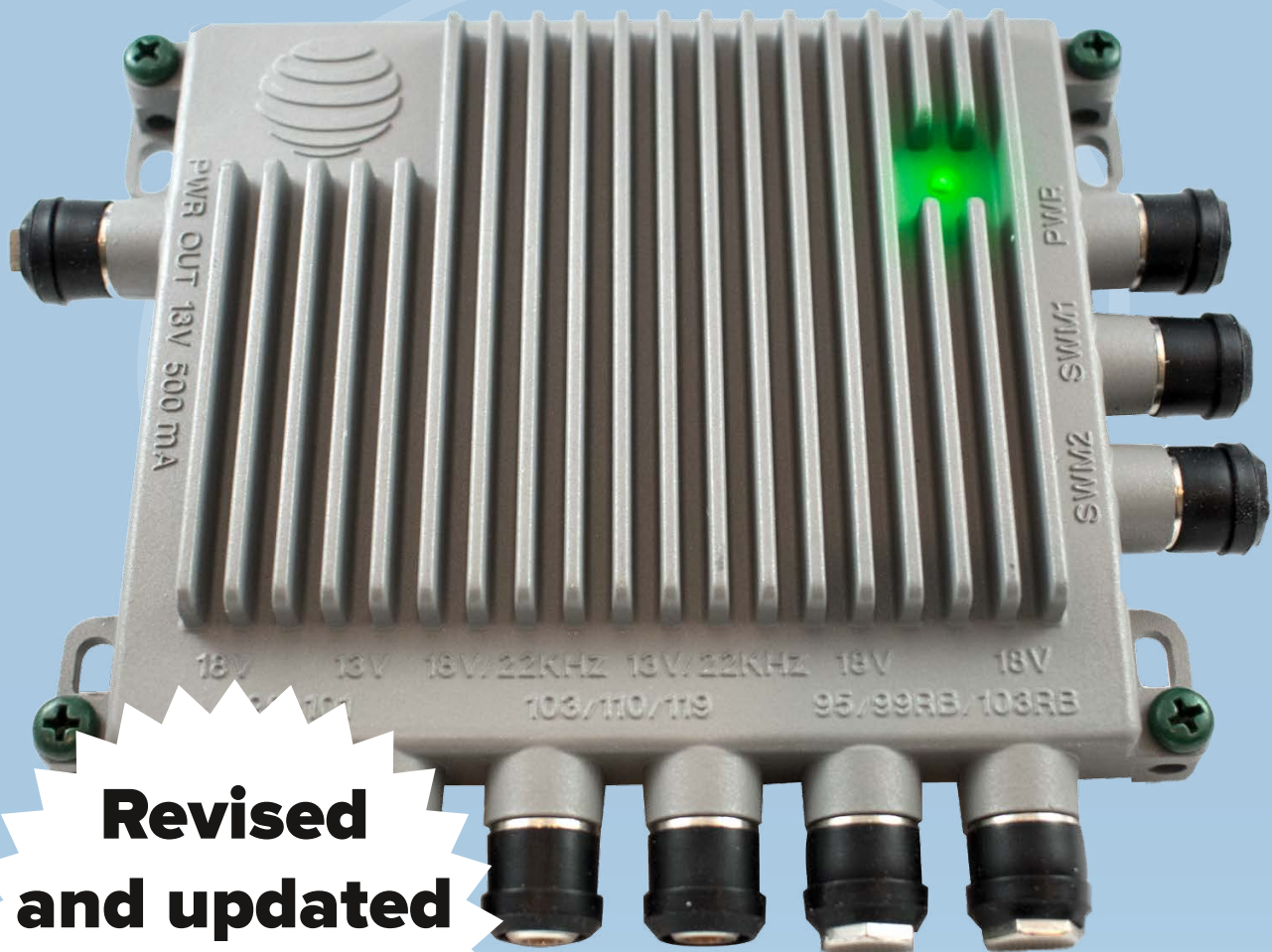


# **SOLID SIGNAL'S WHITE PAPER**

# **THE ULTIMATE GUIDE TO UPGRADING YOUR DIRECTV SYSTEM**

*Previous title: "More than 16 Tuners in the Home"*



**Revised  
and updated  
third  
edition**



# THE ULTIMATE GUIDE TO UPGRADING

So, you've done well for yourself, and you've rewarded yourself with a home theater system in several rooms. You have multiple DVRs, possibly even a server closet full of DVRs, or a Genie DVR with a bunch of receivers. You've got so much equipment that you had to hire a custom installer, but now you want to expand it further.

Or, perhaps, you're looking to put together a commercial installation with a lot of TVs. There aren't any instruction manuals for that, since every installation is different. It's pretty easy to build a system with 16 receivers, but where do you go from there? How should you go about making sure that everything works the way it should and avoid the dreaded "771" error?

The first thing you need to know is that when you're looking at a DIRECTV system, don't just count receivers. You need to count tuners. A regular receiver is 1, an older DVR is 2, a 1st-gen Genie DVR is 5, an HR54 Genie DVR is 7, and the HS17 Genie 2 counts as up to 13. Clients count as zero tuners because their tuners are in the Genie DVR. While DIRECTV will not activate a second Genie on a customer account (for now) it's still fairly easy to bump up against that 16-tuner limit common in DIRECTV installs before 2017. What can you do?

DIRECTV installers will not be of much help. There are many documented cases where an installer simply refuses to go above 16 tuners in the home, claiming that any more tuners require a commercial account. This isn't true, but many installers think it is. You may simply be a sports fan, or watch a lot of television, or just have a big family. No matter what, you'll need to have some skill and knowledge, because you may need to help the installer, hire a custom installer, or do it yourself. There is a lot of misinformation out there and this special report will help you sort it all out.

That's where you'll find this document helpful. You'll find everything you need including descriptions of all current and recent DIRECTV hardware, diagrams, and helpful charts to make sure you're choosing the right equipment. **Throughout the text, click on photos to be taken to the product pages at SolidSignal.com, if the product is still available.** It's all here, all ready. If you have any questions at all, post them at <http://solidsignal.com/forum> and we'll be happy to help.

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## ABOUT THIS DOCUMENT

The original version of this document, called "More than 16 Tuners in the Home" was designed to help DIYers upgrade their own systems. Since then, it's been downloaded hundreds of thousands of times and been used by installers and consumers.

This all new, revised version of this document was written to address the newest LNBs and multiswitches, and the challenges of upgrading an older system to the latest technology. It was originally published in 2012 when there were still a lot of people who were using the first generation of DIRECTV's multiswitches and as of June, 2017, over 120,000 people have used it as the definitive guide to upgrading a DIRECTV system. This new version assumes that you are upgrading to the latest possible technology in your home, whether that's the HR54 4K Genie DVR plus a number of older DVRs and receivers, or the HS17 Genie 2 DVR.

Some installations will not work with all equipment, but every attempt has been made to document incompatibilities where they arise. This document is accurate as of mid-2017 but may not reflect technological advances made since then.

# OLDER DIRECTV LNBs AND DISHES

**If you have any of these dishes...**



**...you'll need a new dish. But chances are you don't.**

Most likely, you have the Slimline dish, the standard for DIRECTV dishes since 2008. Most Slimline dishes say "Slimline" on them, but some simply have the DIRECTV logo. What you're looking for is an oval dish that looks like the picture at right.

The front part of the dish is the "LNB." It's the part that actually receives the signal. In most cases it's the only part that you'll need to change in order to upgrade your DIRECTV system. There are three older LNB designs, and chances are you have one of them on your roof right now.



## SLIMLINE-3 LNB



The Slimline-3 LNB is designed to pull in signals from DIRECTV's three primary satellite locations (99°, 101°, and 103°). It is available in a version with a built-in SWM multiswitch, and one without (pictured.) The built-in multiswitch version has one wire coming out and supports a maximum of 8 tuners. If you want more than 8, you must replace it with something else.

## SLIMLINE-5 LNB



The Slimline-5 LNB pulls in signals from all the same locations as the Slimline-3, plus the 119° location which will be obsolete in 2019. It was originally used for receiving from the 110° location before those satellites were assigned to Puerto Rico. As with the Slimline-3, it comes with a built-in SWM multiswitch or without. The SWM-enabled version supports a maximum of 8 tuners,

## "GENERATION 2" and "GENERATION 3" SLIMLINE-3 LNB



The generation 2 and Generation 3 Slimline-3 LNBs were only available for about a year. They have built-in SWM multiswitches and are not available in a non-SWM version. The generation-2 version supported 13 tuners while the generation-3 version supported up to 21 tuners in some configurations. These were the first products for home to use the newer digital SWM multiswitch technology.

# FUTUREPROOF DIRECTV LNBs

There are several LNBs currently in use by DIRECTV. The (first generation) Slimline-3 and Slimline-5 are still in use in some cases but for the most part they are being replaced by more modern LNBs that support 4K service.

## REVERSE BAND 3 SWM-ENABLED LNB

This is the “go-to” LNB for all higher-end home installs. Its built-in digital SWM multiswitch supports up to 21 tuners (depending on configuration) and will receive signals from DIRECTV’s three primary satellite locations, including the new “reverse band” signals required for 4K service. It does not support the use of an external multiswitch. Also, due to limitations with the H24 and H25 receiver lines, a maximum of 13 tuners is supported if an H24 or H25 receiver is used.

This LNB is supported by any DIRECTV HD or 4K hardware made since 2010 but may not work with standard definition hardware.



## REVERSE BAND 5 SWM-ENABLED LNB

This LNB is used for those increasingly rare markets still served by local channels on DIRECTV’s satellite at 119°. Like the Reverse Band 3, its built-in SWM multiswitch can support up to 21 tuners, but is limited to 13 tuners if an H24 or H25 receiver is used at all. This LNB also supports reverse band signals from the 99° and 103° locations for compatibility with 4K DVRs.

As with the reverse band 3 LNB, this LNB may not work with receivers made before 2010.



## REVERSE BAND 5 LEGACY LNB

This is DIRECTV’s all-purpose LNB for commercial use. It supports 4K programming and can be used alongside DIRECTV’s international dish to provide both 4K and international programming. It is also the only 4K-capable LNB to support an external multiswitch and it is the one you should be using if you are planning on supporting more than 16 tuners and remaining future-proof.

It has 6 outputs and an external SWM30 multiswitch must be used for any DIRECTV installation as, unlike older LNBs, all lines are not capable of carrying all signals..





