



kaleidescape

Kaleidescape Strato

Installation Guide

December 2023

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Overview

The Kaleidescape Strato Installation Guide describes how to set up and configure the Strato movie player and add new components to an existing installation.

Kaleidescape Strato and Strato C Movie Players

The Kaleidescape Strato and Strato C movie players are 4K Ultra HD movie players with high dynamic range (HDR) capability. Strato includes internal movie storage, while Strato C has a compact form factor without internal movie storage.

A Strato with internal movie storage can store and play up to 180 4K Ultra HD, 330 Blu-ray quality, or 1500 DVD quality movies on its internal hard drive.

Strato C is intended to be used as part of a larger system that includes Strato players with storage, or a Terra movie server.

This document covers the Strato movie player (with storage). There is a separate installation guide for the Strato C.

Benefits of Strato

Strato is easy to set up and provides amazing convenience without compromising quality.

Strato enables you to:

- ▶ Download and play 4K Ultra HD movies from the Kaleidescape Movie Store with audio and video quality superior to that found in many commercial theaters
- ▶ Download Blu-ray quality and DVD quality movies with identical fidelity to those optical formats
- ▶ Use the comprehensive Kaleidescape Movie Guide to easily navigate your collection and directly access memorable scenes, songs, and special features

Strato supports easy integration into audio, video, and whole-house control systems.

Supported Configurations

Strato can be used by itself as a complete Kaleidescape system, or it can be used with additional Strato or Strato C movie players and/or Terra movie servers as part of a multi-zone system.

In a multi-zone system, up to four Strato players with internal storage may be used. This configuration is suitable for installations where one or two movies will be played at the same time in the household.

Beyond four zones, or if more than two simultaneous movie playbacks are required, the system should be built with Strato C players and one or more Terra servers.

Kaleidescape recommends that a large system be designed such that all of its storage is in the Terra movie servers (i.e., using only Strato C players), because Terra can support more concurrent playback streams. However, if circumstances dictate, you can still use up to four players with internal storage, with the important limitation that an individual Strato player with storage can only support two simultaneous movie playbacks (one on the player itself plus one being sent to a remote player, or two remote playbacks).

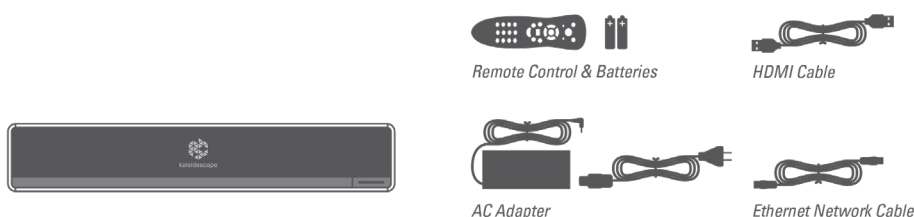
Gigabit Ethernet connections are required for all components in a multi-component system. 100Base-T Ethernet networks are not acceptable because of the bandwidth required for 4K Ultra HD.

Strato players with storage have built-in Wi-Fi, which may be used when Strato is installed as a standalone, single-component Kaleidescape system.

What's in the Box

The following accessories are packaged with Strato:

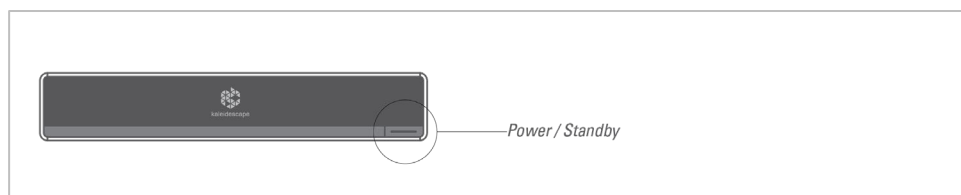
- ▶ 1x Shielded Ethernet Network Cable
- ▶ 1x HDMI Cable
- ▶ 1x AC Adapter
- ▶ 1x Remote Control
- ▶ 2x Batteries (for remote control)



Front Panel Button

There is one button located on the front panel of Strato:

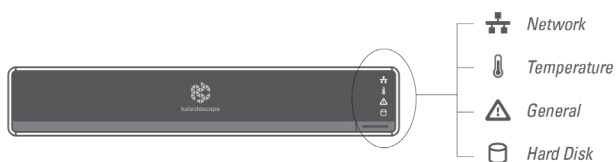
- ▶ Power/Standby – turns Strato on or off or places Strato in standby



Front Panel Error Indicators

There are four error indicators located on the front panel of Strato. These error indicators illuminate briefly during system startup, but otherwise are only visible in the event of a problem:

- ▶ Network – indicates that Strato encountered a network error
- ▶ Temperature – indicates Strato temperature is too hot or too cold
- ▶ Hard disk – indicates the hard disk drive inside Strato has a failure
- ▶ General – illuminates in conjunction with other indicators. If illuminated by itself, check the system's Browser Interface for details.



Physical Installation

Planning the Installation

Ventilation and Clearance

Use the following guidelines when installing system components to ensure proper clearance and ventilation. These guidelines apply to all installations including rack mounting. (Rack-mount hardware sold separately.)

1. Mount components in a location with adequate ventilation.
2. Check for proper grounding if installing components in a rack.
3. Maintain a 2 in. (5 cm) clearance in back and a 1 in. (2.5 cm) clearance in front and on the sides.

Power Requirements

Kaleidescape component power supplies are universal input and operate on any nominal line voltage between 100–240 V, and frequency between 50–60 Hz. Verify that power outlets are grounded, and preferably shielded from power surges and brownouts.

Kaleidescape recommends a grounded outlet with a high-quality surge protector for the power source for players and servers. A UPS is optional.

Network Requirements

A Gigabit Ethernet network is recommended and is required when Strato is used with any other Kaleidescape components. Connect Strato using a shielded Ethernet cable. The built-in Wi-Fi may be used when Strato is used as a single-component standalone system.

Audio and Video Components

Before beginning the installation, determine the type of display and audio equipment that will connect to your Strato.

Strato supports the following outputs:

Video

- ▶ High-Definition Multimedia Interface (HDMI). HDMI 2.0 and HDCP 2.2 are required for 4K Ultra HD content. HDMI 2.0a is required for HDR.

Audio

- ▶ HDMI (Digital stereo or multi-channel)
- ▶ Coaxial (Digital stereo or multi-channel)
- ▶ Optical (Digital stereo or multi-channel)

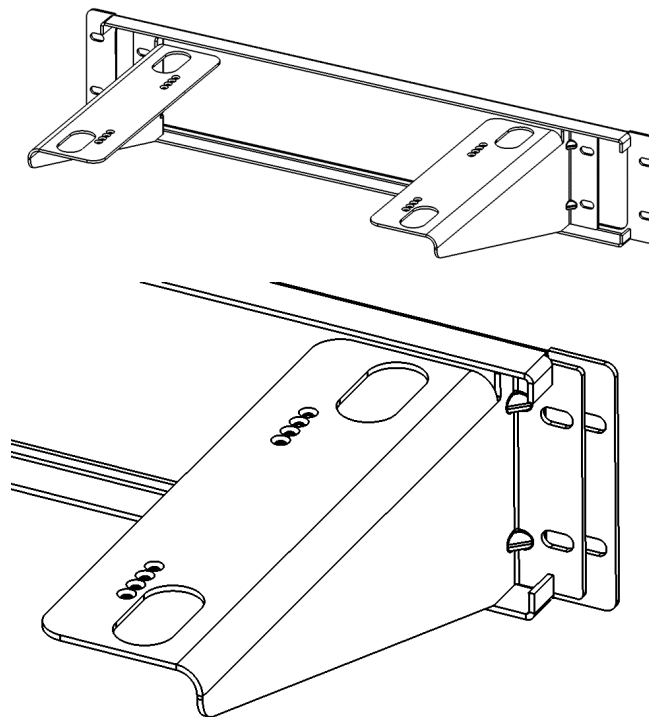
Installing Strato

Tabletop / Shelf Installation

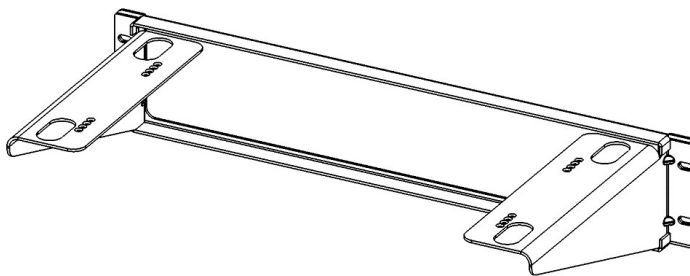
4. Choose a suitable location that is sturdy enough to hold Strato. Strato weighs approximately 15 pounds.
5. Place Strato onto the tabletop or shelf. Strato ships with feet attached.
6. Installation is complete. You may now proceed to the Audio and Video Connections section below.

