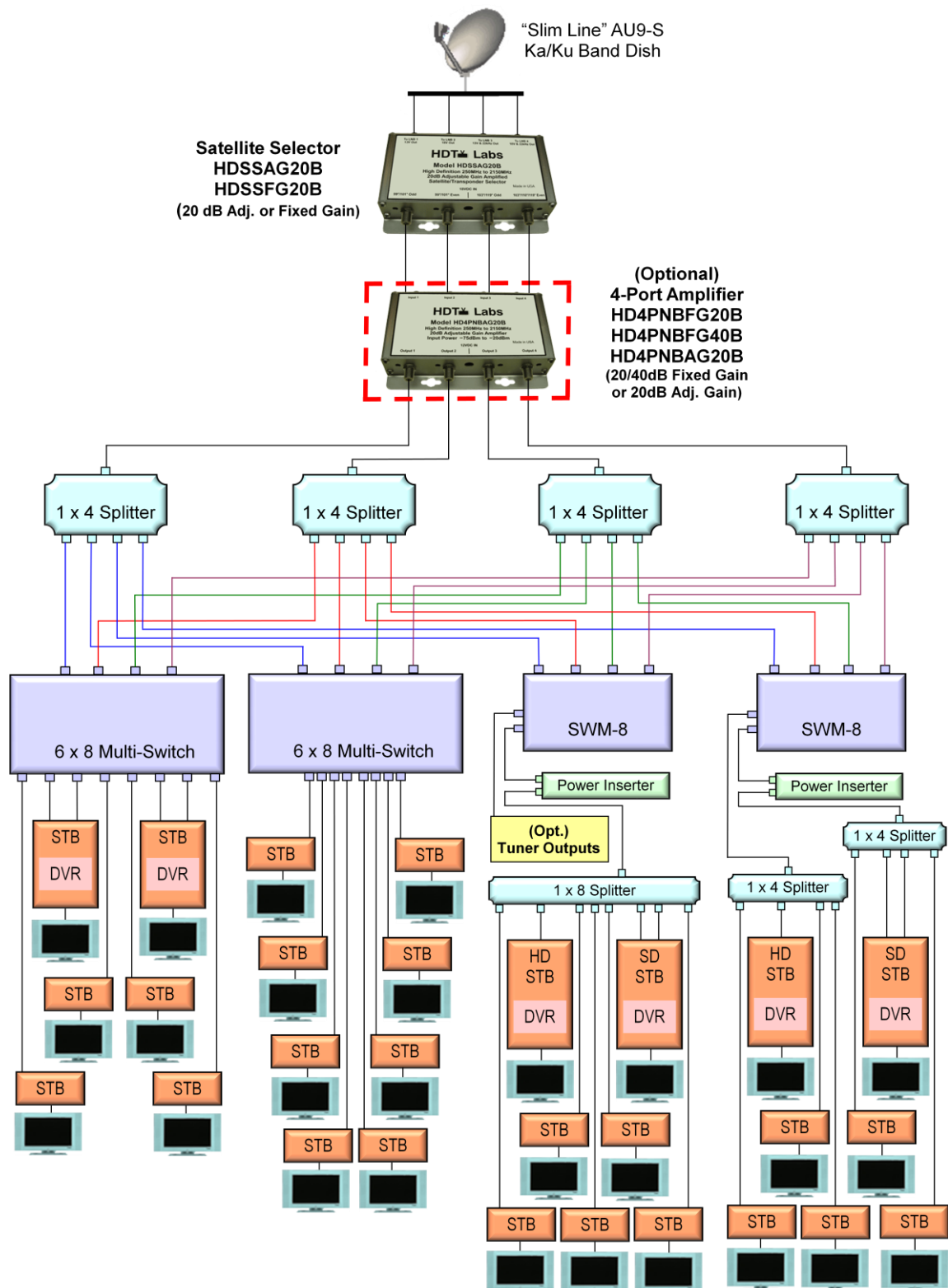


# Typical HDTV Commercial Multi-Switch System Diagram for DIRECTV



# Typical HDTV Commercial Multi-Switch System Description for DIRECTV

## DISH ANTENNA

In most typical commercial installations, HDTV desired systems will usually use the "Slim Line" AU9-S Ka/Ku band dish (99°/101°/103°/110°/119°) for signal reception. The RF output signal level of the dish will vary between -19dBm and -28dBm, depending upon the model of LNB used. Recommended RG-6 coaxial cable will have a loss of about 10dB per 100' at 2150MHz, when the connectors and ground blocks used are rated to 2GHz.

