

Solid Signal's

WHITE PAPER



Extending your DIRECTV signal



EXTENDING YOUR DIRECTV SIGNAL



What's the max length of a DIRECTV cable? What's the maximum distance between a receiver and a SWM? These are questions asked every day and the problem is there's no easy answer. We have [downloadable calculators](#) available but sometimes it's just nice to have a simple set of numbers, right? While that's impossible, we can at least give you some guidelines to start with.

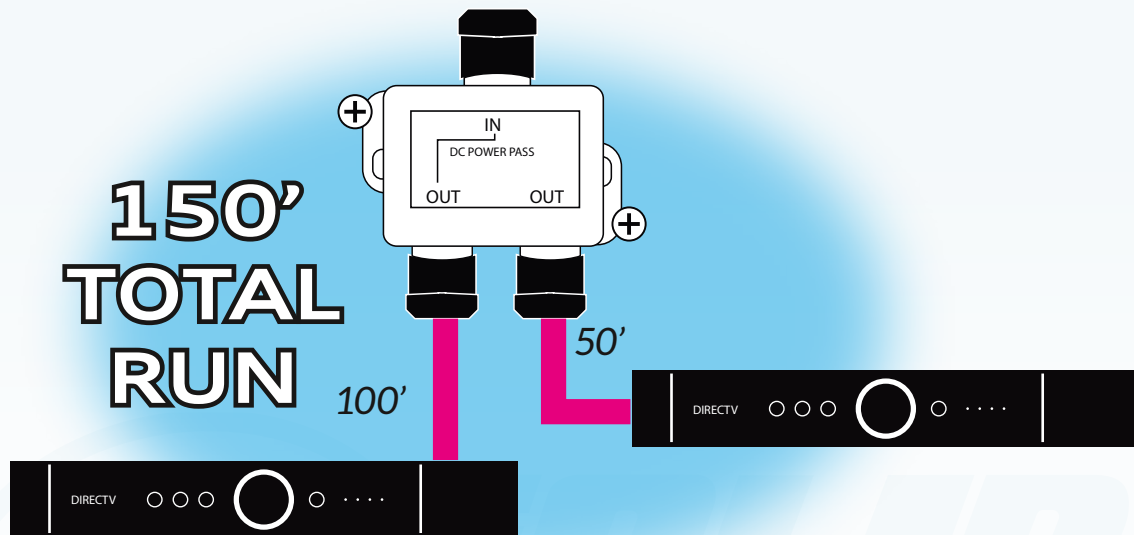
Why would you need a very long run?

Some folks are just genuinely lucky in life and have long houses. If you have a mansion, 200 feet isn't necessarily going to cut it. Another case is an apartment over the garage; it may take a long run to get all the way to a garage or other outbuilding, especially if line-of-sight problems limit the places you can put a dish. While it's true that maybe 1% of DIRECTV subscribers or less have a need for a very long cable run, that's still a pretty large group.

Why not just use a second dish?

If a second dish is a possibility, you are often best going that way. There's no rule against having multiple dishes in your home and it may just make your problems disappear. On the other hand, having a second dish means there's no chance of sharing programming to that distant receiver. Sharing programming may not be a possibility anyway, but with two dishes it's right out. You may also have line-of-sight problems with a second dish and that should be carefully considered.

HOW TO READ THESE NUMBERS



We're going to use the term *total run* a lot. Total run means the total cable run between two receivers. If one receiver has a 50' run from the splitter and the other has a 100' run from the splitter, that's a 150' total run. This is important when using Whole-Home because the signal travels from DVR to receiver when you're sharing programs, and from receiver to dish when you aren't.

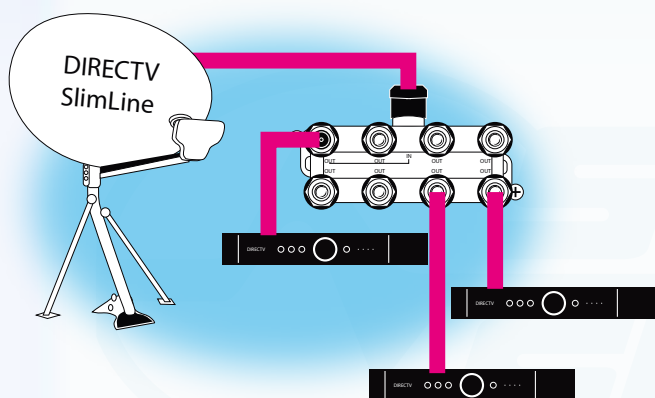
"Total Run" is only important with SWM systems that use whole-home, and there is a difference between cables on the same splitter and cables that go to other splitters. If one receiver is trying to share programming with another receiver, and both receivers are on the same splitter, then the signal goes up one wire, through the splitter, and down the other wire. On the other hand if you're watching live TV, the signal comes from the dish, *through the splitter* and down to your receiver. That's why it's important to consider both total run and distance to the dish with Whole-Home systems.