Rack Installation

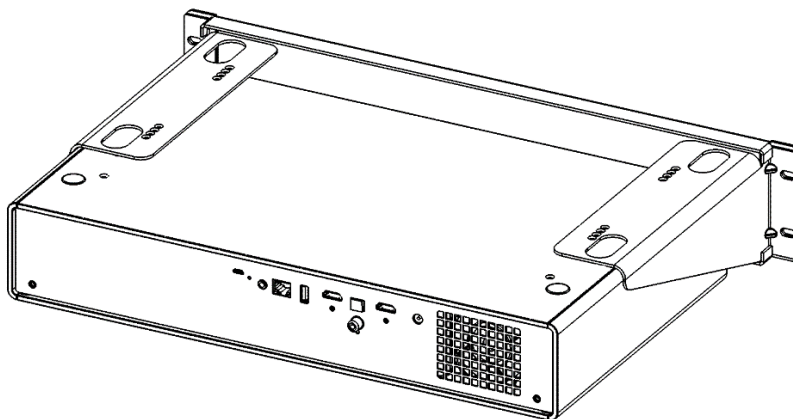
1. Installing Strato in a rack requires the Strato rack-mount kit (KMOUNT-K0509-1), sold separately.
2. Strato requires two rack units of space. Determine a location in the rack to install Strato.
3. Place Strato upside down on a soft, clean surface.
4. Assemble rack sides into front panel as shown:



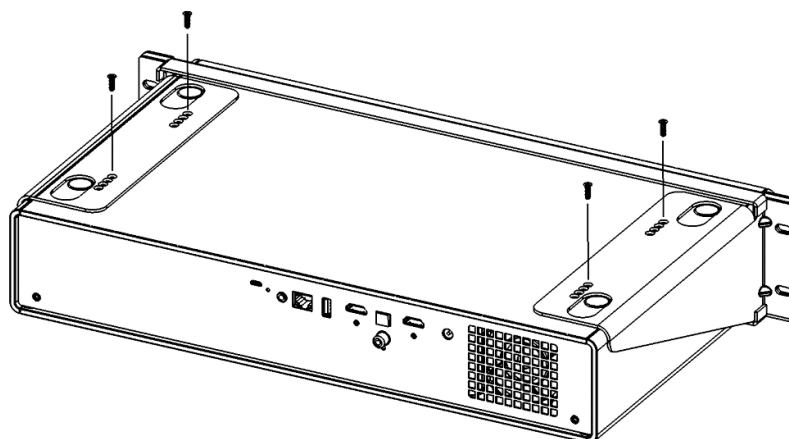
Completed assembly:



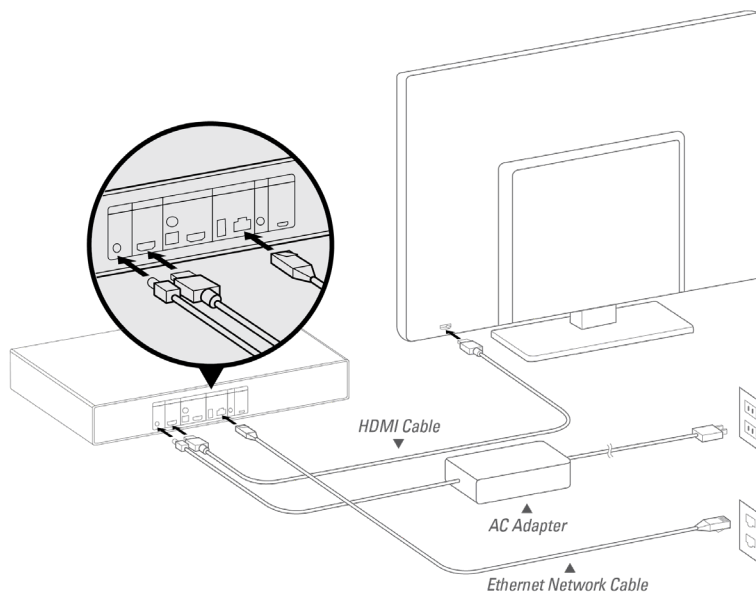
5. Remove and keep the four flat head screws installed near Strato's feet on its bottom surface.
6. Place rack ear assembly over the unit and gently slide into position. Four positions are available depending upon the desired reveal. In the frontmost position the player face will protrude by $\frac{3}{4}$ " (recommended). In the rearmost position the face of the player will be flush with the front of the rack ears.



7. Install the saved flat head screw ensuring both sides are in the same position.



Audio and Video Connections

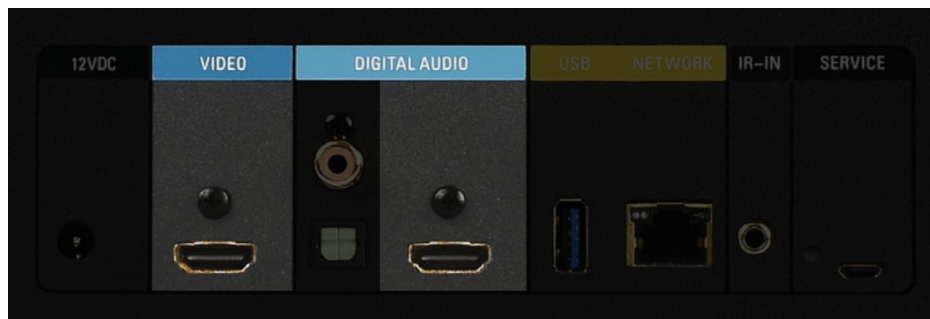


Connect network, audio, and video cables before connecting the AC adapter.

To play 4K Ultra HD content with Strato, the display must support HDMI 2.0 and HDCP 2.2. High Dynamic Range (HDR) content requires HDMI 2.0a and an HDR-capable display that supports the SMPTE HDR (“HDR10”) standard.

When the HDMI signal passes through other components before reaching the display (e.g., an audio receiver), all of those components must also support HDMI 2.0 and HDCP 2.2. Otherwise, Strato will have to reduce the video quality to accommodate the limits of those components.

For this reason, Strato has two HDMI ports. The primary HDMI port (labeled VIDEO) carries both video and audio information. The secondary HDMI port (labeled DIGITAL AUDIO) carries audio information only.



If the audio equipment does not support the necessary HDMI capabilities, you should connect the *display* directly to the VIDEO HDMI port and connect the *audio equipment* to the DIGITAL AUDIO HDMI port. This will ensure that you achieve the highest possible video and audio quality.

If using a single HDMI connection, be sure to connect to the VIDEO HDMI port. The secondary HDMI port does not support video output.

Network Connection

A wired Gigabit Ethernet network connection is recommended and is required if any other Kaleidescape components are used with Strato (e.g. another Strato player, a Terra server, etc.). Connect Strato using a shielded Ethernet cable. If using a single Strato player by itself, you can use the built-in Wi-Fi if a wired connection is not possible.

Power Connection and Startup

After making the audio, video, and network connections, make sure your television is set to the correct HDMI input, then connect Strato's AC adapter. You should see the Kaleidescape logo on the display, and after a few minutes, the initial setup menu appears.

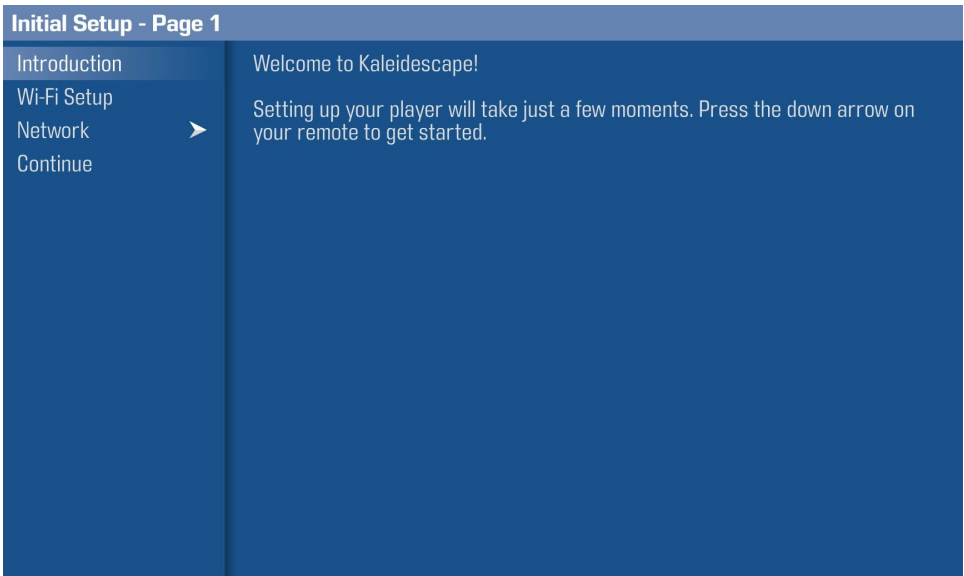
If you do not see the Kaleidescape logo and the setup menu, first check that Strato has power. Check the AC adapter's connection, and make sure that the Kaleidescape logo on the front of the player is glowing. If it is not, try pressing the power button, located in the lower right corner of the front panel.