# OLDER DIRECTV MULTISWITCHES

## SWM-8 SINGLE WIRE MULTISWITCH



DIRECTV's original single-wire multiswitch was a revolution in the industry. It allows for 8 tuners on a single cable run, plus 3 standard definition receivers through its legacy ports. It was designed to be an upgrade for an existing dish, adding single-wire functionality without having to go up on the roof. Using SWM technology also allows for the use of splitters instead of using a separate cable for each tuner. The SWM-8 is still available but isn't often used it since it has the same number of tuners available as the [SWM-enabled Slimline 3 LNB](#) which is easier to install on a new system.

## SWM-16 SINGLE WIRE MULTISWITCH



The SWM-16 was the "go-to" multiswitch for most medium to large installs due to its low cost and ability to serve up to 16 tuners in two banks of 8 each. As an upgrade to the original SWM-8, it features 6 legacy ports, a dedicated power port, and a crossover between outputs so that all devices connected to the same SWM multiswitch can see all other devices (except for those on the legacy ports.)

Multiple SWM-16s can be fed from the same dish through the use of splitters or taps, and in some cases, a second multiswitch can be cascaded through the legacy ports.

The SWM-16 has been used for almost a decade in commercial, residential, and apartment installations and performs well, although it is legendary for running very hot.

## SWM-32



This popular but expensive multiswitch is essentially four SWM-8s in a single case, providing 32 tuners. It's largely used for commercial installs since it does not work with DIRECTV's Whole-Home DVR feature and requires additional parts for a proper installation.

## WB68



DIRECTV's original 8-tuner multiswitch isn't that smart. It can split your satellite lines to support up to 8 tuners, but you need a separate line for each tuner and there's no way to share programs between DVRs without running additional Ethernet cables.

## DTV3x4



This multiswitch is only used with round dishes and other pre-Slimline dishes. If you have any of these in your system, you should definitely be replacing them.

# FUTUREPROOF DIRECTV MULTISWITCHES

## SWM-30 DIGITAL SINGLE WIRE MULTISWITCH



The SWM-30, also known as the DSWM30, is the current generation DIRECTV multiswitch, replacing the SWM-8, SWM-16, and SWM-32. With the correct receivers, it supports up to 30 tuners in two banks of 15 each. While this is fewer than the SWM-32, it actually supports 6 Genie DVRs instead of 4 due to the way the banks are configured.

The SWM-30 is the only multiswitch compatible with the Reverse Band 5 legacy LNB, so it is the only multiswitch that can be used to combine international programming with 4K programming. Just like other DIRECTV multiswitches, multiple SWM30s can be used in a single installation through the use of taps or splitters. It supports Whole Home Viewing on each output port, but there is no crossover between ports, so special steps must be taken to share programming on all 30 tuners.

## SWM-30 HP DIGITAL SINGLE WIRE MULTISWITCH



This is a special version of the SWM-30 that has about 100x the output power of the regular SWM-30. It isn't designed for residential use because it could overload a receiver potentially causing permanent damage. However, when used in a commercial environment, it allows lines up to 100 feet longer than the standard SWM-30, or allows the use of RG-59 cable instead of RG-6, which is important when working with existing cable that is already in the wall.

The SWM-30 HP looks identical to the SWM-30 but has red-orange weather boots to warn installers not to use it in smaller-sized installations where it can do damage to other equipment.

Great care should be exercised when using this multiswitch in any installation.

## POWERING A SWM MULTISWITCH OR LNB



The PI-29Z power inserter is the preferred way of powering a multiswitch or LNB. Any LNB with a single wire out, or any external SWM multiswitch, requires power to work. The power inserter is connected to the dedicated PWR port (except in SWM-8 multiswitches which do not have one and is powered through the SWM1 port.)

The PI-21 power inserter, which is black instead of grey, should no longer be used. DIRECTV HR54 and HS17 Genie DVRs are capable of powering a dish but should not be used to power an external multiswitch.

# “LEGACY” DIRECTV RECEIVERS AND DVRs

DIRECTV refers to its previous-generation receivers as “legacy” products. These receivers and DVRs will work with current generation dishes and multiswitches to allow you to upgrade your system to make it exactly what you want it to be.

## HR24 HIGH DEFINITION DVR

The HR24 allows for up to two recordings at the same time and allows recordings to be shared with other receivers. It was the first DVR to completely support DIRECTV’s Whole-Home service for sharing programs between receivers. Its 500GB hard drive allows for up to 100 hours of HD programming to be stored, and when connected to the internet, it has access to over 10,000 on-demand programs.



## H25 HIGH DEFINITION RECEIVER

DIRECTV’s H25 is the “go-to” receiver for standalone viewing. It will play back programs recorded on any DVR but also has its own tuner so it can always watch live TV regardless of how many programs are being recorded on the main DVR. However, it is not capable of pausing live TV, only recorded TV. Also, a limitation in the H25’s design means that when used with a SWM-30, only 26 tuners are available. When used with a 21-tuner LNB, only 13 tuners are available for use at any one time.



## H24 HD RECEIVER



The H24 HD receiver is an earlier version of the H25 that is bigger and supports older dishes. While it is still available, its only benefit over the H25 is its ability to support older, standard-definition dishes and older multi-switches. It uses more power than an H25 receiver as well.

## D12 SD RECEIVER



DIRECTV is ending all standard definition service in 2019. At this point, you should consider aggressively moving away from standard definition equipment. This D12 receiver will work with SWM-8, SWM-16, and SWM-32 multiswitches but may not work with the new SWM-30. It should be swapped out for an H25.

## OLDER DIRECTV RECEIVERS AND DVRs

If you are using any DIRECTV hardware made before 2010, it’s really time to upgrade. There’s no getting around it. Any equipment that’s older than what’s shown here has served its time and should be retired before it breaks and leaves you stranded. Older hardware may not work with the latest generation of multi-switches and satellite dishes.

# FUTUREPROOF DIRECTV DVRs

DIRECTV's Genie system allows the DVR to do all the work and replaces receivers with "clients" or smart TVs that have no tuners of their own. All the work is done by the Genie DVR and every location can pause live TV and view recorded programs. The original "HR34 Genie" model will continue to work but should be upgraded due to its slow processor. Genie DVRs are not permitted on commercial accounts.

## HR44 "GENIE" DVR



The Genie DVR has the ability to record 5 programs at one time, up to 200 hours of HD programming and feed up to 8 client boxes (up to 3 may be active at the same time). It has built-in Wi-Fi for on-demand and interactive features and while it will record 4K programs for display on a 4K Genie Mini Client if 4K service is already active, **the HR44 Genie can no longer be activated for 4K service due to DIRECTV guidelines.** It also supports both IR and RF remotes at the same time, unlike older receivers.

## HR54 "4K GENIE" DVR



The HR54 4K Genie is the same size and shape as the HR44 but has no front buttons other than the power button. It has all the same features as an HR44 and adds the ability to power a SWM-enabled dish without a power inserter. However, even though the HR54 can only record 5 programs, it counts as 7 tuners when connected to a multiswitch because it has the hardware required to tune 4K programs from DIRECTV's "Reverse Band" 4K satellites.

## HS17 "GENIE 2" HEADLESS SERVER/DVR



DIRECTV's latest home solution is a big change from anything that has come before. The HS17 can record up to 7 programs at once with 400 hour HD recording capability. It can provide programming to five HD locations and two 4K locations, **but it does not output live TV itself.** It can power a SWM-enabled dish, connect to the internet over Wi-Fi, and connect to wireless clients without any additional hardware. It is designed as a "set and forget" device that sits near the customer's router instead of near a television. It is designed to pull 13 tuners from a SWM-enabled reverse-band dish or SWM-30, but will work "in a pinch with a SWM-8 or SWM-16 where it will pull 8 tuners. **Due to DIRECTV restrictions, if a Genie 2 is installed, no other receivers or DVRs may be on the same account** so this may not be the best option for people seeking to load up on recording capacity. If you are looking for more than 7 recordings at the same time, or the ability to serve more than 7 rooms, you may wish to use the 4K Genie instead. However, this DVR should serve the needs of the vast majority of DIRECTV customers while minimizing extra wiring and extra "black boxes."



# DIRECTV GENIE CLIENTS

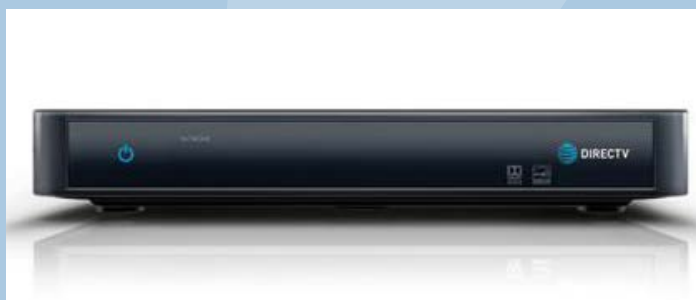
The Genie Client looks and functions like a tiny DIRECTV client but it's all “smoke and mirrors.” The client receives input from the remote and outputs video to the TV, but all the hard work is done by the Genie DVR. The clients can pause live TV and do everything that the DVR itself can do, but run completely silent and use less power than any other DIRECTV product.

## GENIE MINI CLIENTS (MODELS C31, C41, C51, C61)



The Genie Mini Client displays SD and HD video over HDMI. An adapter cable can be used to output over component or composite connections. It does not require an access card since it has no tuner and relies on the Genie DVR for all programming and functions. There are few functional differences between models: the C31 model works in RF mode with [DIRECTV's older remote](#), while all other models work with the [Genie Remote](#). The C61 model has AT&T branding.

## 4K GENIE MINI CLIENT MODEL C61K



The 4K Genie Mini Client is designed specifically for use with 4K TVs with HDMI 2.0 and HDCP 2.2. It is not designed to be used with HD or SD TVs and does not have the ability to output over component or composite. If connected to an HDTV it may show annoying “nag messages” saying that the TV is not 4K compatible. It is somewhat larger and much heavier than a traditional Genie Mini Client, and uses quite a bit more power.

## WIRELESS GENIE MINI CLIENTS (MODELS C41W, C61W)



The wireless Genie Mini Client outputs SD and HD programming without a coaxial cable connection. When used with an HR44 or HR54 Genie, a separate [Wireless Video Bridge](#) must be used for connection, but when used with a Genie 2 system, no separate video bridge is required. The client may be placed up to 50 feet away from the video bridge or Genie 2. Up to 3 wireless clients may be used with an HR44 or HR54, and up to 5 wireless clients may be used with a Genie 2.

