other LNB to always look at the Vertical transponders. This is why a Multi Switch only works with Dual LNBS and not (single) LNBS that Switch their polarities.

Inside the Multi Switch, signal splitters are used to divide the incoming Horizontal & Vertical signals and provide the required number of multiple outputs. Each output is sent to a customer's premise, where it is connected to a DTH receiver and TV set.

The split outputs within the Multi Switch are paired and connected to a series of A/B Switches such that one side of the switch sees the Horizontal LNB & the other sees Vertical LNB.

The signal splitters ofcourse significantly reduce the signal level, when providing multiple outputs from each LNB. To compensate for these (significant) losses, active Switches provide signal amplification as well.

**In A Multi Switch DTH Distribution System, Dedicated LNBS  
Are Required To Separately Receive The 2 Signal  
Polarisations**

## HOW A MULTI SWITCH WORKS

To better understand how a Multi Switch works with a satellite antenna, lets get an understanding of how the two work together.

The LNB on your satellite dish is capable of tuning to a satellite transponder that is broadcasting in either left-hand or right-hand circular polarity.

When the DTH receiver is tuned, the receiver sends a Switching signal back up the coax cable to the LNB in the form of a 14-volt or 18-volt DC voltage level to select the correct polarity for the transponder requested.

Further, a 22KHz tone can also be sent by the receiver to a Switch, to select from a different group of LNBS.

As an example, the installation will have the following DTH LNBS :

FOR DD DTH

- \* Horizontal Polarity Doordarshan DTH LNB
- \* Vertical Polarity Doordarshan DTH LNB

**FOR DISH DTH**

- \* Horizontal Polarity DISH DTH LNB
- \* Vertical Polarity DISH DTH LNB

The 22 KHz Tone sent by the DTH receiver, will, as normal, select either the Doordarshan (DD) LNBS or DISH LNBS. The 14-volt or 18-volt DC voltage level sent by the each DTH receiver in each customer's home, will determine whether it receives the Horizontal or Vertical signal.

In a normal DTH setup ( separate DTH Dish for each Receiver ) the DTH receivers signals (14VDC/18VDC and 22 KHz Tone) are sent to the LNB.

However, in a DTH Multi Switch, these signal terminate at the Multi Switch. They are then interpreted by the Multi Switch, which then routes the required LNB's signals to the receiver demanding it.

**TYPES OF MULTI SWITCHES**

There are basically 2 different types of Multi Switch available:

- \* Passive (un-powered) and
- \* Active (powered).

If cable runs are longer than 100 feet for any receiver, a powered Multi-Switch is highly recommended.

The long run can degrade the signal level to the DTH receiver. A powered Multi Switch compensates the signal loss.

There are 3 main types of Multi-Switches:

**[A] NON-POWERED MECHANICAL MULTI-SWITCH**

Cheapest in price. Has mechanical Switching mechanism that is controlled by the power coming off of the DTH receiver. The DTH receiver changes voltages on the line depending on which transponder group it wants to look at. This Multi Switch uses that voltage to move the Switch.

Non-powered cheaper switches are recommended only for small installations, where Cable Runs are very, very short.

**[B] POWERED MECHANICAL MULTI-SWITCH\***

Mid range in price. Has a mechanical switching mechanism. It uses the voltage changes from the DTH receiver to determine what it should look at, but uses it's own external power to control the switch.

**[C] POWERED SOLID STATE MULTI-SWITCH\***

Most expensive. Completely solid state-no moving parts. Reads the voltage changes from the DTH receiver and electronically routes the signal to the correct LNB.

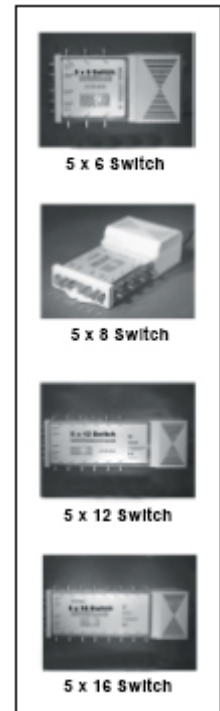
- \* There are variations of [B] and [C] which include signal amplification.

**Each DTH Receiver In The System Must Be Fed  
By A Decicated Output From The Multi Switch**

**ADDING MORE RECEIVERS**

A note of caution. In a Multi Switch installation, a customer cannot provide for a second receiver, ( eg in the Children's room ) by adding a splitter, in his house.

If a splitter is used, then the 2 receivers may each call for a different LNB ( eg a different channel) and create a conflict by simultaneously calling for Horizontal & Vertical transponders ! As a result,



one or both receivers will only be able to see channels originating from the same LNB !

The only proper solution will be to run a separate feed from the Switch to the second DTH Receiver + TV set in the same customer's premises.

## CASCADING MULTI SWITCHES

A cooperative housing society is likely to require a large number of DTH feeds, probably 2 per household.