If you still see no image, double-check that the correct input is selected on the display. If there are other devices in the video chain, like audio receivers or switches, ensure that they are configured properly. You may want to try connecting Strato directly to the display with the supplied cable to rule out compatibility issues with intermediate devices or cables.

System Configuration

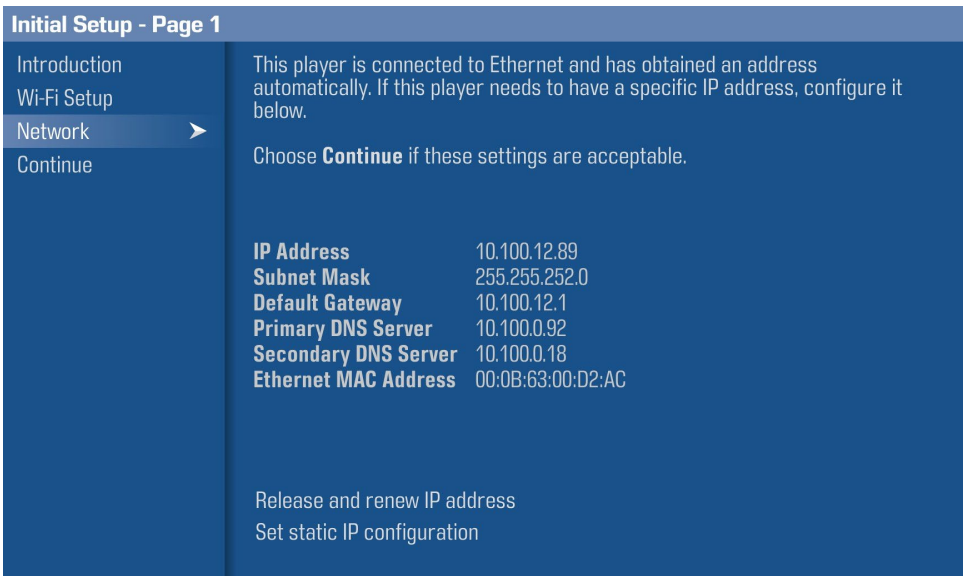
First-Time Setup

After installing your Strato, you will be prompted to set it up using the onscreen display. Connecting to your network (via a wired or wireless network connection) and activating your Strato is required.

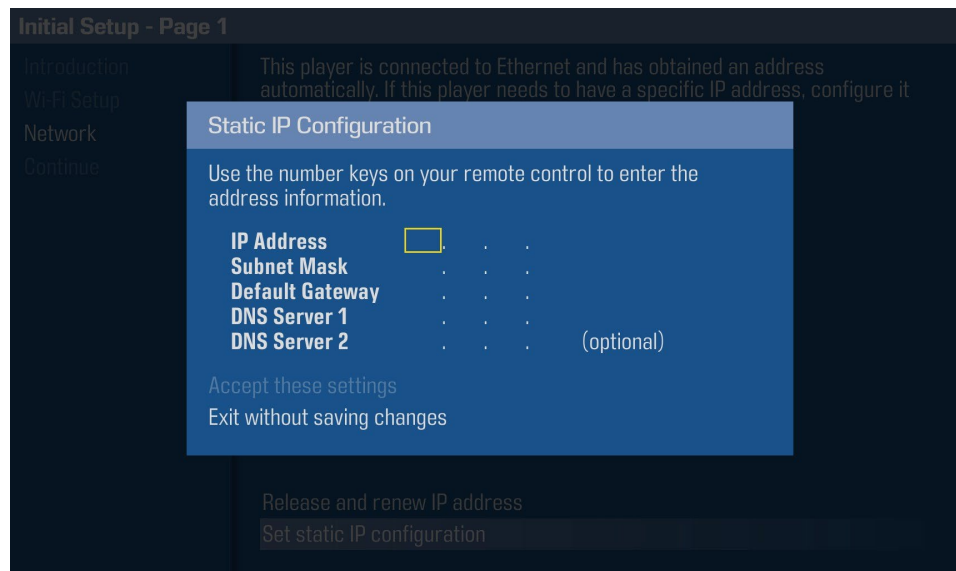


Wired network connection (recommended)

Scroll past the **Wi-Fi Setup** option and select **Network** from the onscreen menu. In most cases, Strato will automatically obtain an IP address from a DHCP server.

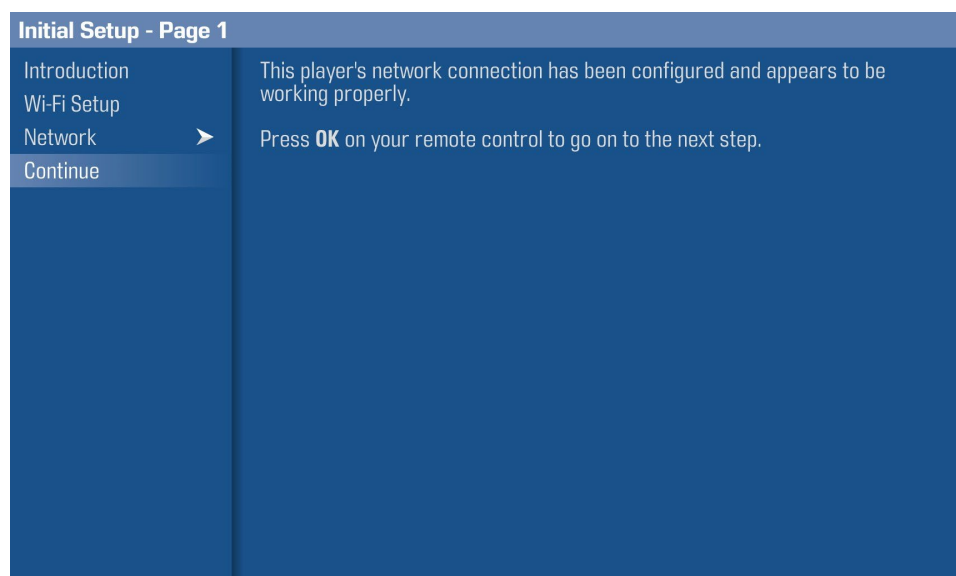


If you wish to set a static IP address, select **Set static IP configuration** and enter your network information.



Select **Accept these settings** to save the information entered.

After a valid network connection is set up, select **Continue** to proceed to the next step.