# RECEIVER/SWITCH/LNB MATRIX

## AVAILABLE DIRECTV LNBs

Model	Description	Nº. Lines out	Nº.Tuners Supported	4K Reception	Upgradeable to External SWM
<a href="#">SL3</a>	Legacy Slimline-3	4	4*	No***	Yes
<a href="#">SL3-SWM</a>	SWM-Enabled Slimline-3	1	8	No***	No
<a href="#">SL5</a>	Legacy Slimline-5	4	4*	No***	Yes
<a href="#">SL5-SWM</a>	SWM-enabled Slimline-5	1	8	No***	No
<a href="#">3D2RBLNB</a>	Reverse Band 3 SWM-Enabled	1	21**	Yes	No
<a href="#">5D2RBLNB</a>	Reverse Band 5 SWM-Enabled	1	21**	Yes	No
SL5KRB	Reverse Band 5 Legacy	6	4	Yes	Yes

\*Genies cannot be connected to legacy dishes without a SWM multiswitch

\*\*LNB may be limited to 13 tuners if non-Genie receivers are present

\*\*\*Reverse Band LNBs are required for future 4K reception

## AVAILABLE DIRECTV MULTISWITCHES

Model	Description	Nº. outputs	Nº.Tuners Supported	Outputs bridged for Whole-Home DVR
<a href="#">SWM-8</a>	8-channel Multiswitch	2	8 total	Yes
<a href="#">SWM-16</a>	16-channel Multiswitch	2	8 per output, 16 total	Yes
<a href="#">DSWM30</a>	30-channel digital Multiswitch	2	13-15/output, 26-30 total <sup>1</sup>	No
DSWM30HP	Commercial digital Multiswitch <sup>2</sup>	2	13-15/output, 26-30 total <sup>1</sup>	No

<sup>1</sup>Maximum number of tuners per output leg is 13 if non-Genie receivers are present

<sup>2</sup>High power multiswitch may destroy receivers if not used properly

## AVAILABLE DIRECTV RECEIVERS/DVR/CLIENTS

Model	Description	Output	DVR Function	Outputs to TV	Nº.Tuners Used	SWM Multiswitch Required
<a href="#">H24</a>	Receiver	SD, HD	No	Yes	1	No
<a href="#">H25</a>	Receiver	SD, HD	No	Yes	1	Yes
<a href="#">HR24</a>	DVR	SD, HD	Yes	Yes	2	No
<a href="#">HR44</a>	Genie DVR	SD, HD	Yes	Yes	5	Yes
<a href="#">HR54</a>	4K Genie DVR	SD, HD	Yes	Yes	7 <sup>3</sup>	Yes
HS17	Genie 2 DVR	None	Yes	No	13 <sup>4</sup>	Yes
<a href="#">C31/C41/C51/C61</a>	Genie Client	SD, HD	Yes <sup>5</sup>	Yes	0	Yes
<a href="#">C41W/C61W</a>	Wireless Genie Client	SD, HD	Yes <sup>5</sup>	Yes	0	Yes
<a href="#">C61K</a>	4K Genie Client	HD, 4K	Yes <sup>5</sup>	Yes	0	Yes

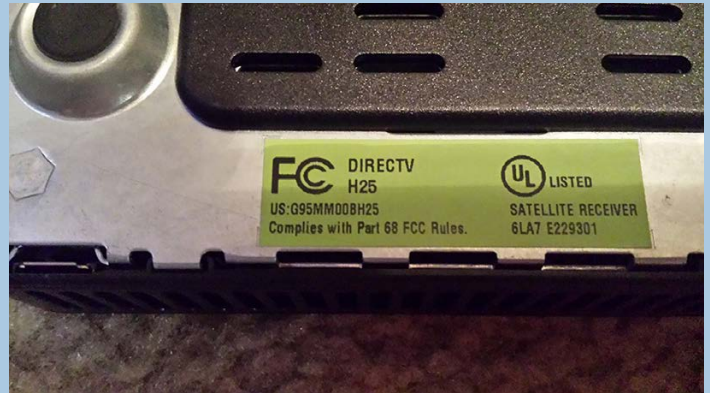
<sup>3</sup>HR54 DVR uses 7 tuners but only records 5 shows

<sup>4</sup>HS17 uses only 8 tuners when connected to SWM-16 and records max. 7 shows

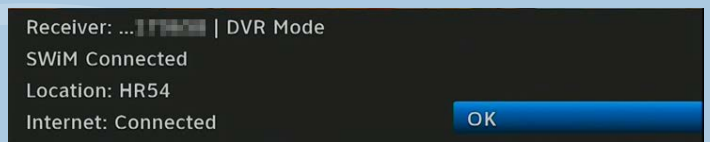
<sup>5</sup>Clients will not function unless connected to Genie DVR

# KNOW WHAT YOU HAVE NOW

The first step in knowing how best to upgrade is to know as much as you can about the equipment you have now. First things first, you'll need to know what receivers you have. If this is a system put in since 2010, chances are you have some combination of H24, H25, HR24, and Genie products. Model numbers can be found on a green sticker on every receiver, usually on the underside.



Then, you'll need to know for sure if you have a SWM system. Start by pressing the {DASH} button on the remote (to the left of the number 0) and you'll see a popup that tells you. If it says, "SWiM Connected, then you are. This is important to know because in order to be current, you'll need to upgrade to a SWM system. Most likely, though, you're already there.



Finally, you'll need to know some more details about your dish setup. Press the {MENU} then go to Settings&Help, Settings, Satellite, Repeat Satellite Setup. You'll see a screen that tells you your dish type and multiswitch type. Most likely the multiswitch type will be SWM, and you just need to know if there is a 3 or a 5 associated with the dish type. If it says Slimline-3, Slimline-3S, or SL3 LNB, that's a "3;" if it says Slimline-5, Slimline-5S, or SL5 LNB, that's a "5."



Next, look at the dish you have. Is there one line coming out of it, or more? If there is one line, that's a "SWM LNB" and may be limited to between 8 and 13 tuners. You may need to swap it out for something else.



If you have four or six lines coming from your dish, trace the wires and find the multiswitch. Unless this is a very old system, there are only a few possibilities: The WB68,, SWM-8, SWM-16, SWM-32, and DSWM30. Depending on your needs, you may be able to simplify your system significantly by eliminating the multiswitch and using a DIRECTV LNB that can handle up to 21 tuners.

Before getting into actual upgrades, take an inventory of the equipment you have now. You may want to plan to replace an LNB or a multiswitch to make wiring easier.

# PLANNING YOUR EXPANSION

In order to get everything to work properly the first time, you should take some time to plan your system. There are a number of things you'll need to consider.

## Do you need to upgrade your dish?

If your current dish has only one line out, it's possible that it won't support the number of tuners you want. If that's true you'll want to change out the LNB for a "Legacy" version and run 4 or 6 lines into an external multiswitch. Directions for swapping out an LNB are on the next page.

## How many tuners do you need?

Remember, DIRECTV systems count the number of tuners, not the number of receivers. Look at the table on the previous page to count the number of tuners you need. If that number is over 13, you may need to use at least one external multiswitch.

## How many devices will share recorded programs?

As a general rule, no more than 15 devices can share programs and no more than 10 of those can be DVRs. If you want more recording/viewing capacity you'll need to break them up into groups where each group has no more than 15 devices. If the devices aren't all on the same output from the SWM, you'll need to take special steps as well.

## Planning for 4K

At some point, there will be massive growth in the number of 4K channels available. At that time, you'll need to use the Reverse Band LNBs to get 4K programming, and only the HR54 and HS17 DVRs will receive 4K programs.

## Considerations for Specific Receivers

**H24/H25/HR24:** If these receivers are present in your system, the output from your dish or multiswitch can be limited to 13 tuners. There is a technical limitation of these receivers that keeps them from getting signal if 13 other tuners are in use. Officially DIRECTV says this applies to all pre-Genie receivers, however some people have reported that it does not apply to the HR24 DVR. While it's not "officially supported," many people have had luck in using all available tuners by making sure that the non-Genie receivers are powered up first, since the Genie DVR will work no matter what order it's powered up in.

**HR54:** Although this DVR records only 5 programs it reserves 7 tuners.

**HS17:** This is the only DIRECTV DVR that does not output to a TV, so plan for an appropriate number of clients. Also, the HS17 cannot be combined with any other receiver or DVR on the same account.

**Clients:** Clients must be used with a Genie DVR. All Genie DVRs have a maximum of 8 clients. The HR44 and HR54 can support 3 at one time, and on an HR54, one of those can be 4K. The HS17 can support 5 HD clients and 2 4K clients.



# HOW TO CHANGE AN LNB

**Use these instructions if you need to upgrade to an external multiswitch**



**Carefully mark your dish's position on these pieces using a pencil so you will know if you've knocked anything out.**

If you have four lines coming from your dish, you're all set. If not, follow these instructions. When you have more receivers than you have connections for at the dish, you need to use another switch, but if you're connecting two or more receivers to the same signal from the dish, the signal would get divided and the power would drop equally, so these switches have buffer amps to isolate each receiver and keep the levels the same whether one or 8 are connected. This type of setup is based off switches, and each receiver must connect each tuner to the switch at the dish, or the additional switch.

A legacy dish (non-SWM) has four (or six) outputs which carry all the signals, so connecting a switch down the line, means all cables need to connect. All receivers must connect to a switch with all the cables from the dish, and you can't add a switch or a splitter to one of the outputs of the switch to connect another receiver, because each tuner sends a voltage and a signal that controls the switch position, powers the buffer amp, and ends up powering the LNB at the dish.

If you need to change out the LNB, do that first. Be careful. Use a pencil to note the mounting angles on the dish. This will help you see if you have inadvertently moved the dish. Gently mark the position of the dish on the dish bracket and also mark the angle on the top and bottom adjustment areas on the mounting arm. Disconnect and remove the old LNB and attach the new one. You will need to run four wires to the multiswitch, so connect those and run them inside.

# INSTALLATION: UP TO 21 TUNERS

**First**, choose the correct LNB for your use. In most cases that will be the [Reverse Band 3](#), because DIRECTV is moving away from needing the 119 satellite location. However, if you have a Slimline-5 LNB now, you may choose to use the [Reverse Band 5 LNB](#) instead just to be safe. Or, call Solid Signal and a technician should be able to tell you if you truly need the larger LNB.

**Take Note:** This method does supply 21 tuners, but officially, non-Genie equipment can only see 13 tuners. Some people have reported that using HR24 DVRs instead of receivers lets them use all 21 tuners, and others report that powering up the H24/H25 receivers first, followed by HR24 DVRs, followed by the Genie DVR allows all 21 tuners to be used. Remember that this method is completely unsupported. If you want a more stable installation, you should use an external multiswitch to supply your DIRECTV system if you have over 13 tuners. If you are only using H24 or H25 receivers, use an external multiswitch to connect more than 13.