These numbers aren't absolutes either. You may find that you could possibly go even further if need be, but these are the numbers *we are comfortable with*. We know they work. In fact we have deliberately kept these numbers extremely conservative to take into account weak cable and other variables. Feel free to try longer distances and post your success stories, but if you're looking for some solid numbers that you can count on, take our suggestions.

COMMON SCENARIOS

If you're like most people, 8 tuners is more than enough, especially if you have a Genie system. Eight tuners will give you a Genie, a DVR, a receiver and three clients for a total of 7 possible recordings at once and six rooms. Change over to a SWM-16 system and you can have a Genie, two DVRs, three clients, and nine receivers in a total of fifteen rooms. That's enough to satisfy most folks for sure. If you need more than that, you're talking about issues with sharing programming anyway, but we have you covered with [instructions on how to do it](#).

Most common scenario: SWM, one 8-way splitter



Most DIRECTV installations start with a [SWM-enabled dish](#) and an [8-way splitter](#). In this scenario, the numbers are fairly simple to calculate:

- With Whole-Home service: maximum 300' total run
- Without Whole-Home service: maximum 250' from SWM or LNB
- Genie+clients (and nothing else): 200' run from dish or SWM, then a total run of 300' after the splitter (with the Genie run being no more than 50')

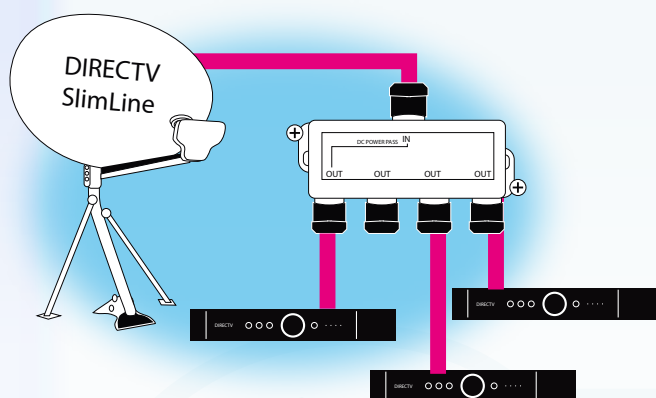
Tips: If you use Whole-Home, you will need to make sure that the run between any two receivers is no more than 300' total, as well as making sure that every individual run is under 250' so that live programming still works as well. If you have a SWM-enabled dish, you need to count the distance from the receiver to the dish, while an external SWM means you only have to count the distance from the receiver to the SWM.

A home that only has a Genie is a special case, because the clients never communicate with the dish. They get all their information from the Genie, so you can have 200' runs from the splitter to the clients even if the run from the dish or SWM to the splitter. However, it's important to make sure that the total run from dish or SWM to the Genie DVR itself is no more than 250'.

COMMON SCENARIOS

Another common scenario: SWM, one 4-way splitter

If you are just using a Genie and three clients, you can get away with a [4-way splitter](#) instead of an 8-way. This will help you get a longer run for non-Whole-Home but it won't help you with Whole-Home.



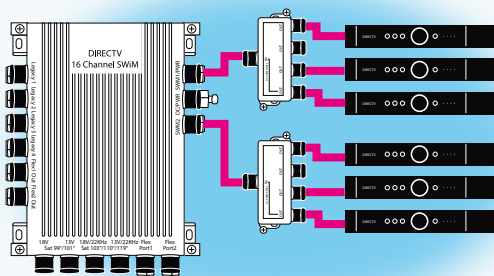
- With Whole-Home service: maximum 300' total run
- Without Whole-Home service: maximum 300' from SWM or LNB
- Genie+clients (and nothing else): 250' run from dish or SWM, then a total run of 300' after the splitter (with the Genie run being no more than 50')

Tips: Smaller splitters don't affect whole-home performance because the signal stays within the splitter and the loss between ports is the same whether it's a 2, 4, or 8-port splitter. So in this scenario you really don't get a longer run with Whole-Home but you get some flexibility. You can have a 275' run from the LNB or SWM to the splitter, and four 25' runs from the splitter for example.

The same applies to a Genie; with a smaller splitter you're getting more signal in the Genie DVR so you can get more distance before the splitter and the distances for the clients don't change.

Scenario #3: SWM16, one 4-way splitter on each leg

In many cases, this is the best scenario for Whole-Home viewing. Let's assume you have a Genie and three clients on one leg, and two DVRs and a receiver on the other. This gives you 7 tuners for recording and a total of 6 rooms in which to watch.



- With Whole-Home service: maximum 400' total run (200' max run on each line)
- Without Whole-Home service: maximum 300' from SWM.
- Genie one leg, non-Genie on the other on the other: maximum 400' total run (200' max on each line) for DVRs and receivers, and each client can be 300' from the SWM.

Tips: This gives you a lot of flexibility. Anything that connects to the dish (Genie DVR, regular DVR or receiver) gets a 400-foot run while your clients get the benefit of an even longer run.