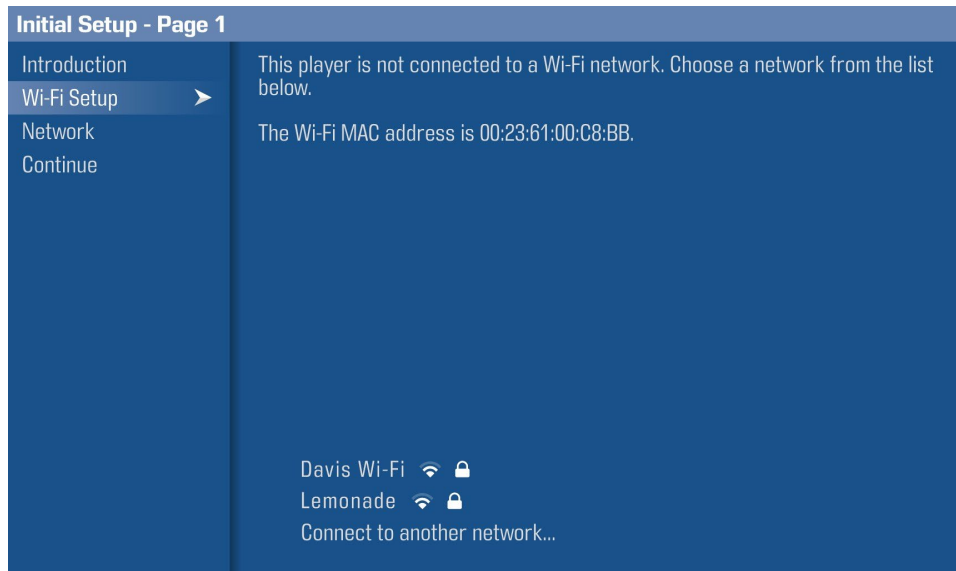


Wireless network connection

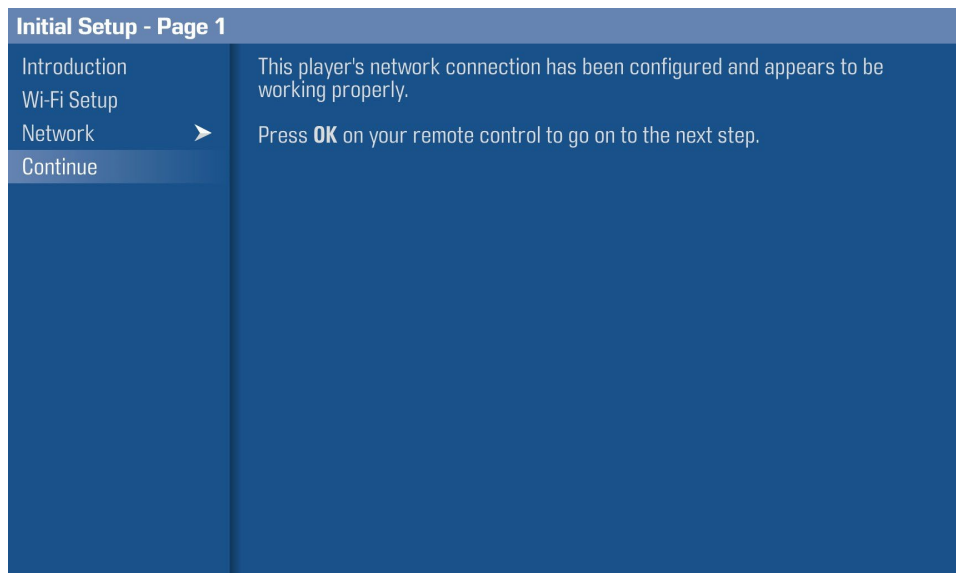
Skip this section of the document if you are using an Ethernet connection.

To use the built-in Wi-Fi feature, make sure that no Ethernet cable is connected to Strato. Ethernet always takes precedence over Wi-Fi. Select the **Wi-Fi Setup** option.

A list of available wireless networks will be displayed. Select the one you would like to connect to and enter the username (if applicable) and password. If your Wi-Fi network is not displayed, select **Connect to another network** to enter its information.

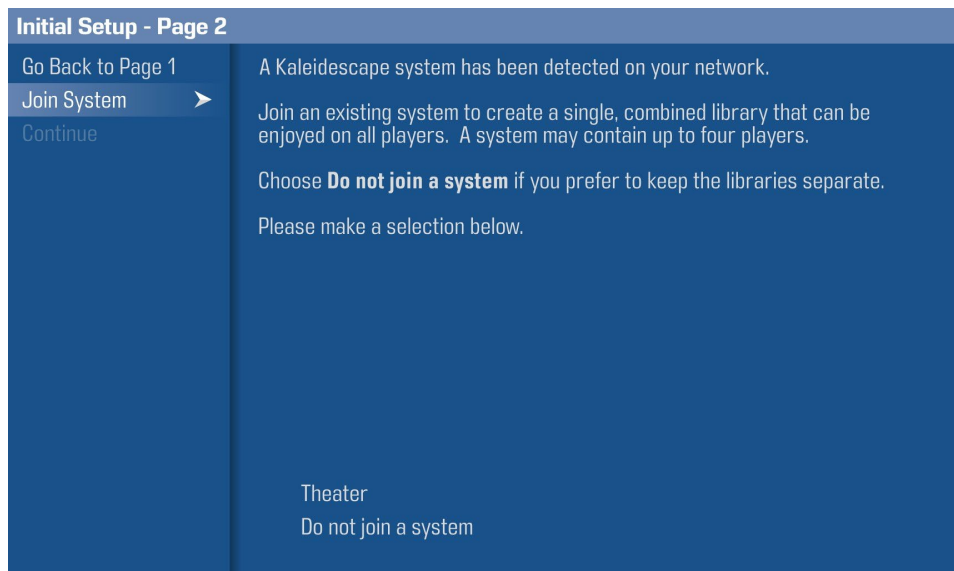


After a valid network connection is established, a checkmark will appear next to the name of the connected Wi-Fi network. Select **Continue** to proceed to the next step.



Adding Strato to an existing system

If you are adding your Strato player to an existing system (e.g. another Strato player or a Terra movie server), then once you've configured the network connection and chosen **Continue**, you should see the Join System page:



If you don't see this page, ensure that your Strato is on the same local area network as the existing system, and that the existing system is powered on. Then, choose **Go Back to Page 1** to return to the network setup screens, then Continue again.

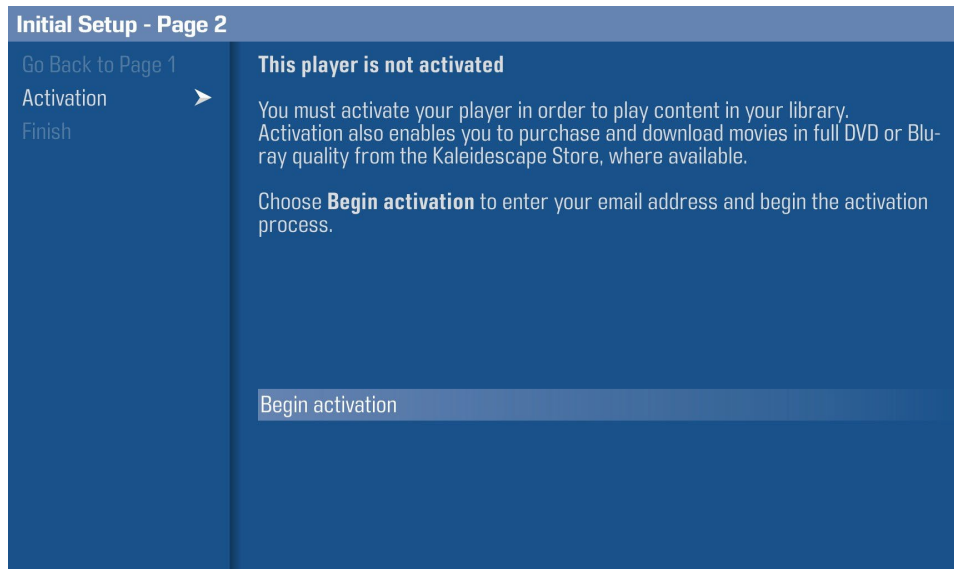
Highlight the system you want the Strato to join and press OK on the remote. Once you have selected the system to join, setup is complete. You can select **Finish** to begin using your Strato.

Activating your Strato

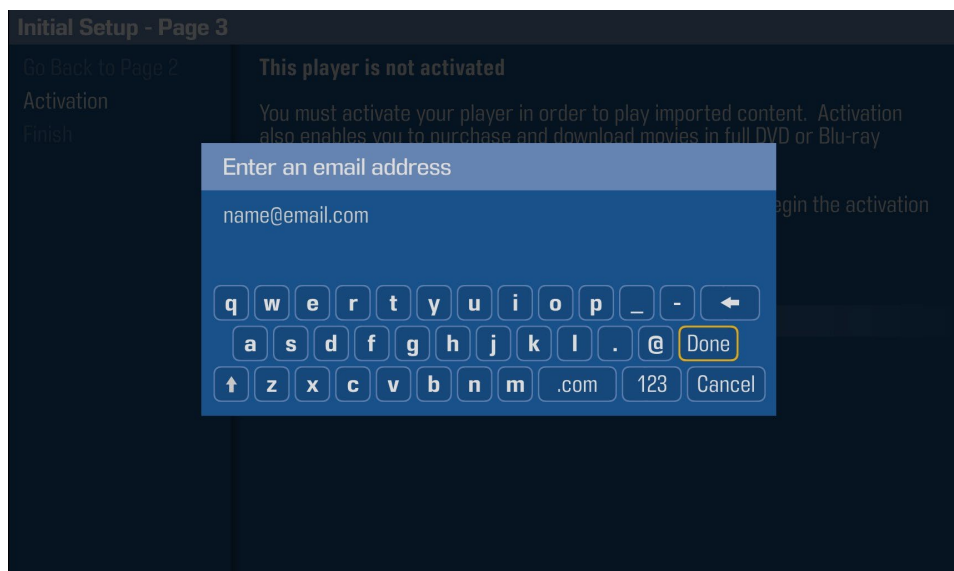
If you added your Strato to an existing system above, you should not see this screen. You can skip this section of the document.

If you are not adding your Strato to an existing system, then you need to activate it to use all its features. To activate your Strato, select **Begin Activation** from the **Activation** page on the onscreen menu.