**Remember “Tuner Math:”** Use the chart on page 10 to determine how many tuners you will need. Remember, you’re counting tuners, not physical boxes.

**Powering the Dish:** If you have an HR54 or HS17 DVR, it can power the dish. Otherwise you will need a [PI-29Z Power Inserter](#).

You’ll need the following parts (it is presumed you already have a DIRECTV dish)

- [Reverse Band 3](#) or [Reverse Band 5 SWM-Enabled LNB](#)
- [Power Inserter](#) (optional if you have an HR54 or HS17 DVR)
- DIRECTV [MSPLIT2](#), [MSPLIT4](#), and [MSPLIT8](#) splitters as needed
- [DIRECTV Broadband DECA Kit](#) (optional if you have HR44, HR54, or HS17 DVR)
- [Terminators](#)
- [Cable](#)

Remember, do not oversplit the signal and terminate any unused connections. Also, remember to ground your equipment whenever possible. Better to ground too often than not often enough.

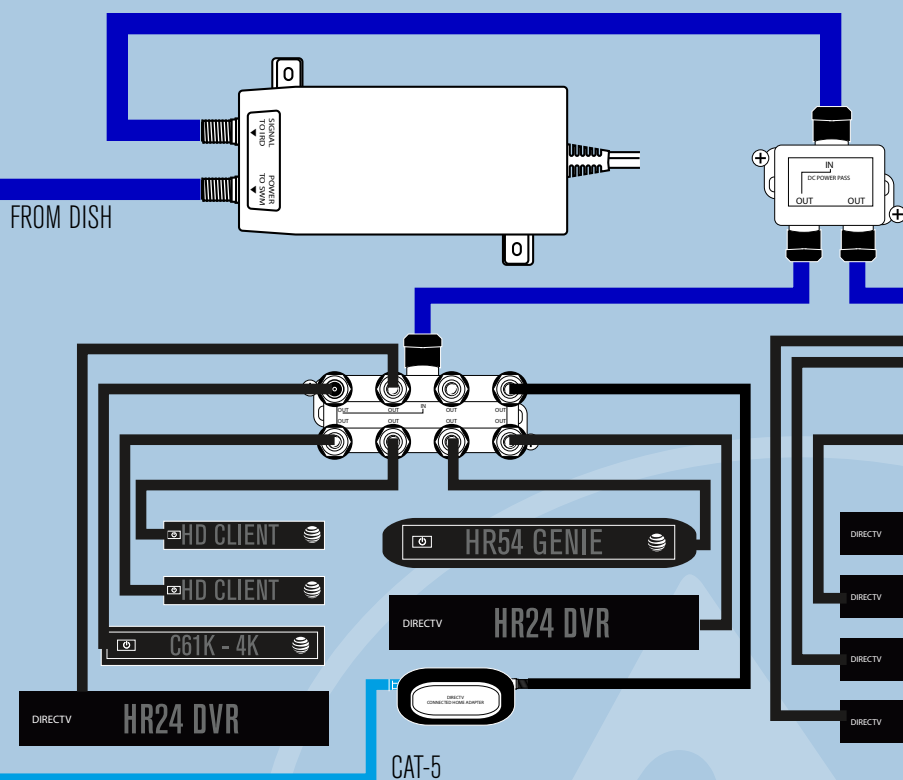
**Using a PI-29 Power Inserter:** Run the line from the satellite dish to the POWER TO SWM port. Run a line from the SIGNAL TO IRD port to appropriate splitters, then to your receivers. Be careful to connect the system properly or receivers may be “fried.” If the PI-29Z is used with a Genie, do not connect the Genie DVR to the red port on the splitter.

**Using an HR54 or HS17 without PI-29 Power Inserter:** Run the line from the satellite dish to an appropriate splitter. Connect the Genie DVR to the red port on the splitter. Other splitters may be connected to the first splitter if needed.

**Internet Connection:** To use on-demand and interactive features, you must connect to the internet. You can connect a Genie DVR (HR44, HR54, HS17) over wired Ethernet or Wi-Fi, or you may use an external Broadband DECA kit. If you are using a Broadband DECA kit, connect coax to the kit, connect its Ethernet cable to your router. One internet connection can supply your entire DIRECTV system, but remember that there is a maximum of 15 receivers or DVRs that can be connected this way, and no more than 10 DVRs. If you need more DIRECTV boxes than that connected, use an external multiswitch and plan for having separate blocks of receivers that cannot see each other.

The following page shows a diagram of the two most common ways of using a Reverse Band LNB to supply up to 21 tuners. Your selection of receivers may vary, and you should always follow proper grounding ordinances.

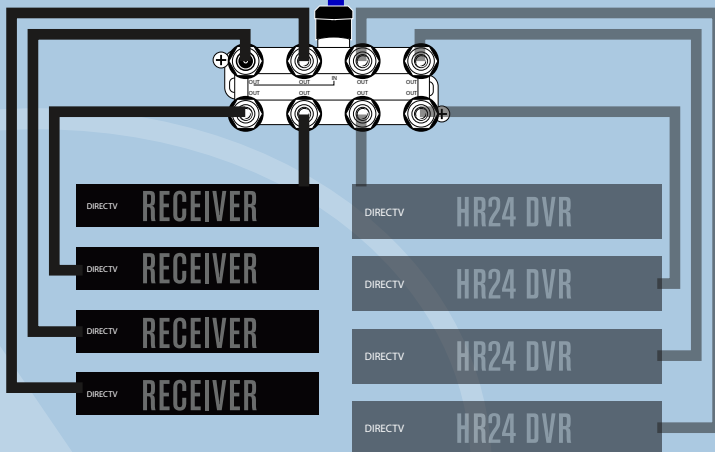
# INSTALLATION: UP TO 21 TUNERS



## OPTION 1: Most reliable

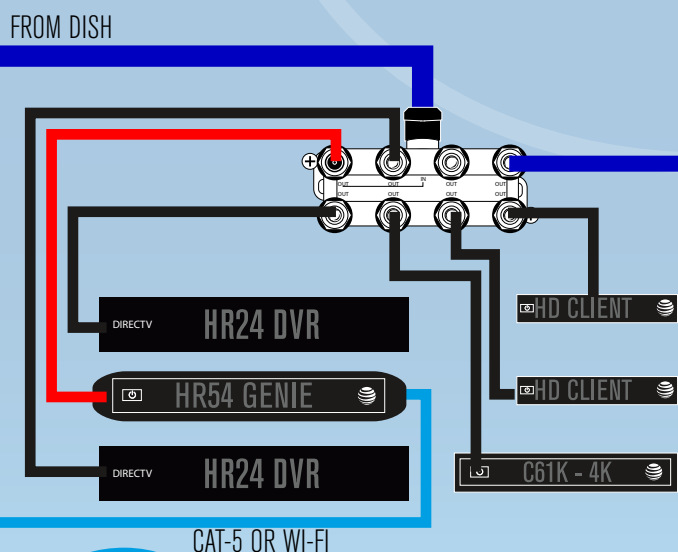
1. Connect dish to Power Inserter "POWER TO SWM" port.
2. Do not connect Genie DVR to red port on splitter.
3. Use Broadband DECA Kit to connect to internet.
4. Follow proper grounding procedures for your area.

**Warning: DIRECTV officially supports only 13 tuners if older receivers are present**

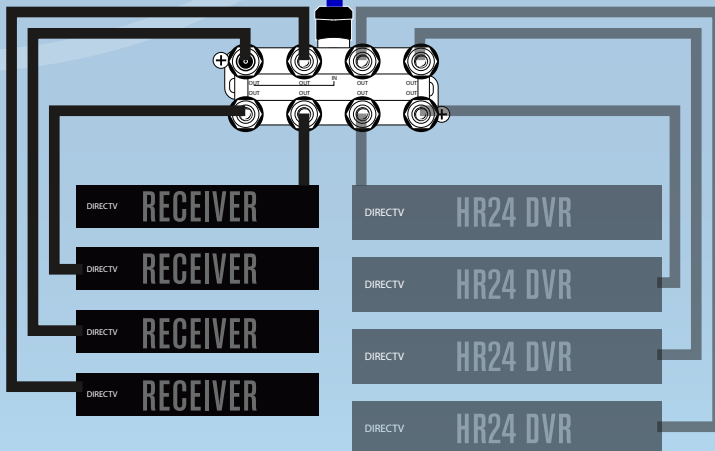


## OPTION 2: Simplest

1. Connect splitter #1 to dish. Connect HR54 DVR to RED port on splitter.
2. Connect splitter #2 to splitter #1. Signal level on splitter #2 will be lower, so run lengths should be 75 feet or less. For longer runs use option #1.
3. Use HR54 Genie to connect over Wi-Fi or wired connection.



**Warning: DIRECTV officially supports only 13 tuners if older receivers are present**



JULY, 2017

# INSTALLATION: UP TO 26 TUNERS

**First**, choose the correct LNB for your use. The most futureproof LNB is the Reverse Band 5 Legacy LNB. However, to save money you may choose the [Slimline-3 Legacy](#) or [Slimline-5 Legacy](#). If you choose the Reverse Band 5 Legacy LNB, you will need 6 lines, otherwise you will need only 4.

**Take Note:** This method officially supplies 13 tuners per SWM output. It is possible to connect up to 15 tuners in an unapproved installation. Some people have reported that by using HR24 DVRs instead of receivers, they have used all 15 channels. This method should be used with caution and may simply not work.

**Remember “Tuner Math:”** Use the chart on page 10 to determine how many tuners you will need. Remember, you’re counting tuners, not physical boxes.

**Powering the Dish:** The dish must be powered by the [PI-29Z Power Inserter](#). To be safe, do not connect the Genie DVR to the red port on the splitter to make sure it does not attempt to power the multiswitch.

You’ll need the following parts

- Dish with [Slimline-3 Legacy](#), [Slimline-5 Legacy LNB](#) or Reverse Band 5 Legacy LNB
- [SWM-30 Multiswitch \(Includes Power Inserter\)](#)
- DIRECTV [MSPLIT2](#), [MSPLIT4](#), and [MSPLIT8](#) splitters as needed
- [DIRECTV Broadband DECA Kit](#) (optional if you have HR44, HR54, or HS17 DVR)
- [Terminators](#)
- [Cable](#)

Remember, do not oversplit the signal and terminate any unused connections. Also, remember to ground your equipment whenever possible. Better to ground too often than not often enough.

**Using a PI-29 Power Inserter:** Run the line from the satellite dish to the POWER TO SWM port. Run a line from the SIGNAL TO IRD port to the PWR port of the SWM-30. The green light on the front of the switch lights up when it is being powered.

