HOW TO INTEGRATE WITH A MAC MINI

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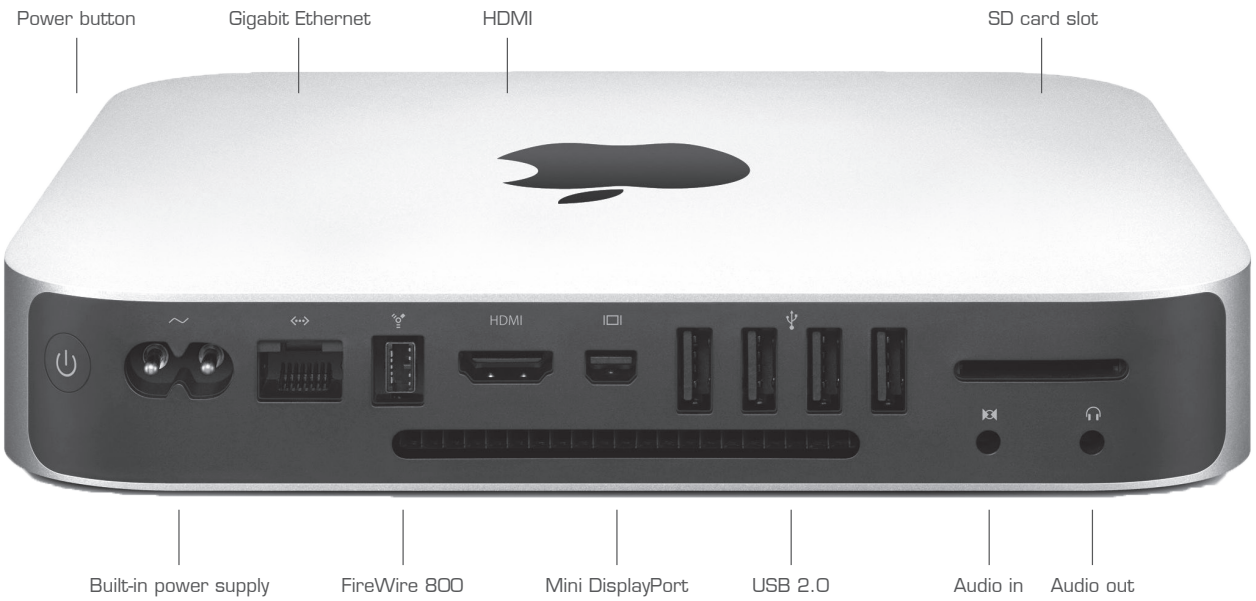
Apple's Mac mini is exactly what it sounds like. It is a small Mac Computer. These computers are popular in the AV industry, because they are petite, relatively inexpensive, powerful, and are adorned with the Apple logo. Due to their size, these Mac mini's are commonly found in the AV racks. Since most consumer products were never designed for the commercial AV world, it is important to know how they will perform in this more complex environment.



The focus of this white paper will deal with the two video outputs of Mac mini. One output is the mini Display Port connector now found on all Apple computers, and the other is an HDMI output which is a first for Apple devices. Since both output ports are digital, all digital rules apply answering these following questions. What EDID will the computer see? How far away are the displays or other interfaces? What resolution is required? Do my sources enable HDCP? If so are all devices connected HDCP compliant? What makes the Mac mini unique is the way that it handles HDCP.

Why is HDCP a concern if the Mac doesn't have a Blu-ray player? The purpose of HDCP or High-Bandwidth Digital Content Protection is to ensure movie studios that high resolution copies of their movies are not made by consumers. Today, Blu-ray discs are not the only way to legally view a high-definition movie. Services like iTunes allow users to purchase HD content for your viewing. Just like in Blu-ray players, computers now need to have the ability to encrypt their digital outputs with HDCP when such content is being played. Since normal computer content does not need to be copy protected, it is put to the computer to decide when to enable and disable HDCP on its output.

In the consumer world, computers are always directly connected to one of two types of digital monitors; ones that are HDCP compliant and ones that aren't. Since Apple doesn't know which type you have, they have to account for both situations. When the Mac mini is connected to a display that is not HDCP compliant, it sends out a digital signal that does not contain HDCP. The caveat here is that if you try and watch a studio movie on this display you will receive an error message such as this one delivered from iTunes.

Since the display connected to the Mac mini is non-HDCP compliant, the Mac cannot legally display that HD content. When you connect the Mac mini to a display that is HDCP compliant, the Mac mini recognizes and encrypts the output 100% of the time, even when HD content is not being played. This could be done for many reasons but mostly because it would prevent the output from glitching when you play a movie and HDCP is initiated. Since Apple assumes your computer is connected directly to the display, it doesn't hurt to encrypt all content, because the user has no knowledge of this happening.

This can create a problem when the Mac mini is added into a commercial installation, because we never go from source directly to a display. Going into devices that are HDCP compliant and then going out to devices that are non-compliant will expose this issue. An example of this issue can be illustrated by connecting a Mac mini into the HDMI input of the VP-729. Since the VP-729 is HDCP compliant, the Mac mini automatically encrypts its output. HDMI input of Kramer's VP-729 switcher scaler is now HDCP encrypted, the 15-Pin analog output of the scaler will shut off even if you aren't watching any HDCP material on the computer. The same would apply if the digital output of the scaler was connected to a non-compliant display. The tricky thing here is that the user could connect the Mac mini directly to that non-compliant display and get a picture since the Mac will recognize this display as non-compliant. Another interesting example concerns connecting a Mac mini to a Kramer DA or Matrix switcher. The Mac mini will make an HDCP connection with the input of that device; therefore, making it impossible to go to a non-compliant display.

This is a very odd problem to have, but there can be a solution as long as the application does not call for the Mac mini to be playing HDCP videos. If the first device the Mac mini recognizes is a non-HDCP device, then it will think it is connected to a non-compliant display and it won't encrypt its output. This can be accomplished by placing a VA-1DVIN in-between the computer and the scaler, matrix switcher, or distribution amplifier. The VA-1DVIN is usually used as an EDID Emulation device, but since it is not HDCP compliant it can also be used to emulate a non-HDCP environment allowing the computer to output a non-HDCP signal. While this issue can be exposed using Kramer equipment, it is not a Kramer problem and is just a matter of understanding how the Mac mini operates.

Note: The VA-1DVI has DVI connectors so the Kramer AD-DM/HF may be needed to convert HDMI to DVI.

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