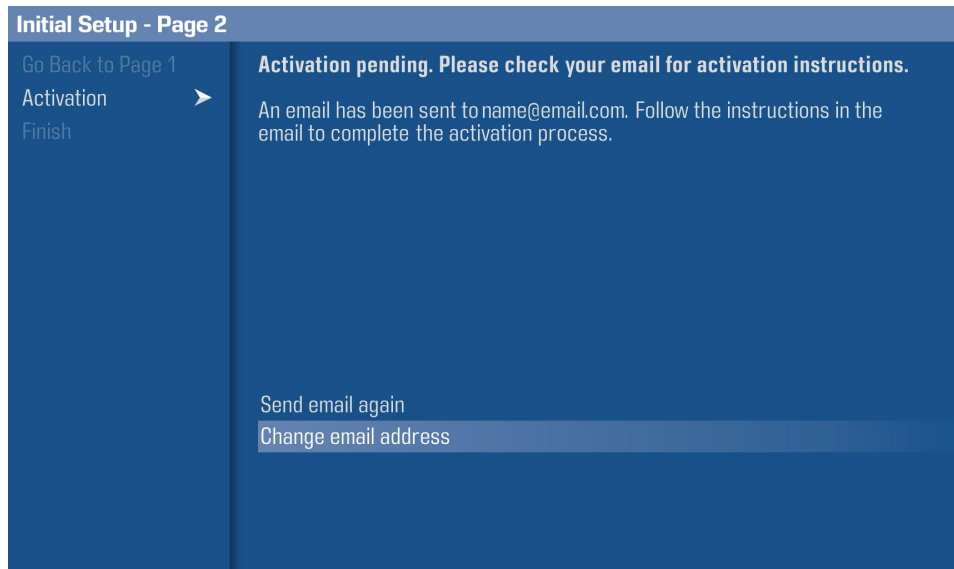
*Note: For testing and calibration purposes, installers can skip the activation step by selecting **Finish** despite this option appearing unavailable. The system will need to be activated later on so that the customer can use it.*



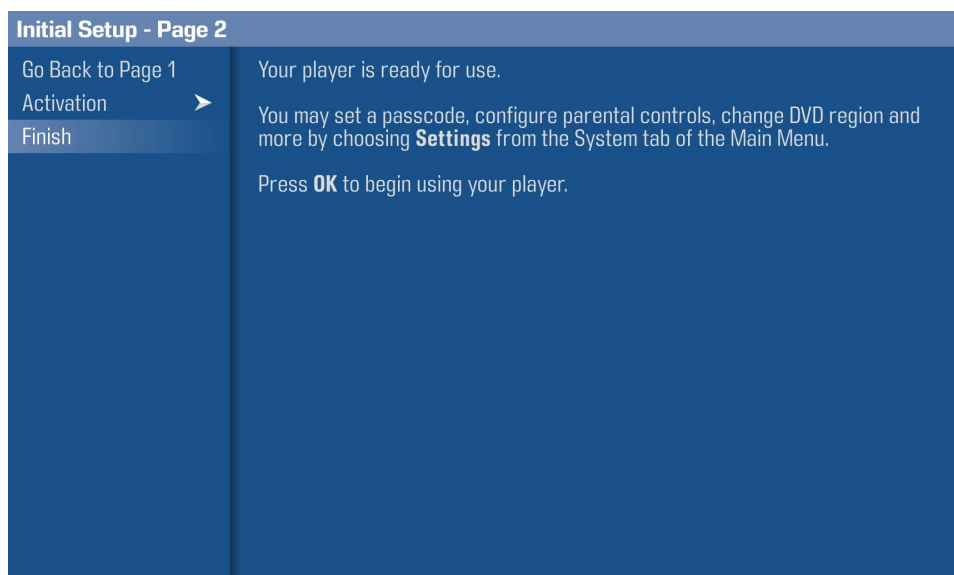
Enter the email address of the system owner using the onscreen keyboard and then select **Done** on the keyboard. Check your email for registration instructions.



If the email is not received within several minutes, check the spam or junk folder. If the email still cannot be located, select **Send email again** to resend the email, or **Change email address** to send the email to a different email address. You must complete the online activation steps to enable full functionality of Strato, including the ability to download movies.



Once the email address has been submitted, the **Finish** option in the onscreen menu will be available. Select **Finish** to exit the initial setup menu and start using your Strato.



Configuring Settings

Most of Strato's settings are configured in the onscreen *Settings* menu. However, video and audio settings, settings related to IR and IP control, and component linking are all accessed via the system's Browser Interface.

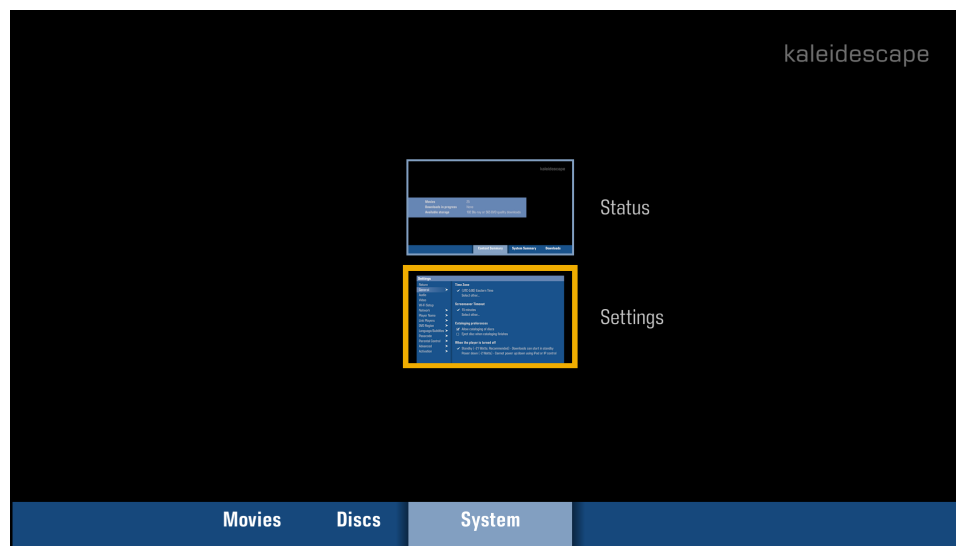
Onscreen Settings Menu

Kaleidescape mobile app: If you haven't already, download and install the free Kaleidescape mobile app from the Apple App Store or Google Play Store.

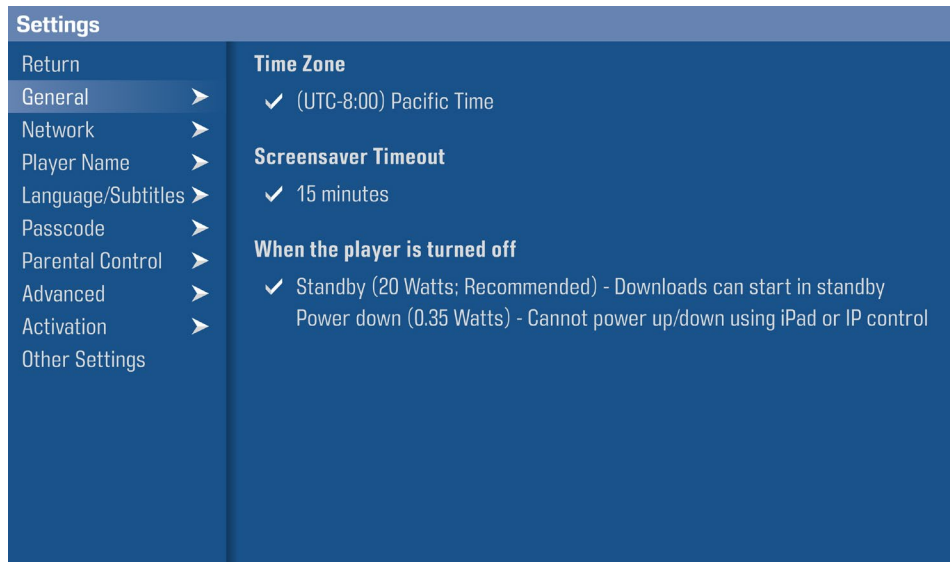
Ensure the device is on the same network as the Kaleidescape Strato player. Start the app and press the **REMOTE** button on the bottom of the screen. Ensure you are connected to the new Strato player by pressing the "Select Zone" drop down (v) at the top center and select the correct player from the list, or press "Connect to another system..." and enter the IP address of the correct Strato player. Press **MENU** at the bottom of the app screen.

Programmed remote, or Kaleidescape remote: Press the **MENU** button.

Scroll to the **System** tab and select **Settings**.