**Internet Connection:** To use on-demand and interactive features, you must connect to the internet. You can connect a Genie DVR (HR44, HR54, HS17) over wired Ethernet or Wi-Fi, or you may use an external Broadband DECA kit. If you are using a Broadband DECA kit, connect coax to the kit, connect its Ethernet cable to your router. One internet connection can supply an entire output leg of a SWM-30. The SWM-30 multiswitch does not allow sharing of programs between its two output ports, due to the 15-device limit of the DIRECTV Whole Home system. If you connect a Broadband DECA or Genie DVR to a wired network connection and run both lines to the same network switch, it may be possible to share programming. However, only 10 DVRs may be visible. See the section on “Whole Home Considerations” for more information.

The following page shows a diagram of a common installation of a SWM-30 multiswitch to service up to 26 tuners with one switch.



# INSTALLATION: UP TO 26 TUNERS

Use the smallest splitter possible.

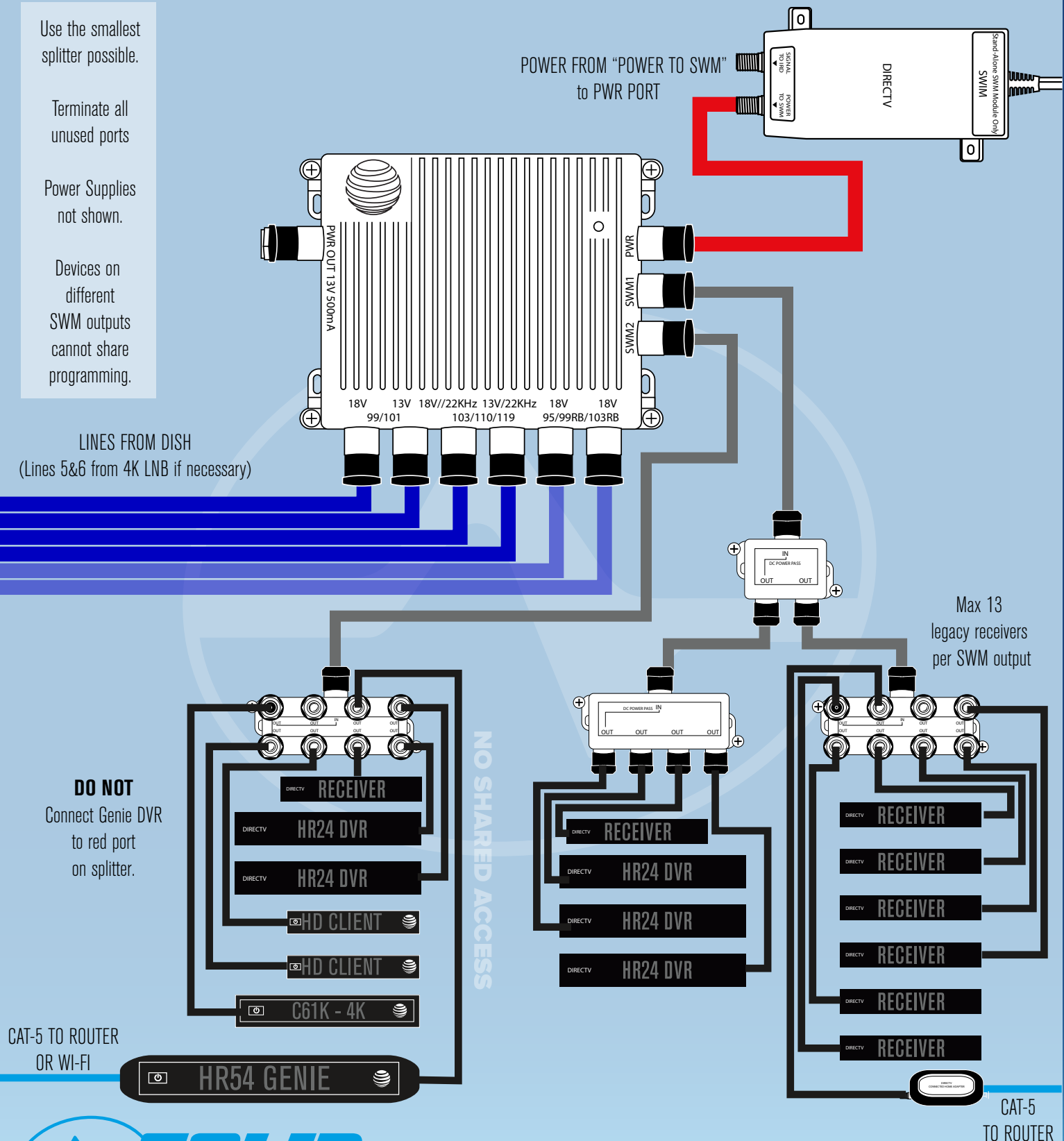
Terminate all unused ports

Power Supplies not shown.

Devices on different SWM outputs cannot share programming.

POWER FROM "POWER TO SWM" to PWR PORT

LINES FROM DISH  
(Lines 5&6 from 4K LNB if necessary)



JULY, 2017

# INSTALLATION: UP TO 52 TUNERS

**First**, choose the correct LNB for your use. The most futureproof LNB is the Reverse Band 5 Legacy LNB. However, to save money you may choose the [Slimline-3 Legacy](#) or [Slimline-5 Legacy](#). If you choose the Reverse Band 5 Legacy LNB, you will need 6 lines, otherwise you will need only 4.

**Take Note:** This method officially supplies 13 tuners per SWM output. It is possible to connect up to 15 tuners in an unapproved installation. Some people have reported that by using HR24 DVRs instead of receivers, they have used all 15 channels. This method should be used with caution and may simply not work.

**Remember “Tuner Math:”** Use the chart on page 10 to determine how many tuners you will need. Remember, you’re counting tuners, not physical boxes.

**Powering the Dish:** The dish must be powered by the [PI-29Z Power Inserter](#). To be safe, do not connect the Genie DVR to the red port on the splitter to make sure it does not attempt to power the multiswitch.

You’ll need the following parts:

- Dish with [Slimline-3 Legacy](#), [Slimline-5 Legacy LNB](#) or Reverse Band 5 Legacy LNB
- [Two SWM-30 Multiswitches \(Includes Power Inserters\)](#)
- [4 Skywalker 23302 splitters](#) (Need 6 with Reverse Band 5 Legacy LNB)
- DIRECTV [MSPLIT2](#), [MSPLIT4](#), and [MSPLIT8](#) splitters as needed
- [DIRECTV Broadband DECA Kits](#) (optional if you have HR44, HR54, or HS17 DVR)
- [Terminators](#)
- [Cable](#)

Remember, do not oversplit the signal and terminate any unused connections. Also, remember to ground your equipment whenever possible. Better to ground too often than not often enough.

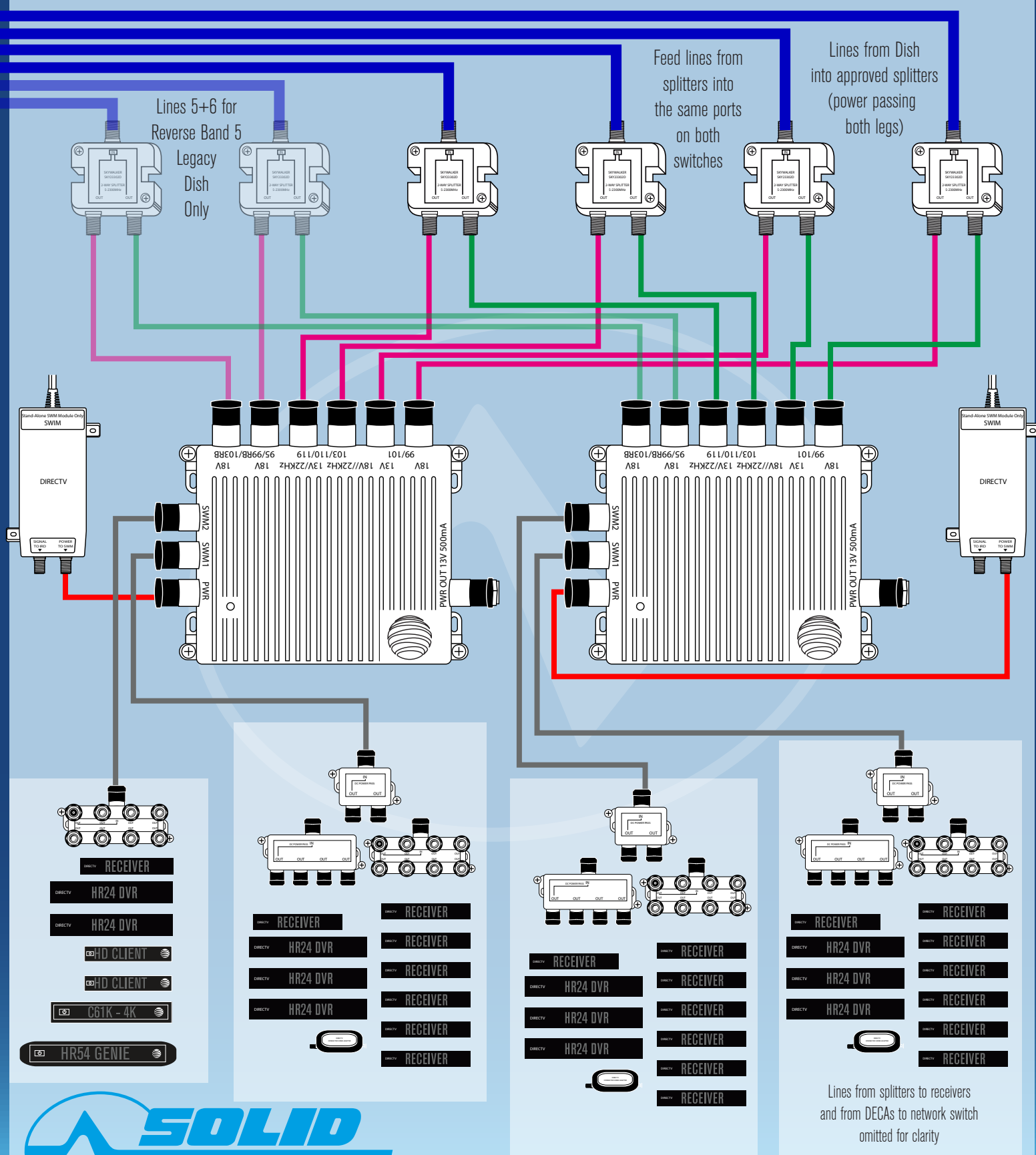
**Using a PI-29 Power Inserter:** Run the line from the satellite dish to the POWER TO SWM port. Run a line from the SIGNAL TO IRD port to the PWR port of the SWM-30. The green light on the front of the switch lights up when it is being powered.