## SATELLITE SELECTOR

Since most commercial installations will have considerable signal loss due to the number of devices and cable runs in the system, a Satellite Selector should be used to optimize system performance. The **20dB Adjustable Gain Satellite Selector (HDSSAG20B)** is a combination of polarity locker, 20dB adjustable gain amplifier, and independent power supply that ensures strong and consistent control signals to the dish LNBs and adds signal strength to the system.

If the signal level at the input to the multi-switch is less than -35dBm, then a Satellite Selector should be used. When the input signal levels at the receivers are -45dBm or less, you could experience pixilation or 771 searching for satellite every time cloud cover impairs your dish. Hitting the multi-switch at the top of the input window will allow you to have the greatest output signal from the multi-switch. Use your satellite meter to make sure your C/N is greater than 11, typically being 16 to 17 on satellite 101° and 13 to 16 on satellite 119°.

Use the Adjustable Gain Satellite Selector to more accurately tune each of the four system channels and maximize the multi-switch output levels to the highest C/N ratio possible. The Adjustable Gain Satellite Selector allows you to build more reliable systems, use fewer parts, and produce a cleaner C/N output on all channels.

## 4-PORT AMPLIFIERS

If the amplification from the Satellite Selector still does not allow you to hit the desired input windows of the multi-switches and receivers, optional 4-Port Amplifiers can be used. The 20dB Fixed Gain Amplifier (HD4PNBFG20B) when paired with the adjustable gain of the Satellite Selector would be a preferred solution for relatively small system losses. If very large system losses exist, the 40dB Fixed Gain Amplifier (HD4PNBFG40B) should be considered. An alternative to the fixed-gain amplifiers would be to pair a **20dB Adjustable Gain Amplifier (HD4PNBAG20B)** with a **20dB Fixed-Gain Satellite Selector**

**(HDSSFG20B)** to again have precise gain control into the next device. Care should be taken in this case to not over-drive the Adjustable Gain Amplifier.

Input power levels to all three amplifiers can be as low as -75dBm. Since the amplifiers can detect these very weak signals, longer cable runs may be used before amplification is required. All three amplifier types have gain/slope networks built into each of their four channels. As system channel frequencies increase, so does the loss associated with that channel. The gain/slope circuitry essentially keeps the output signal at a consistent level across all frequencies by applying more gain at the higher frequency channels and less gain at the lower frequency channels.

### **SPLITTERS**

The common 2-way, 4-way, and 8-way splitters may be used in any combination and number in order to produce the desired number of receiver inputs. Each splitter, however, does introduce loss into the system and reduces signal strength accordingly. Care should be taken when wiring splitter outputs to multi-switch inputs in that each multi-switch input must be from a different satellite, as the color coded lines in the diagram indicate.

### **MULTI-SWITCH**

A commonly used multi-switch in the industry is a 6x8 port switch with 6 input and 8 output ports. This multi-switch can provide satellite TV signals from all five of DIRECTV's primary satellites to the inputs of multiple receivers. Four of the multi-switch input ports can be used by the HDTV Labs' Satellite Selectors while the other two input (Flex) ports can be used with separate dishes if satellites 72.5° and 95° are desired.

### **SWM-8 MODULE**

An alternative to the 6x8 multi-switch is the Single-Wire Multi-switch with outputs to 8 tuners (SWM-8). This module also provides satellite TV signals from all five of DIRECTV's primary satellites to the inputs of multiple receivers. Both SWM-8 modules and 6x8 multi-switches have four main input ports and two "Flex" ports although the SWM-8 module also has an additional Off-Air input port. The SWM1 and SWM2 output ports combined can send signals to 8 tuners. If all 8 signals are used on SWM1, then port SWM2 should be terminated.

Commercial installations can have any number and combination of 6x8 multi-switches and SWM-8 modules.

### **SET TOP BOXES, TV's, and DVR's**

HR23 (HD + DVR), H23 (HD), R16 (SD +DVR), and D12 (SD) are the current models of set top boxes being used to receive the DIRECTV signal. The minimum input signal to each device by standards is a level of -51 dBm. Typically, this level should be no lower than -40 dBm, but for peak performance our recommendation would be to use an even stronger input level of about -30 dBm. This should result in the desired C/N ratio of about 16.

A single wire is required for each set top box and two wires are required for each set top box with DVR. If a SWM-8 module is used instead of a multi-switch, only one wire is required to the HD + DVR set top box. Legacy receivers can be used with both 6x8 multi-switches and SWM-8 modules if desired.