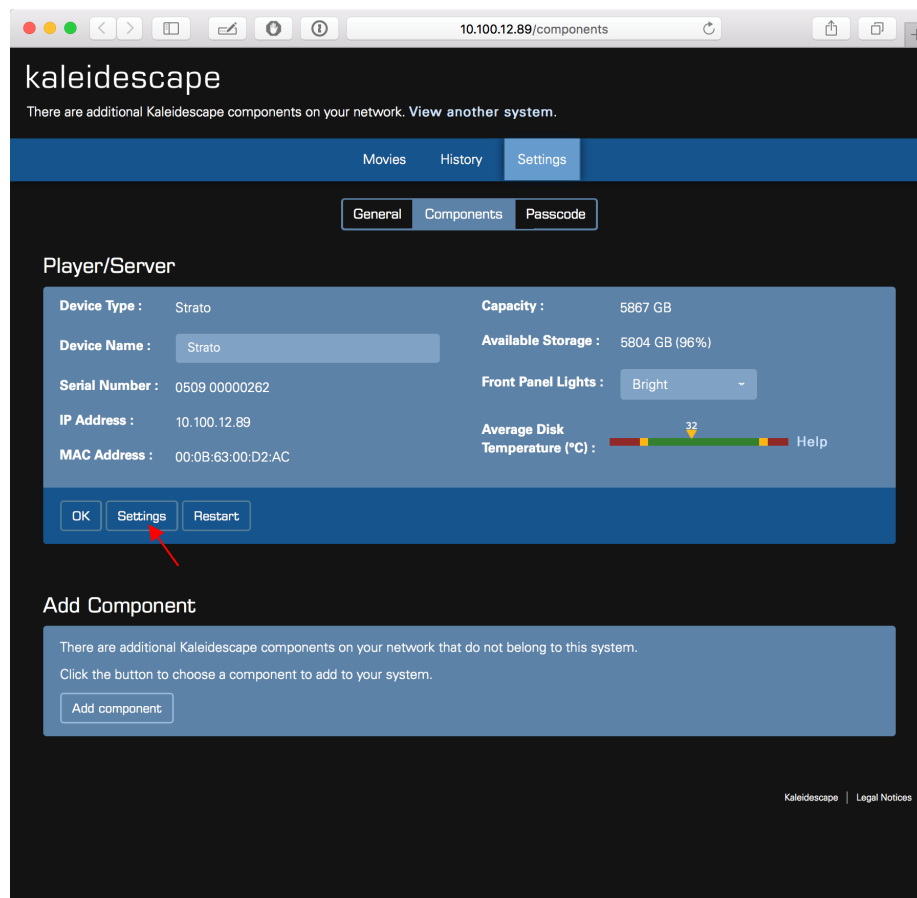
The *Settings* menu is navigated in the same way as the initial setup menus.



Browser Interface Settings Page

To access this page, use a web browser on your computer or mobile device. You can easily find the correct URL by going to the onscreen *Settings* menu and choosing the **Other Settings** option. This option displays the URL to access the settings in the Browser Interface.

To change settings of your player, click the “Settings” button.



You can also use the **Add component** button if you need to add additional components to your system, such as a Terra movie server or a Strato C player.

Getting the Most out of Strato

Strato is a high-performance source device, capable of playing 4K Ultra HD content encoded at data rates of 100 megabits per second (Mbps) or higher. It supports 10-bit color, and high dynamic range (HDR) content. Taking full advantage of Strato's capabilities requires careful attention to HDMI connections, cabling, and configuration.

This section discusses background information on HDMI and HDCP, and best practices that will help you to maximize Strato's performance within the larger A/V system.

In particular, we discuss cases where using the second HDMI port will allow you to achieve maximum video and audio quality, even when audio equipment does not support HDMI 2.0 and/or HDCP 2.2.

We also include some information on ensuring your installation is set up properly for HDR. We conclude with a brief tutorial covering the use of Strato's new HDMI Capabilities tool in the Browser Interface.

About 4K HDR, 4K Ultra HD, HDMI 2.0a, and HDCP 2.2

Achieving Strato's highest video output quality requires a 4K HDR display capable of receiving and displaying an 18 Gbps HDMI 2.0a signal with HDCP 2.2.

As well, if Strato is connected to the display via intermediate devices (such as an audio processor, an A/V matrix switch, an active HDMI cable, or an HDMI extender), *every* device in that chain must support the required HDMI and HDCP versions in order to display 4K HDR and 4K Ultra HD at full fidelity.

The earliest 4K displays may not be able to display 4K Ultra HD content from Strato at all, and other displays may be able to display 4K Ultra HD content, but unable to handle all of the latest features, like HDR. This section describes the features present in different 4K displays, and how Strato will interoperate with those displays.

First and foremost, HDCP 2.2 copy protection is required to play 4K HDR, and 4K Ultra HD content with Strato. Some early 4K display devices do not support HDCP 2.2 and will not be able to display 4K Ultra HD content when used with Strato. Consult with the display's manufacturer to see if an upgrade is available.

If a display does not support HDCP 2.2 copy protection, but does support HDCP 1.x, Strato will down-scale the 4K Ultra HD content and output it at up to 1080p resolution. 4K HDR content cannot be downscaled.

Strato also requires HDMI 2.0 to properly display 4K Ultra HD content (2.0a for HDR content). One might expect that a display that supports HDCP 2.2 is also an HDMI 2.0 display, and vice versa. Unfortunately, the situation is more complicated.

Some early HDMI 2.0 displays do not support HDCP 2.2. Also, some HDMI 2.0 displays only support data transfer at 10.2 gigabits per second (Gbps), rather than the maximum 18 Gbps included in the HDMI 2.0 spec. The lower speed places some limits on how Strato displays 4K HDR and 4K Ultra HD content.

Note that some equipment describes HDMI bandwidth in terms of frequency rather than data rate. A 10.2 Gbps connection or cable may also be called 340 MHz, and an 18 Gbps connection may also be called 600 MHz.

The chart below summarizes how HDMI and HDCP capabilities affect Strato playback.

Table: Strato output according to display capabilities

	HDCP 1.x	HDCP 2.2
HDMI 1.3 and below	1080p 24/30/60	N/A
HDMI 1.4	1080p 24/30/60	2160p 24/30 <i>Not recommended. OSD performance will be degraded and some content will display poorly.</i>
HDMI 2.0 @ 10.2 Gbps	1080p 24/30/60	2160p 24/30 10-bit color 2160p 60 8-bit color
HDMI 2.0 @ 18 Gbps	1080p 24/30/60	2160p 24/30/60 10-bit color <i>Kaleidescape OSD can be rendered with 4:4:4 chroma</i>
HDMI 2.0a @ 10.2 Gbps	1080p 24/30/60	2160p 24/30 10-bit color HDR possible with HDR display 2160p 60 8-bit color
HDMI 2.0a @ 18 Gbps	1080p 24/30/60	2160p 24/30/60 10-bit color HDR possible with HDR display <i>Kaleidescape OSD can be rendered with 4:4:4 chroma</i>

Note: in countries using PAL format, content is displayed at 25 or 50 frames per second rather than 30 & 60.

About Bit Depth

Digital images represent each pixel in an image as a series of bits (ones and zeroes). The number of bits used for each pixel is referred to as the "bit depth," and is often expressed in terms of the number of bits used for each signal component. For example, an "8-bit" RGB image uses eight bits of data for red, eight bits for green, and eight for blue, for a total of 24 bits per pixel.

DVD and Blu-ray discs are examples of formats that use 8-bit color.

When more bits are used for each pixel, the digital information can represent more subtle differences between the colors. Kaleidescape's 4K HDR and 4K Ultra HD downloads use 10-bit color (30 bits total), which produces images with fewer artifacts, like stair-stepped bands of color visible in images of a blue sky.

About HDR

High dynamic range (HDR) content incorporates both a wider color gamut – meaning that it can display more vivid and lifelike colors – and the ability to display very bright and very dark images simultaneously. This combination produces remarkably realistic images.

Strato fully supports 10-bit 4K HDR content, at up to 60 frames per second, provided that Strato is connected to a display that supports 4K HDR. As of 2017, new 4K displays typically all support HDR. HDR support is less common in older displays.

See the **Supported 4K Ultra HD Modes** section on page 29 to learn how Strato can help you discover the capabilities of the connected display.

About Chroma Sampling

In addition to bit depth, another factor in how images are displayed is how the color information is represented. This is usually expressed in terms of three numbers separated by colons, like 4:4:4 or 4:2:0.

The details of this notation are beyond the scope of this document, but in summary, 4:4:4 has discrete *luma* (brightness) and *chroma* (color) information for every pixel in an image. 4:2:0 has discrete luma for every pixel, but the chroma is averaged across 2x2 clusters of pixels.

4:2:0 significantly reduces the amount of data required for each frame, so a 4:2:0 signal requires less bandwidth than a 4:4:4 signal. In a moving image, the difference in chroma resolution is not perceptible to most viewers.

4K Ultra HD movie content is encoded as 4:2:0 (as are Blu-ray and DVD discs and Blu-ray quality and DVD quality downloads), so a 4:2:0 connection does not compromise video playback quality.