**Using the Skywalker Splitters:** It is critical that the lines from the Skywalker splitters go to the same port on both SWMs. In other words, if one line from the splitter goes into the leftmost port on the SWM-30, the other line must go into the leftmost port on the other SWM-30.

**Internet Connection:** To use on-demand and interactive features, you must connect to the internet. You can connect a Genie DVR (HR44, HR54, HS17) over wired Ethernet or Wi-Fi, or you may use an external Broadband DECA kit. If you are using a Broadband DECA kit, connect coax to the kit, connect its Ethernet cable to your router. One internet connection can supply an entire output leg of a SWM-30. The SWM-30 multiswitch does not allow sharing of programs between its two output ports, due to the 15-device limit of the DIRECTV Whole Home system. With 52 tuners in use, you will certainly go over the 15 device limit recommended for DIRECTV Whole Home, so each connection should be subnetted or otherwise isolated from the others to avoid connection problems. See the section on “Whole Home Considerations” for more information.

The following page shows a diagram of a common installation of two SWM-30 multiswitches to service up to 52 tuners

## INSTALLATION: UP TO 52 TUNERS



Lines from splitters to receivers  
and from DEGAs to network switch  
omitted for clarity

JULY, 2017

# WHOLE-HOME CONSIDERATIONS

DIRECTV's Whole-Home DVR platform (previously known as multi-room viewing) has some serious limitations. It's based on the MoCA 1.1 standard, which has a maximum of 16 connected devices and a maximum speed of 175Mbps throughout the network. This 16-device limit includes the connection to the internet, which is why the number usually quoted for a limit is 15 devices. In addition, DIRECTV's systems can only recognize 10 DVRs so if you have more than that, your other devices may not see them.

## Counting devices is different from counting tuners

When you're planning to implement your system, you count tuners in order to figure out what kind of multiswitch you need. With whole-home DVR, you count devices. Every device, whether it's a receiver, DVR, or client, counts as one. So there is a maximum of 15 devices total that can share programs. That's not a problem since no more than 13 devices would ever be connected to a multiswitch. However, when everything is connected to the same network switch or router there can be problems.

## Connecting devices to the same switch causes problems

If you connect all your devices to the same network switch or router, they will try to discover each other and most of the time they will succeed. Each Broadband DECA has a maximum of 15 devices, but there is no limit to the number of Broadband DECAs on the same network. However, the 10-DVR limit is still in place, and this will make it hard for you to connect to the DVR you want and can cause other connectivity problems.

## Isolate groups of receivers from each other

The best plan is to isolate your receivers from each other so that only receivers on the same SWM output can share programs. There is no internal crossover in the SWM-30 so that is a start. However additional steps can be taken to keep your devices isolated. For example:

- The easiest way to isolate receivers from each other is simply not to connect them to the internet. Whole-Home DVR will work without an internet connection, but you will lose on-demand and interactive features.
- If your router has a guest network, connecting the Genie DVR over Wi-Fi to the guest network and other receivers to the wired network will isolate them. This works if you have one SWM-30 but not if you have multiples.
- If your router has the ability to have multiple firewalled networks, you can assign each SWM output to its own network.
- You can manually assign IP addresses in different subnets to keep devices from seeing each other. This requires some advanced knowledge of networking and subnet calculation.

## Large commercial and industrial installations

Because whole-home DVR functions are disabled on larger commercial installations, it's not a problem to connect everything to the same network switch. If you are in a bar or restaurant application, you can connect all your receivers to the same network to control them via tablet.



# COMMERCIAL INSTALLATIONS

Most people are fairly satisfied with having up to 13 rooms of DIRECTV service. Once you start to get more than that, you're really in the territory of commercial installations. You also may be reading this document with an eye on installing DIRECTV service in a business, in a restaurant or bar, or in an apartment complexes. Each different installation has different challenges, however, there are some common concerns.

## Choosing an LNB for commercial installations

The best choice for futureproofing a commercial installation is the Reverse Band 5 Legacy LNB. This LNB receives signals from all of DIRECTV's domestic satellites, including 4K signals for future expansion. Installing this LNB is similar to other LNB installs. However, it is the most expensive of DIRECTV's LNBs and so the [Slimline-5 Legacy LNB](#) may be used in its place if there is no interest in 4K programming.

## Running the proper cables

All wire used in commercial installations for DIRECTV should be [solid copper core RG6](#). Quad shield cable is not generally necessary unless the installation goes through areas with high RF interference. RG11 cable may be used for runs over 100 feet. While copper cable is expensive, it is generally recommended that seven lines be run even if only four are being used. Six lines are used for a 4K installation, four for a standard installation. The seventh line is a spare or can be used for off-air antenna or for an international dish.

## Powering the dish and amplifying the signal

In commercial installations, it is always best to use an amplifier and polarity locker. Although the SWM-30 multiswitch will supply power to the dish, it is best to have an independent power source. In addition, the long runs between dish and multiswitch could mean that insufficient power got to the dish. An amplifier is used to compensate for long runs and losses due to splitting.

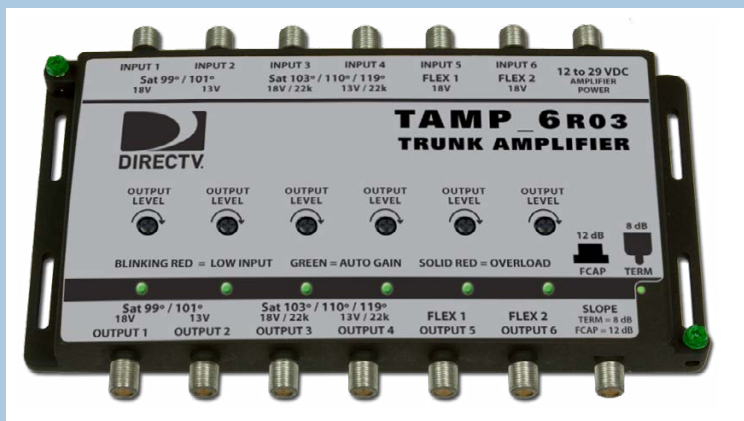
## Networking receivers in commercial installations

In commercial installations like bars and restaurants, you may wish to network all your receivers to be able to control them with the DIRECTV app for tablets or through another automation system. Because whole-home DVR service does not work in commercial installations, there aren't any concerns about the number of DVRs on the account or other receivers seeing each other through a network. Each output leg of a SWM-30 can be connected to a network switch using a [DIRECTV Broadband DECA Kit](#) and there will be no conflicts. It is usually desirable to set IP addresses manually in commercial installations.

## Considerations for multiple apartments

When installing a large system for an apartment complex or other case where there is more than one DIRECTV account, it is critical that groups of receivers be isolated by a [Band Stop Filter](#). This device completely blocks networking signals over coaxial cable, keeping people from seeing other DVRs outside their homes.

# AMPLIFIERS AND POLARITY LOCKERS



Every piece of cable, every splitter, in fact everything that comes between your dish and your receivers causes some signal loss. This is an unavoidable fact. That's why the best practice is to use as few splitters as possible, and use the smallest splitter possible. Sometimes, though, you have to split the signal.

If you're using more than one multiswitch, you are losing at least 6dB of signal. That probably isn't a problem by itself, but it can be a problem if you have many splitters further down the run. If you are using more than two multiswitches, you're losing at least 10dB of

signal. That could be a real problem when rain, snow, or even dense cloud cover come into play.

The most commonly used amplifier is [DIRECTV's TAMP 6](#). This is an automatic gain amplifier with a fixed output level as high as -15dBm from a minimum input of -52dBm. The output can be adjusted if it is too high. In addition, it features three different levels of slope compensation (including no slope compensation). Slope compensation is used to make sure that high frequencies, which have more loss over long distance, have a higher power output than lower frequencies. This amplifier will work with anywhere between four and six lines, for a futureproof installation.

For those who would like a less expensive option and do not plan on getting 4K service, [The Sonora LA144R-T DBS/SMATV Input Amplifier](#) is an excellent choice for amplifying a satellite signal. It provides up to 14dB of gain, which should be enough to combat the losses brought on by multiple splitters. Other amplifiers in the Sonora line can provide more output power if needed.

An amplifier by itself is not going to solve all the problems that may exist. The amplifier is only going to work with the signal it has, and that signal may benefit from further processing. For that reason, we recommend the use of a polarity locker as well. A polarity locker does not remove noise from a signal but it does help stabilize the signal by adding more voltage and locking in the specific signals required for a high-definition dish.

The preferred polarity locker is the [DIRECTV DTV6PWRPOL](#). It isolates the signals from the LNBs and gives priority to only those signals that should come through each of the lines. Each line pulls signal from a different part of your dish's LNB assembly, and provides signal from a different set of satellites. Locking in each line's polarity should help compensate for noisy or weak signals. It also provides a power source for those LNBs to make them as efficient as possible. Normally this is done by your receivers or the power inserter in your system. Adding voltage specifically to power the LNB helps to avoid voltage drops that can cause problems for the receiver. [The Sonora 4SATPL-T Polarity Locker/Power Inserter](#)

