

Domestic multi room digital satellite distribution

Using multi switches

The month has been set, November 2013 and there will be no VHF/ UHF analog Television Transmissions in New Zealand .Those who choose Satellite delivery of the Free View platform and require reception in many rooms will need to use a device called a multiswitch. As a result of constraints to Direct to home broadcasting, where multiple channels are required using both horizontal and vertical polarities engineers have developed "Multi Switches" for distribution of DTH signals from a single set of DTH antennae, Multi Switch DTH distribution systems provide homes, multi home dwellings with access to the communal satellite system without any interference from other users of the system.



A Multi Switch is basically a box that contains signal splitters and A/B switches. In a Multi Switch DTH distribution system, dedicated LNBS are required to separately receive the two polarizations (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 specific room or home 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 of course reduce the signal level slightly, when providing multiple outputs from each LNBF. However given the normal LNBF output of 65 to 70 Dbmv there is sufficient signal available to compensate for these losses if using passive multiswitch (Active). Powered multiswitches provide signal amplification as well.

To better understand how a Multi Switch works with a satellite antenna, we must first understand how the two work together. The LNBF on your satellite dish is capable of tuning to a satellite transponder that is broadcasting either left-hand or right-hand circular or Horizontal and Vertical polarities.

When the DTH receiver is tuned, the receiver sends a Switching signal back up the coax cable to the LNBF in the form of a 13-volt or 18-volt DC voltage level to select the correct polarity for the Transponder requested. Normally 13V will select Vertical and 18V will select Horizontal.

When single satellites Horizontal / Vertical inputs are processed by the multi switch it is a simple procedure of tuning each Satellite receiver to Vertical or horizontal transponders by either using 13V Vertical or 18V Horizontal.

Example:

Optus D1 Free View (Horizontal) (18V 12456 /22,500 and 12483 /22,500)
Optus D1 SBS (Vertical) (13V 12646 /12,600)

Where two or more satellites are received then one satellite is **NON Switched**, **JX Sat** normally allocate Free View to the non switched inputs. "If the switch should fail then the non switched will always function."

Example: Multiple reception from Optus D1 and Optus D2 satellites.

Optus D1 **NON SWITCHED** Free View (Horizontal) (18V 12456 /22,500 and 12483 /22,500)
Optus D1 **NON SWITCHED** SBS (Vertical) (13V 12646 /12,600)

Optus D2 **SWITCHED** a 22 KHz tone is sent by the receiver the second pair of inputs which in our case is connected to the output from the dual output LNBF aligned to the Optus D2 satellite providing both Vertical and Horizontal output signals.

Optus D1 **SWITCHED 22 KHz ON** UBI (Horizontal) (18V 12394 /22,500)
Optus D1 **SWITCHED 22 KHz ON** Globe Cast (Vertical) (13V 12519 /22,500)

The Switching commands sent by the receiver, will, select either Optus D1 0KHz tone or Optus D2 LNBFs with a 22 KHz tone switched on. The 14-volt or 18-volt DC voltage level sent by the each DTH receiver in each room or 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 LNBF.

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 upon request.

There are basically 2 different types of domestic multi switches 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 MultiSwitch compensates the signal loss.

There are 2 main types of domestic Multi-Switches:

1: Non Powered Mechanical Multiswitch GEN CEN 4401

These are the cheapest in price. It 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 initiate the switch .Non-powered cheaper switches are recommended only for small installations, where Cable Runs are very, very short.

2: Powered mechanical multi switches

These are more expensive than the passive devices as they are mains powered and have amplification to each output port. Normally they use a mechanical switching mechanism but uses the voltage changes from the satellite receiver to determine what it should look at, but uses its own external power to control the switch

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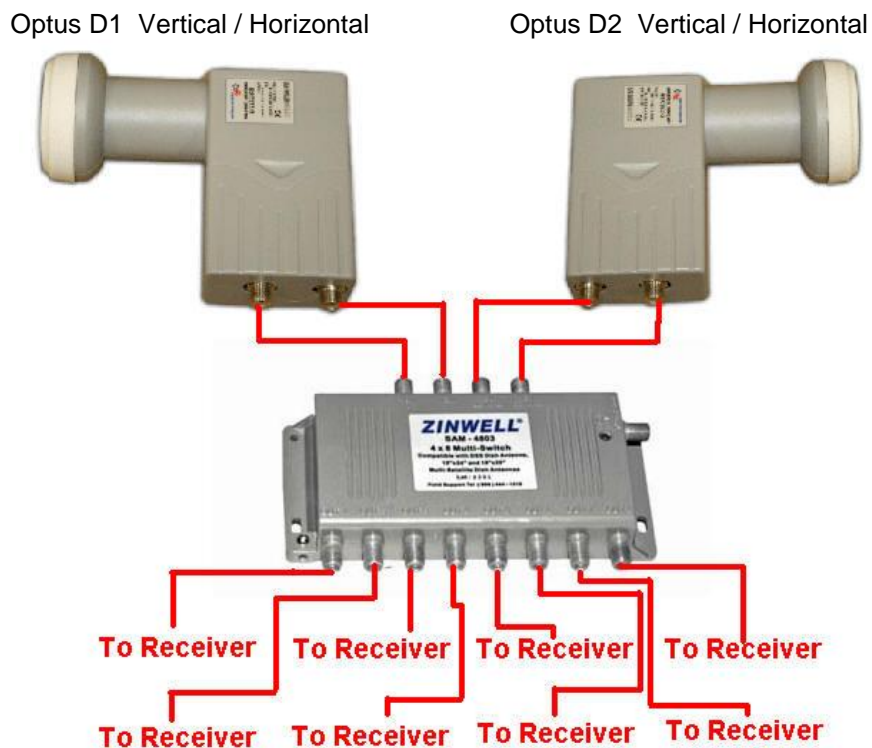
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Multi Switches are designated as: 2x4, 2x8, 3x4, 3x8, 4x4, 4x8, 5x4 or 5x8. The first number in the number of inputs (LNBFs + Terrestrial TV). The second number is the number of outputs of the Multi Switch.

Two satellite distribution system



In this diagram Optus D1 is 0KHz and just passed through whilst Optus D2 requires the 22KHz tone to be switched on so that when selected the switch will connect the required satellite outputs and connect them to the satellite receiver.

When designing multi switch satellite distribution systems one basic question need to be answered before beginning.

How many outputs are required?

It depends on the number of DTH receivers that you plan to feed. For a domestic home four six or eight rooms would be the maximum number of outlets required.