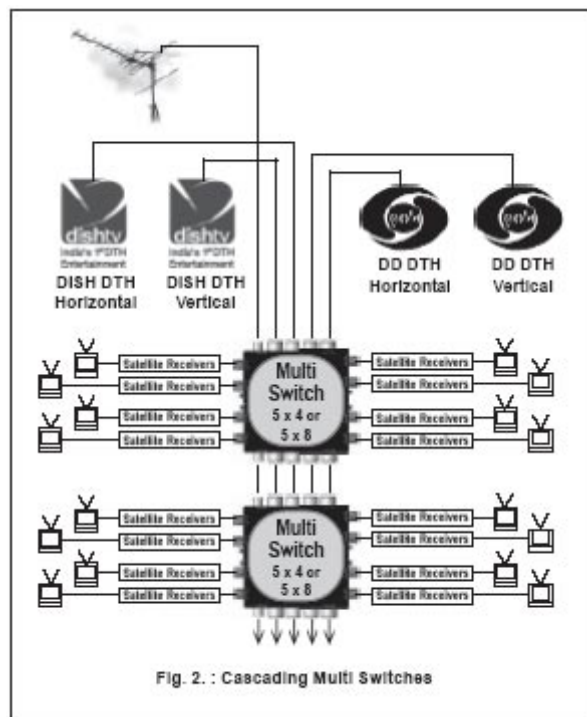
A single Switch will not be able to meet this requirement. In such cases, cascadeable Multi Switches are required.

A cascadeable Multi Switch will not terminate the 22 KHz tone required for selecting between DISH DTH & DOORDARSHAN. Cascadeable Switches pass through the 22 KHz test tone, that it receives from each satellite receiver, to the Multi Switch before it. The 22 KHz tone continues to move up the transmission chain of Multi Switches, till it reaches the Multi Switch that is connected to the LNBS.

## NUMBER OF INPUTS

Multi Switches are available with different number of inputs. You will need one input for each LNB. Hence, currently, to receive Doordarshan's and DISH TV's broadcasts, 4 inputs will be required, viz:

- \* Horizontal Polarity Doordarshan DTH LNB
- \* Vertical Polarity Doordarshan DTH LNB
- \* Horizontal Polarity DISH DTH LNB
- \* Vertical Polarity DISH DTH LNB



Ofcourse, if you want to make a provision for the Tata-STAR DTH likely to be launched in the near future, you will need atleast 6 LNB inputs.

## CABLE TV DISTRIBUTION TOO !

The IF (intermediate Frequency) distribution system deployed for DTH and Multi Switch distribution, utilises the frequency band of 950 MHz to 2150 MHz.

On the other hand, Cable TV and terrestrial broadcasts use the 48 MHz to 860 MHz frequency band, which is unused for DTH distribution.

Hence, several Multi Switches offer separate inputs to also connect and distribute Cable TV and DTH signals.

These Multi Switches are often listed as "3 x n" or "5 x n". This indicates that there is an extra input for Antenna or Cable TV which will be combined / mixed onto the same RG-11 or RG-6 cables as the DTH signals.

Keep in mind that the satellite receiver at the customer's premises will not provide reception of Cable TV signals.

For proper operation, the feed will have to be split using a ( 2000 MHz capable ) 2 way splitter, feeding one output to the DTH receiver and the other to the TV RF input.

## SWITCH DESIGNATIONS

Multi Switches are designated as : 2x4, 2x8, 3x4, 3x8, 4x4, 4x8, 5x4 or 5x8.

The first number in the number of inputs (LNBS + Cable TV + Terrestrial TV). The second number is the number of outputs of the Multi Switch.

## NUMBER OF OUTPUTS

How many outputs are required ?

It depends on the number of DTH receivers that you plan to feed.

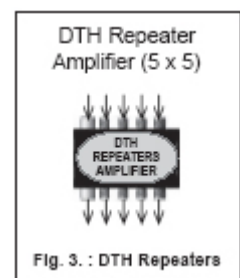
A housing society with 25 apartments may want to consider upto 50 outputs.

Obviously, all these outputs cannot be provided by a single Multi Switch. Multiple Multi Switches will have to be cascaded. This is shown in Figure 3.

## REPEATERS

A Multi-storied building may require extended cable lengths between cascaded Multi Switches. Keep in mind that the IF signals being distributed are 2 to 4 times higher frequency than regular Cable TV signals. As a result, cable losses are very substantial, and the signals may need to be boosted (amplified) at regular intervals.

For this, "Repeaters" ( see Figure 3 ) are available. The repeaters do not provide any outputs for DTH receivers. Instead, a repeater accepts the input from a Multi Switch and provides amplified outputs to another Multi Switch.



The repeater should be selected to have the same number of inputs and outputs as the inputs in the Multi Switches used.

## SYSTEM COSTS

One must keep in mind that a DTH distribution system will always be many times more expensive than a Cable TV distribution system. Hence consider the DTH option only if you are not already being serviced by a Cable operator.

First of all, each TV set ( not just home ) must have its own, dedicated, authorised (subscription paid) DTH receiver. It is not possible for the housing society to share satellite receivers. Each TV set must have its own. This not only calls for the capital cost of DTH receivers but the monthly subscription which is upto Rs 330 per TV set per month for DISH TV (not per household).

In addition, the cost of Multi Switches is high. Currently, a 5x4 Multi Switch is priced at Rs 3,500. A 5x12 Multi Switch is priced at Rs 10,500. A 5 input repeater / amplifier is priced at Rs 3,500 each.

Wiring costs too add up substantially. Keep in mind that a Cable TV network distributes att signals by a single "trunk" coaxial cable. In contrast, a 5 input Multi Switch will require a "Trunk" of 5 co-axial cables.

## CONCLUSION

Use of Multi Switch for DTH distribution is certainly more expensive than Cable TV. Hence this option should be considered only when there is no Cable operator servicing your area.

However, Multi Switches provide an elegant, simple to implement solution for distribution of DTH signals, from a set of shared DTH dish antennae and LNBS. ■

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