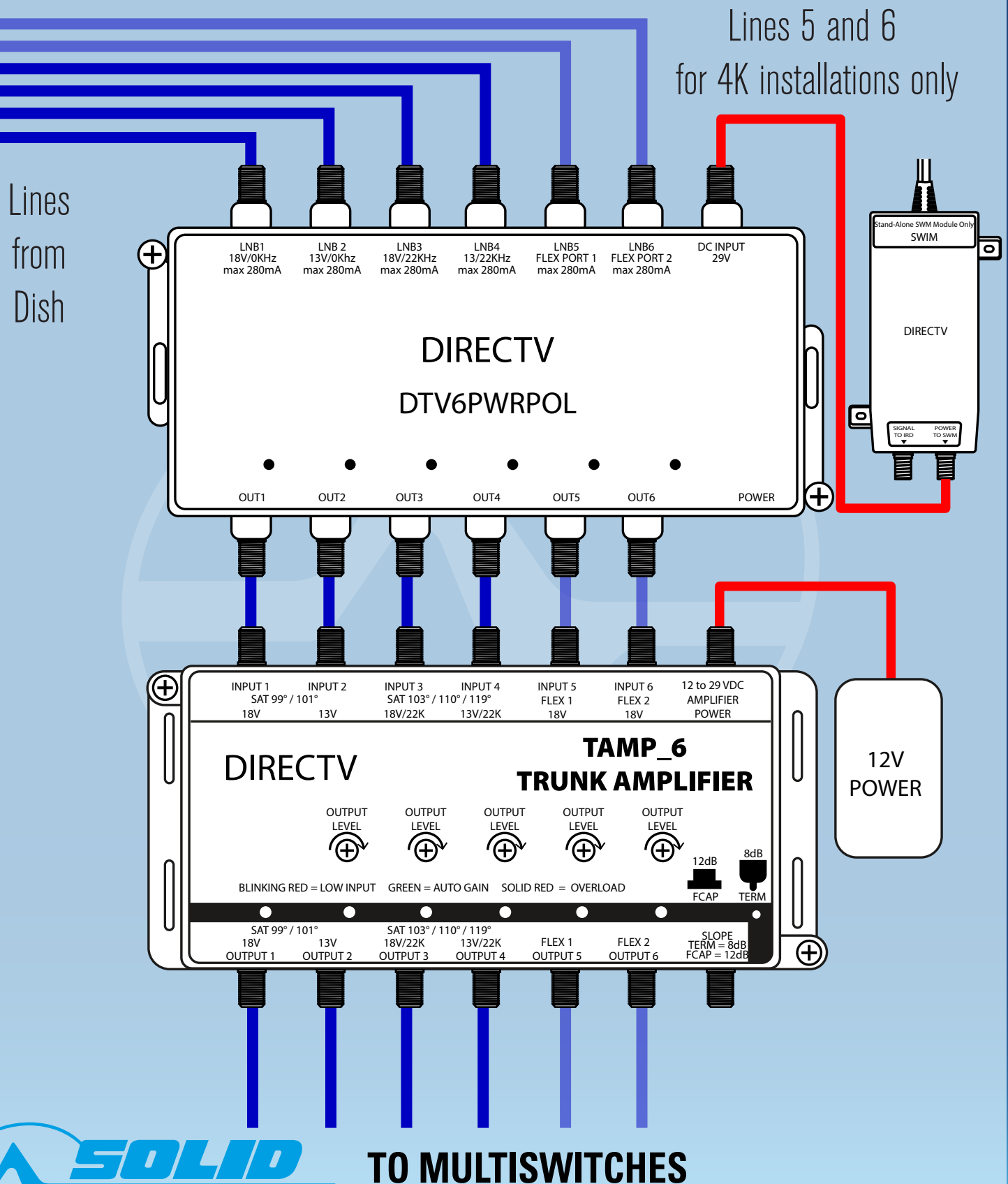
is the right companion to the LA144 from Sonora if only four lines are needed.

If you decide not to install an amplifier and polarity locker into your system, it's wise to leave room for one later, and make sure that cables from the dish can reach to where the amplifier would go.

Installation is easy. Install the polarity locker closest to the dish, followed by a short run to the amplifier. The diagram on the next page shows proper installation.



# INSTALLATION: AMPLIFIER AND POLARITY LOCKER



JULY, 2017

# SPLITTERS VS. TAPS

In a truly large installation, a decision must be made on how to split the signal. Splitters provide the same output level to each output, while taps provide a differential output – the output to the multiswitches is weaker so that a stronger signal goes down the “trunk line” to the next tap. Taps are generally used when there is more than one distribution closet, while splitters are used if all the multiswitches are in the same closet. Here is a table showing the losses expected from each common splitter and tap.



Model	Description	Nº. outputs	Loss to multiswitch lines	Loss to trunk lines
<a href="#">SKY23302D</a>	2-output power-passing splitter	2	3.5dB	N/A
<a href="#">SKY23304D</a>	4-output power-passing splitter	4	7dB	N/A
<a href="#">DTV7TAPDB16</a>	7-output tap for first drop	7	16dB	2dB
<a href="#">DTV7TAPDB12</a>	7-output tap for second drop	7	12dB	2dB
<a href="#">DTV7TAPDB09</a>	7-output tap for third drop	7	9dB	3dB



## Proper use of splitters

Splitters are used when all multiswitches are in a single closet. One splitter is used for each incoming line and the output from each splitter must go into the same port on each multiswitch. In other words, if you are feeding the leftmost port on one multiswitch using a splitter, all the other outputs from that splitter must be fed into the leftmost ports on other multiswitches.



## Proper use of taps

Taps are used to send as much signal as possible from closet to closet through the “trunk” lines. The maximum level of amplification is used – more amplification than a multiswitch needs, and taps are used to send the appropriate amount of signal to each closet. In the first closet, the tap drops the signal by 16dB, the second by 12dB, the third by 9dB. A fourth closet may be fed directly from the trunk output of the last tap, or those lines can be fed into another amplifier to feed three additional closets.

## Combining splitters and taps

If there is more than one multiswitch in each closet and more than one closet, splitters may be used from the tap outputs to feed each multiswitch. However, this method can cause the signal to drop lower than expected due to all the extra wiring, so a signal meter should be used to make sure that each multiswitch has a signal level of at least -45 dBm at its input.

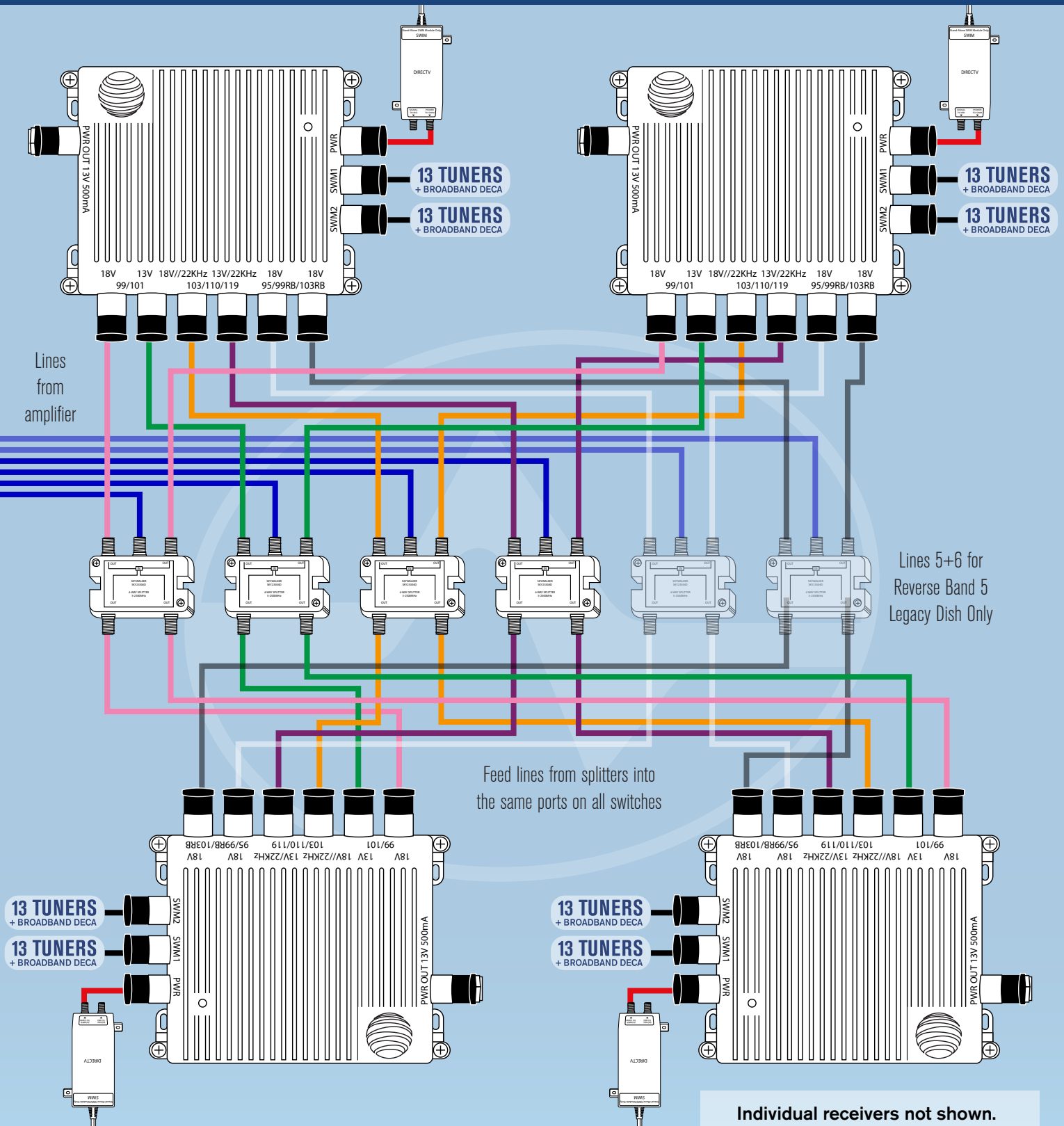
## Taps for 4-line installations

For those installations where 4K is definitely out of the question, the [Sonora SDMST four line satellite taps](#) may be used as a less expensive alternative. These taps have similar characteristics to their 7-line counterparts.



# INSTALLATION: UP TO 104 TUNERS

TYPICAL INSTALLATION WITH ALL MULTISWITCHES IN THE SAME CLOSET



Individual receivers not shown.  
In commercial installations, each output from each SWM-30 supports 13 tuners plus one Broadband DECA kit.