NON-SWM (LEGACY) SETUPS



For the most part, we recommend all customers be on SWM setups. DIRECTV has stopped developing non-SWM equipment and it's a fair bet that all future products will be SWM-only. But, you may have valid reasons to stay with a non-SWM setup. Maybe you just aren't ready, or maybe you have a non-SWM system that works perfectly and you just don't want to mess with it.

The real benefit of a non-SWM system is that it more or less obliterates any distance issues

because a properly configured system doesn't have as much problem with a return path. A SWM system is always relying on receivers to request specific signals over a channel, while a legacy system can be set up so that it is providing all four possible combinations of signal and polarity all the time. This means that distance from the dish to the multiswitch can be extended with [trunk amplifiers](#) so that you can put the multiswitch where you need it.

The key to this system is the use of a [polarity locker](#). A polarity locker forces the dish to supply all the possible signals 100% of the time which means that there needs to be no communication between the receiver and dish, only between the receiver and multiswitch. It's a good idea when you have long runs from the dish to the multiswitch anyway, since without it you're relying on the receivers to power the dish and as cable length increases, voltage drops.

If you are using a non-SWM multiswitch it's easy to extend a run to 500' or more by using a [line amplifier](#). Using a system like this makes it very possible to have over 500' between dish and multiswitch and another 400' from multiswitch to receiver. Of course in a system like this, whole-home sharing is right out of the question.

CREATIVE SOLUTIONS



Your specific installation may let you get creative. For example, you may only need one long run and by using a Genie client for that run, you may be able to preserve whole-home performance. Or, you may choose to avoid using whole-home all together in favor of longer

runs. You may have a virtually unlimited budget which may also makes things a lot easier.

Sacrificing Whole-Home (totally or partially)

If you are not using Whole-Home then you can extend the run to 200' or more through the use of a [Band Stop Filter](#) at the receiver. This will isolate the receiver so that the Whole-Home system doesn't report errors. If you need to go further (and aren't using Whole-Home) then you can use the [SWMA2-T](#) amplifier to get up to 300' from splitter to receiver. Again a Band Stop Filter is required. You can extend one run from the splitter with this technique and let all other runs use Whole-Home, if you so desire. You can isolate one run to potentially increase cable runs by using a band stop filter on the run between the cable and the splitter. Keeping the band stop filter near the splitter means that the whole-home signal never travels down the wire at all. You can also use band stop filters at the output points of each SWM leg so that you never have to worry about signal crossing over.

Avoiding losses through the SWM-16



The crossover circuit in the SWM16 can be bypassed through the use of a NAS STD-9501M diplexer. The diplexer cuts 5dB of loss from the system compared to the SWM16's internal crossover and that could translate out to 50 more feet of cable. [This thread will tell you](#) how to properly use this diplexer.

CREATIVE SOLUTIONS

Extending distances using RG11 cable

RG11 cable can be used for runs over 100' and it can help you add up to 50% more distance to your run. It's hard to use within a house because it is very hard to bend, but if you are trying to reach a distant part of a building and can run a straight line, RG11 cable can help you extend your run considerably. This may help you get Whole-Home service to a distant receiver. Remember though that most RG11 cable is copper-clad steel so do not use it for runs from the power inserter to the dish or SWM. Using RG-11 cables...

- The max run off a 2-way can be 475'.
- The max run off a 4-way can be 375'.
- The max run off a 8-way can be 275'.

The nuclear option: Using fiber



If you're looking for a really long run, say over 1,000 feet, you can translate the signal from the dish into fiber, which gives you a 10km range using a pair of single-mode fibers. Use the [AL5T3 transmitter](#) and [AL5R3 receiver](#) in tandem for this purpose. This is a very expensive option and almost completely eliminates the possibility of whole-home. You cannot use fiber for the signal from the SWM, due to the return path, but it can be used from the lines from dish to SWM. If that's the

case you can use whole-home on devices on that same SWM but those receivers won't see anything else in your home.

CONCLUSION

The most important tool in your toolbox

All the tips in this document are just general purpose guidelines. There are differences in the loss values for different cables, variations in the output levels from different LNBs, and all sorts of other factors that can make your system behave differently from any other systems. There's also loss due to poorly made or deteriorating cables, electrical interference, low voltage supplied to the multiswitch... too many factors to name. That's why it's important to start with these

guidelines and then actively measure using a real satellite meter like the [SatLookLite](#). The most important thing is the signal level at the receiver site, and unfortunately the receiver itself will only give you an inverse bit error rate (the number from 0 to 100 in the signal strength screen.) You need real signal level measurements.

When you measure the signal at the receiver it should ideally be better than -55dBm (in other words, -45 is ok, -65 is not.) You may do just fine with weaker signals but there may be issues with rain fade. That signal level is for the audio/video signal, not for the whole-home signal. For that you need to measure using the hidden menu on the receiver. If you're not familiar with this menu, check out our [Advanced Coax Networking White Paper](#).) Ideally you want the Phy levels to be better than -45 and the coax point to point numbers to all be higher than 220.

If you see that you have very good signal using all these tests, it may be possible to extend the run even further. On the other hand, if the combination of the hidden menu and the meter tell you that you have weak signal, you'll need to think of other options.

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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