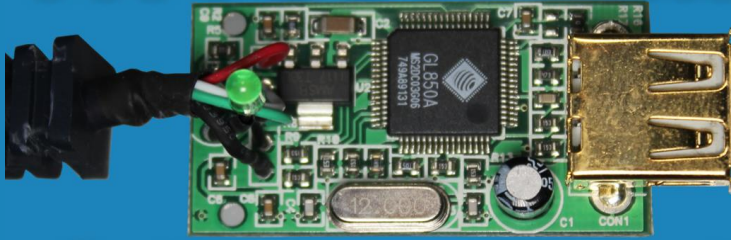


# ITFreeTraining



## Active and Passive Cables

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In this video from ITFreeTraining, I will look at Active and Passive cables. What you are trying to achieve will determine which cable you will use. When purchasing cables, it is important to understand what you are buying, so it will achieve the results that you want.

# Passive Cables

- Cable only. No additional electronics
- Cheaper to make
- Requires more power and suffers more data loss



- Example 5m USB cable
- Very cheap cable
- Very unreliable

0:15 To start with, I will look at passive cables. A passive cable is essentially a cable with no additional electronics or very minimal cheap electronics. Since there is not much in the cable, the cable is cheaper to make, however a cheaper cable is not without its problems.

Shown here is a five-meter USB passive cable. This cable is very cheap but also very unreliable. When I tested this cable, I could get it to work with low speed devices, however USB 2 devices would sometimes work and at other times would not work at all. At the end of the day, you get what you pay for. You will generally find that passive cables work better when they are short, but the longer they get the more unreliable they become.

Due to the cable being a passive cable, the device it is connected to needs to power the cable, which can lead to more data being lost over longer distances. Essentially, think of it like a water hose; if you switch the hose on, you require more pressure to get the water to go further. Cables work the same way, the longer you make the cable, the more power you need to push the signal through the cable.

Electrical signals are affected by interference. Interference will affect the signal and thus cause data loss. Interference can come from many sources. The source can include the cable itself. If you start putting more power through the cable, the cable itself will generate more interference from magnetic fields the cable creates. This interference can affect the cable itself and other cables that may be near it. So, you can see the answer is not to simply up the power. Let's look at how active cables eliminate some of these problems.

# Active Cables

- Uses embedded circuitry to recreate signal
- Increases length of cables
- May need external power
- May have additional security features



- 5m Active USB Cable
- Costs more
- Works well

2:07 An active cable uses embedded circuits to recreate the signal. Shown here is an active five-meter USB cable. You can see on the left-hand side of the cable there is a large plastic casing attached to the cable. This contains the circuits which makes the cable an active cable. In a moment I will have a look at the circuits that are inside. Some cables will not be as obvious as this one. With some cables the electronics will be inside the plug; I will have a look at such a cable later in the video.

An active cable can increase the possible maximum length of the cable. For example, you will find that, with an active cable, the length may be increased to be even longer than the maximum specification allows. If you need to purchase a cable longer than the maximum specification allows, make sure it is an active cable. In some cases, you may not be able to get a cable long enough to meet your needs; however, you may be able to combine multiple active cables together to get a longer length. Each cable will recreate the signal, but you won't be able to use passive cables as they do not recreate the signal. Generally, the manufacturer of the active cable will include (with their specification of the cable) how many cables can be connected together.

The disadvantage of active cables is that they cost more; however, they work really well compared to passive cables. For example, this five-meter cable works flawlessly compared with the passive five-meter cable I looked at before. If you need a longer cable, consider using an active cable as they work a lot better, even though they do cost more.

In some cases, the active cable may need external power in order to operate. In the case of this

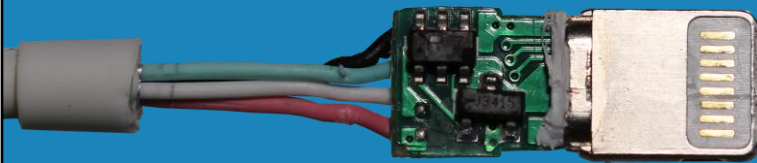
cable, no external power is required, as the embedded circuits draw their power from the device it is plugged into to. Keep this in mind, as with some active cables, if the external power is not connected, the cable will essentially become a passive cable and may not work at all.

One of the criticisms of active cables is that some of these cables contain additional security features. For example, this may limit what devices can be used with the cable. Although the primary purpose of an active cable is to increase the reliability of the cable, its circuitry can be used for other things. Let's have a look inside this cable so we can better understand how it works.

# Inside Active Cable



Essentially a small USB hub



Chips prevent non-approved devices being used

4:35 For this active USB cable, essentially inside it is a USB hub. The signal travels across the cable and then is recreated before being sent to the next connection. This helps prevent signal degradation or loss even over a long distance.

You can see in this second example that the electronics are nowhere as big, as essentially, they fit inside the plug. Given that they can be this small, unless you check the packaging of your product you may not know if the cable is passive or active.

Keep in mind that some passive cables will have a small amount of electronics in them. The big difference between an active and passive cable is the active cable will recreate a signal or provide additional functions like security functions. A passive cable will only do basic signal converting like voltage changing, nothing too complicated.

Let's have a look at some different examples of passive and active cables.

# Passive and Active Cables



HDMI Splitter  
Powered by USB  
Signal not reduced by splitting



VGA Splitter  
Not powered  
Signal reduced when split

5:37 Cables can also be splitter cables – that is: the signal can be divided into two. For example, this HDMI splitter divides a HDMI into two signals. The splitter recreates the signal and, thus, requires power to run the circuits inside it. To do this, a USB power plug is plugged into the side of the splitter. Since the signal is recreated, the signal is not reduced by splitting. This makes it more reliable, particularly when using high resolutions. If you do purchase one of these, since the signal is recreated, the electronics in the device will only be able to handle certain resolutions. So, before you buy, check the product packaging to see what resolutions it will support. Having said that, you will find that passive cables will also have a maximum resolution that they will support. The better the quality of the cable, the higher resolution it will support.

In contrast, this passive DVI splitter does not use any power or recreate the signal. It is cheaper to purchase, but once it splits the signal, it effectively reduces it in half. Since the signal is reduced, it also reduces how long the cables can be when used with this splitter.

Your needs will determine which cable you will purchase. Usually price will be the biggest consideration that needs to be taken into account. Remember to carefully check the specifications before purchasing. You don't want to purchase the cheaper cable and then have to purchase the more expensive cable later on because the cheaper one will not do what you needed. Generally speaking, if you want to cover a longer distance or split the signal you are most likely going to need an active cable.

This concludes this video on active and passive cables. I hope you found it useful and will help you when purchasing a cable to meet your needs. Until the next video, I would like to thank you

for watching.

#### References

“Active cable” [https://en.wikipedia.org/wiki/Active\\_cable](https://en.wikipedia.org/wiki/Active_cable)

#### Credits

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