JULY, 2017

# INSTALLATION: UP TO 104 TUNERS

TYPICAL INSTALLATION WITH MULTISWITCHES IN FOUR DIFFERENT CLOSETS

Lines from Amplifier

Lines 5+6 for Reverse Band 5 Legacy Dish Only

## CLOSET 1

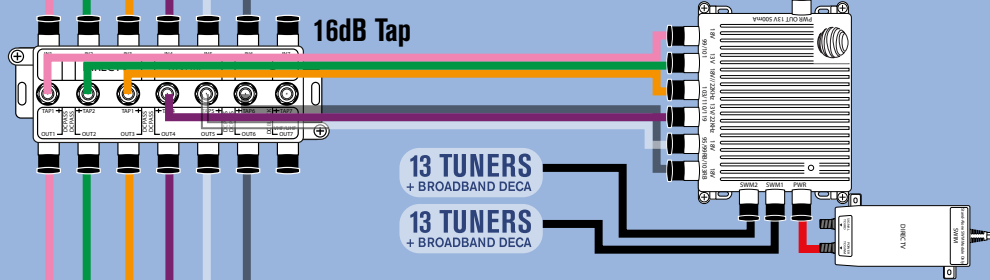
Output from amp -15dB

Loss from cable 2dB

Input level -20dB

Tap output -36dB

Trunk output -22dB



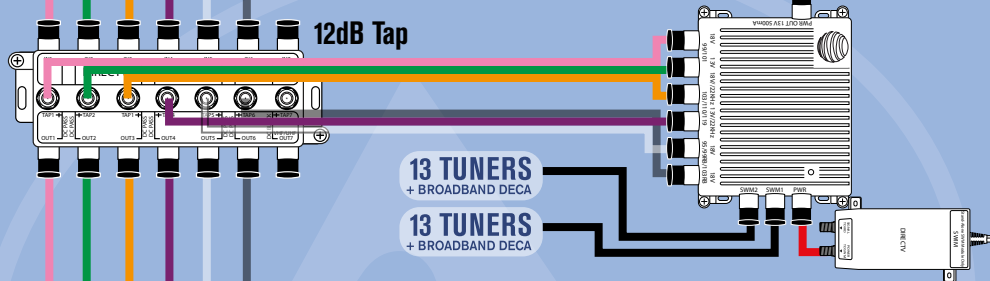
## CLOSET 2

Loss from cable 5dB

Input level -27dB

Tap output -39dB

Trunk output -29dB



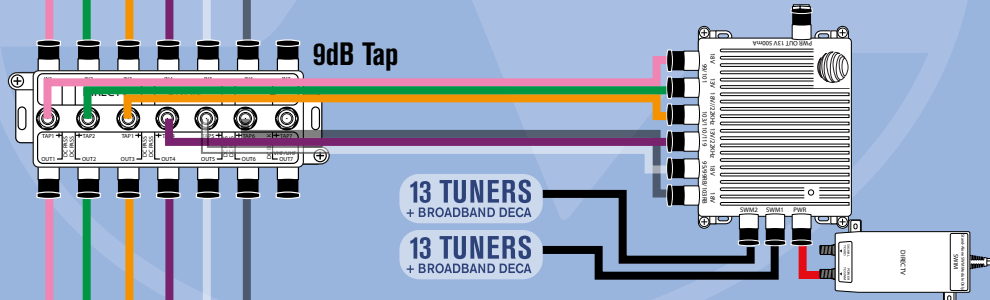
## CLOSET 3

Loss from cable 5dB

Input level -34dB

Tap output -41dB

Trunk output -37dB

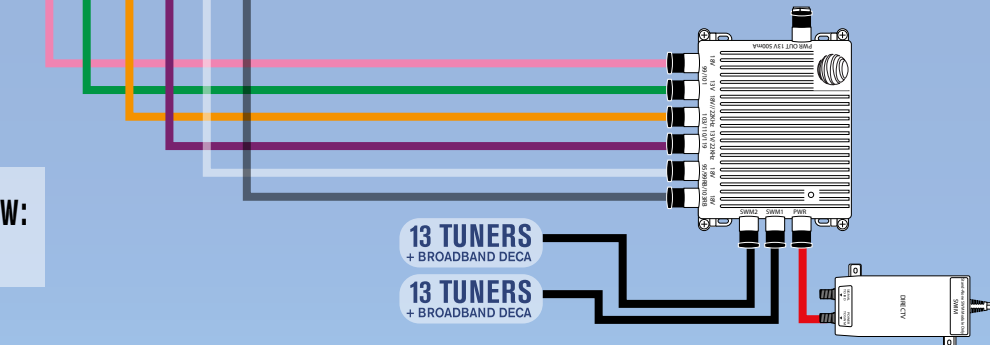


## CLOSET 4

Loss from cable 5dB

Input level -42dB

SWM input window:  
-25 to -45dBm



Individual receivers not shown.

In commercial installations, each output from each SWM-30 supports 13 tuners plus one Broadband DECA kit.

Loss figures for illustration only -  
Always measure signals on site

JULY, 2017



# USING THE WORLDDIRECT DISH



Another common reason for using an external multiswitch is the ability to combine HD or 4K with the output from the [WorldDIRECT dish](#), used for international programming. This requires both dishes to feed into the same multiswitch. In a 4-line system (SD/HD only) this is accomplished by wiring the WorldDIRECT dish to port 5, but since the Reverse Band 5 Legacy dish requires all six inputs, the output from line 5 from the Reverse Band 5 legacy dish is combined with the output from the WorldDIRECT dish using the WD-DIPLEXER-09 diplexer. This diplexer is clearly labeled so that it is easy to know which port receives the signal from which dish, but it will not work if the lines are reversed.

## Considerations for proper diplexing

Unlike ports 1-4 on the LNB, ports 5 and 6 are not capable of carrying any combination of voltage and tone. It is therefore very important to make sure that line 5 from the dish (fifth from the left) goes into flex port 1 on the polarity locker, and line 6 from the dish goes into flex port 2. The line from the amplifier's Flex Port 1 is the only line that will properly diplex with the WorldDIRECT dish.



## Using the WorldDIRECT dish in larger/commercial installations

The WorldDIRECT dish can be used in any size installation. If you are using a Slimline 3 Legacy LNB or a Slimline 5 legacy LNB, one line from the WorldDIRECT dish can be put through a fifth splitter or through port 5 on a tap. If you are using the Reverse Band 5 Legacy LNB, use port 7 on the tap for the line from the WorldDIRECT dish.

The diagram on the following page illustrates the use of a SWM-30 for a single Genie 2 (HS17) installation with an international dish, but the same technique can be used for any combination of receivers, DVRs, and client as needed. Simply diplex the line as shown in this diagram and follow any other diagram in this white paper for the remaining wiring.

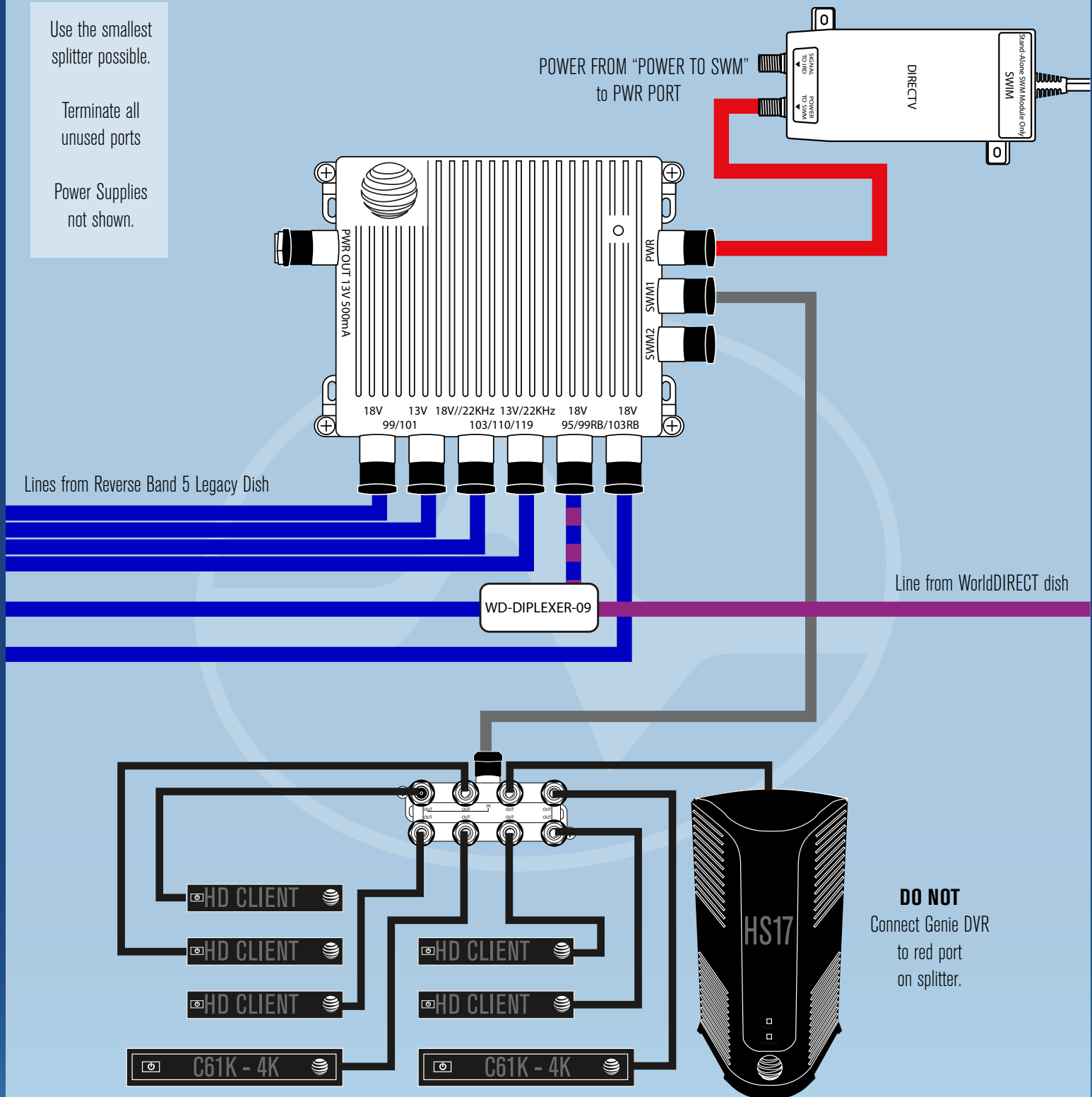
# ADVANCED INSTALLATION: DSWM-30

## INSTALLATION OF GENIE 2 WITH INTERNATIONAL DISH

Use the smallest  
splitter possible.

Terminate all  
unused ports

Power Supplies  
not shown.



JULY, 2017

# CONCLUSION

Installations with more than 16 tuners are easier than ever. While it has always been possible to use equipment intended for commercial buildings to get more than 16 tuners in the home, DIRECTV's whole-home service adds another layer of complexity. Using the latest generation of hardware, including the SWM-30 multiswitch, makes installation much, much easier.

In conclusion, remember:

Avoid long cable runs and unused cables when possible

Terminate any unused connections and Use the smallest splitter possible

Be aware of the effects of signal loss

SWM-30 multiswitches only officially support 26 tuners if older receivers are present

There is a limit of 15 devices for Whole-Home DVR and a maximum of 10 DVRs

And most of all, remember that almost all these methods are unsupported by DIRECTV. If you are comfortable with this level of wiring, you probably have as much knowledge as many DIRECTV technicians and should not expect to get support for this sort of system.

Looking for more information? Check out these helpful links!

**[Downloadable Tutorials and Diagrams](#)**

**[Solid Signal's YouTube Channel](#)**

**[A Guide to Coax Networking](#)**

**[Advanced Coax Networking](#)**

**[Hands on Review: SWM-30](#)**



**SolidSignal.com** is your source for DIRECTV equipment, supplies, and support. We have over 10 years' experience in installing and supporting satellite equipment. Our technical staff is ready to answer all your questions!

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