The Kaleidescape onscreen display can be rendered with 4:4:4 color sampling on displays that support it, if the HDMI connection supports 18 Gbps. This will produce the most detail when looking at images in the onscreen display, such as the Movie Covers view.

HDMI Cables

Carrying an 18 Gbps HDMI signal reliably requires a high-quality cable. Kaleidescape recommends cables that meet the following specifications:

- ▶ HDMI High-Speed cable tested to at least 18 Gbps
- ▶ Double Shielded
- ▶ AWG number for the conductors of 26, 24, 22, or lower

A number of passive cables in lengths up to 15 feet have worked well in our testing. This includes cables that carry [Premium HDMI Cable Certification](#), and cables that have been given [4K-18G-DC certification](#) by DPL Labs.

For cables longer than 15 feet, it may be necessary to use an active cable (including fiber optic cables) or an extender system. However, in our testing, many active cables and extenders have been unable to reliably support 18 Gbps signals in all situations, despite how they are labeled.

Check the Kaleidescape support site support.kaleidescape.com for the latest HDMI cable information.

HDMI Best Practices

To achieve the best possible audio and video performance in a given installation, you may need to use both of Strato's HDMI outputs or adjust some of Strato's settings. The approach you take will depend upon the capabilities of the display and any intermediate devices like switches or audio processors.

Best Quality, Single Connection

To achieve maximum image quality, Strato must be connected to a display that supports HDMI 2.0a at 18 Gbps with HDCP 2.2. If the signal is routed through an audio receiver, it must also support both HDMI 2.0a at 18 Gbps and HDCP 2.2. Such an installation allows for maximum video quality at all 4K Ultra HD frame rates, and fully supports 4K HDR at up to 60 frames per second.

Best Quality, Dual Connection

A common situation is one in which the display supports HDMI 2.0 or 2.0a at 18 Gbps with HDCP 2.2, but the audio receiver either does not support HDMI 2.0 and HDCP 2.2 or supports HDMI 2.0 at only 10.2 Gbps. You can still achieve maximum video quality in such a system by using the second (audio-only) HDMI port on Strato.

When the display supports HDMI 2.0 and HDCP 2.2, but the audio equipment does not, connect the display directly to Strato's primary (VIDEO) HDMI port, and connect the receiver or audio processor to the secondary (DIGITAL AUDIO) HDMI port. This dual connection allows the full video capability of Strato to be delivered to the display, while still providing full fidelity audio to the receiver.

Very Good Quality, Single and Dual Connections

If the display supports HDMI 2.0 and HDCP 2.2, but at 10.2 Gbps, Strato can still output 4K Ultra HD, including 4K Ultra HD at 60 frames per second. However, at 60fps, video will be limited to 8-bit color, which can produce color banding with some content.

With such a display, configuring Strato to “Allow Display Mode Changes” in the Video tab of the browser interface’s Settings dialog will allow Strato to switch to 24 frames per second for film content. At 24 fps, Strato can output 10-bit color and HDR content even over a 10.2 Gbps link for displays that support it, so the image for film content is identical to what you would see on an 18 Gbps connection.

As with the 18 Gbps connection options described above, you can connect the audio equipment to the second HDMI port if the audio equipment has HDMI or HDCP limitations that the display does not.

Even if the display only supports a maximum of 10.2 Gbps, consider choosing cables that are tested to work at 18 Gbps or higher, especially when cables are run in-wall or in other difficult to replace installations. This will help to ensure a smoother upgrade path to a new display in the future.

1080p

Strato provides a great experience with a 1080p display. 4K Ultra HD content is downscaled for display at 1080p, and the Kaleidescape onscreen display runs at a full 60 fps. Using Strato with a 1080p display is a good choice in an installation that has a mix of 4K and 1080p displays, especially if the 1080p displays may be upgraded over time. If you can use 18 Gbps-capable cables, a later upgrade should also go more smoothly.

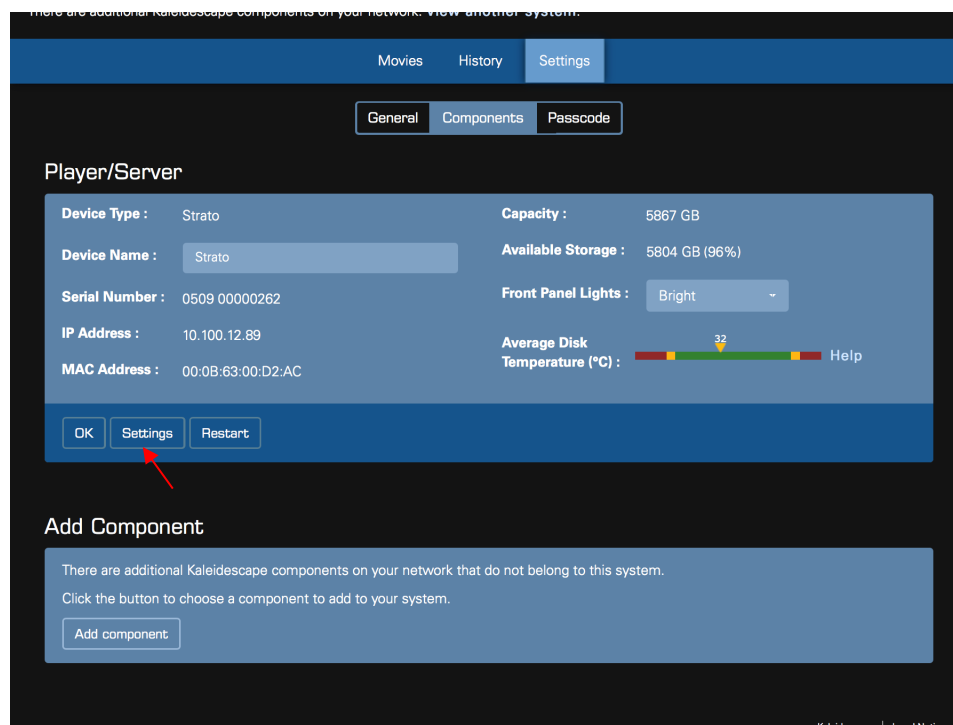
Note that while 4K Ultra HD content can be downscaled, 4K HDR content cannot. This is because 1080p displays don’t support HDR, and Strato cannot convert HDR content for playback on non-HDR displays.

Verifying HDMI Video Performance

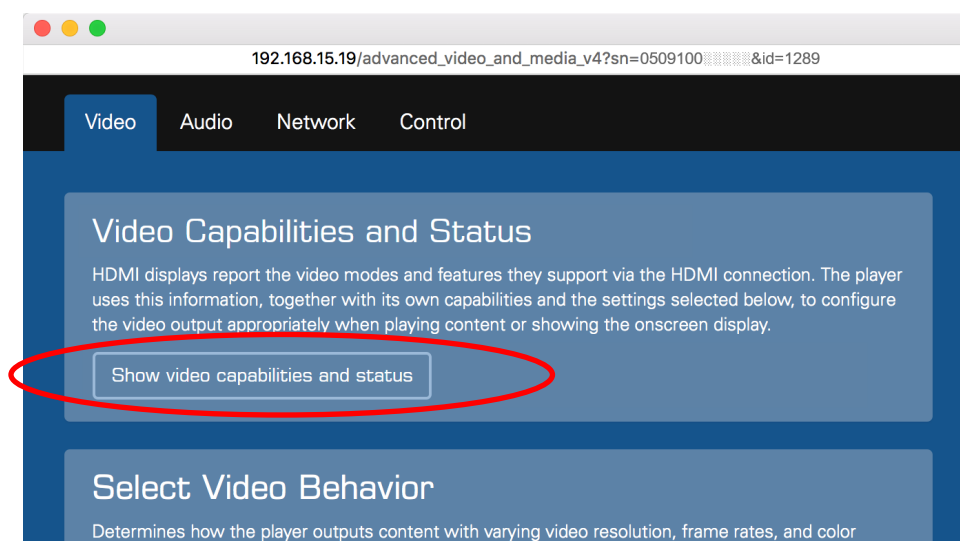
Once your Strato has been connected and configured, you should verify that you are seeing the expected video resolution and frame rate.

Strato includes a new tool to help you ensure that things are working as expected. Go to the system's Browser Interface, and click on the Settings tab. You should see the Components page.

In the section for your Strato, click the Settings button:



In the window that opens, click the "Show video capabilities and status" button:

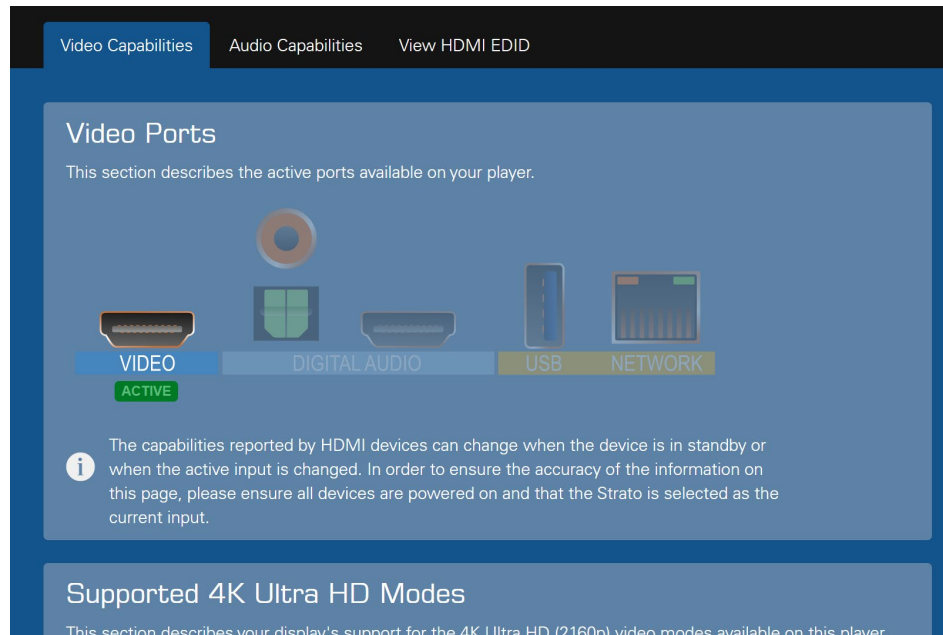


You will see a new “Video Capabilities” view, divided into four sections:

- ▶ Video Ports
- ▶ Supported 4K Ultra HD Modes
- ▶ Supported HDMI Features
- ▶ HDMI Video Output Status

These sections are described below.

Video Ports








The Video Ports section at the top of this page shows a visual representation of the rear ports of the player. It will show when a video port is active or in standby. The state of the port is important as the reported capabilities of the port may be dependent on its current state. This is useful for knowing the state of the port when the video output may not be in direct line of sight, the display is set to the wrong input, or the display has gone into standby.

Supported 4K Ultra HD Modes

Supported 4K Ultra HD Modes

This section describes your display's support for the 4K Ultra HD (2160p) video modes available on this player, as reported by the display. The player uses this information to determine which video mode(s) to use for video content and the onscreen display.

NTSC	 	Your display supports NTSC content at 60Hz with 4:2:0 chroma subsampling. 30Hz is required for deep color. Some HDMI 2.0 displays support full 4:4:4 color at 60Hz, but require you to change a setting on the display to enable it. Please refer to your display's manual for information.
PAL	 	Your display supports PAL content at 50Hz with 4:2:0 chroma subsampling. 25Hz is required for deep color. Some HDMI 2.0 displays support full 4:4:4 color at 50Hz, but require you to change a setting on the display to enable it. Please refer to your display's manual for information.
Film		Your display supports film content at 24Hz. Deep color is supported. If you selected "Allow Display Mode Changes" in your video configuration, the player will switch to 24Hz for film content.

Supported HDMI Features

This section lists the HDMI features of this player that are supported by your display, as

This section summarizes the 4K Ultra HD capabilities of the device(s) connected to the primary HDMI port, as detected by Strato. If Strato is connected directly to the display, then this shows the capabilities that the display is reporting. If Strato is connected to the display via an audio processor, an HDMI switch or matrix, or other intermediate equipment, then this section shows the capabilities of the combined display chain, including any limitations imposed by the intermediate devices.

This section is divided into NTSC, PAL and Film sections. The icons provide a quick summary of the display's capabilities for each of these formats. The paragraphs in the right column give more detail.

Note that when you see "30 bit" or "24 bit", this refers to the number of total bits of color information. These same modes are often called "10 bit" and "8 bit", which refers to the number of bits for each color component. Since the signal has three color components, 10 bits per component equals 30 bits, etc.

Supported HDMI Features

4:4:4 30bit

Mode Changes* in your video configuration, the player will switch to 24Hz for film content.

Supported HDMI Features

This section lists the HDMI features of this player that are supported by your display, as reported by the display.

HDCP	1.x 2.2	The player has established an HDCP 2.2 link with your HDMI device(s). You can play protected content in full 4K Ultra HD resolution.
HD/UHD Resolutions	720p 1080i 1080p 2160p	Your display is 4K Ultra HD capable.
TV Standards	NTSC PAL Film	Your display supports the playback of NTSC (North American) content, as well film content in its native 24Hz format.
Deep Color	Yes	Your display supports deep color.
HDR	Yes	Your display supports high dynamic range content.
Audio	Yes	Your display can accept audio over the HDMI link.















HDMI Video Output Status

This section details the copy protection, resolution, TV standard and color capabilities of the display, and indicates whether audio is accepted by the display. Note that it is normal for HDCP 1.x to be rendered with a line through it when HDCP 2.2 is supported, because of how Strato detects HDCP. When HDCP 2.2 is active, Strato cannot detect whether the display also supports HDCP 1.x.


HDMI Video Output Status


HDMI Video Output Status


This section lists the status of your player's HDMI Video output port. If any content is being played, the parameters of the content are also displayed.


	Media	Output
Protection	—	 HDCP 2.2 
Resolution	—	 2160p 
Display Rate	—	 59.94 Hz 
Chroma	—	 YUV 4:2:0 
Deep Color	—	 24-bit (No) 
Colorspace	—	 Not applicable 
Dynamic Range	—	 SDR 

The colors used in the table above denote the effect of the change in the output parameters on the quality of the video. The meaning of each color is given in the legend below.

Passthrough  The parameter is being sent through without adjustment

Increase  The parameter is being sent through with minimal effect on quality


Reduction  The parameter is being sent through, but some quality may be lost

Problem  There is a problem with the output that must be addressed

Dismiss

Refresh

This section shows the output status of the HDMI port, as of when the window was opened or refreshed. It works when displaying the onscreen display, and while playing content, so you can use it to confirm that 4K Ultra HD content is being displayed at full resolution, that 1080p content is being up-scaled, and that the expected frame rates and color information are being output.

The colored indicators show whether content is being passed through in its native format, if it is being up- or down-scaled, or if there is a problem. Hover over the  symbol (or tap it if using a tablet) to get more details on the output status.

Click the Refresh button at the bottom of the window to easily update the status information, for example when trying different types of content.

The example above shows Strato connected to a 4K projector, displaying the onscreen display. This particular projector does not support 18 Gbps HDMI 2.0, so the onscreen display is being rendered at 60 frames per second with YUV 4:2:0 color sampling and 8-bit color.

Here is another example:

HDMI Video Output Status

This section lists the status of your player's HDMI Video output port. If any content is being played, the parameters of the content are also displayed.

	Media	Output
Protection	HDCP 2.2 required	<div></div> HDCP 2.2 ?
Resolution	2160p	<div></div> 2160p ?
Display Rate	23.976 fps	<div></div> 59.94 Hz ?
Chroma	YUV 4:2:0	<div></div> YUV 4:2:0 ?
Deep Color	30-bit (Yes)	<div></div> 24-bit (No) ?
Colorspace	Rec. 709	<div></div> Rec. 709
Dynamic Range	SDR	<div></div> SDR ?

The colors used in the table above denote the effect of the change in the output parameters on the quality of the video. The meaning of each color is given in the legend below.

Passthrough

 The parameter is being sent through without adjustment

Increase

 The parameter is being sent through with minimal effect on quality

Reduction

 The parameter is being sent through, but some quality may be lost

Problem

 There is a problem with the output that must be addressed

Dismiss

Refresh

The example above shows Strato playing 4K Ultra HD film content on the same projector. Strato has been set to minimize display mode changes, so it is converting the 24 fps film content to 60 fps. At 60 fps, this projector is not able to accept deep color, so Strato is sending standard 24-bit (8 bits per component) color to the display. Note the yellow indicator indicating a reduction.

With this projector, the installer should consider configuring Strato to allow display mode changes when starting movie playback. This would allow Strato to switch to 24 frames per second on film content, which would in turn allow Deep Color information to be passed to the display.

One final example:

HDMI Video Output Status

This section lists the status of your player's HDMI Video output port. If any content is being played, the parameters of the content are also displayed.

	Media	Output
Protection	HDCP 2.2 required	<div></div> HDCP 2.2 ?
Resolution	2160p	<div></div> 2160p ?
Display Rate	59.94 Hz	<div></div> 59.94 Hz ?
Chroma	YUV 4:2:0	<div></div> YUV 4:2:0 ?
Deep Color	30-bit (Yes)	<div></div> 30-bit (Yes) ?
Colorspace	BT. 2020	<div></div> BT. 2020
Dynamic Range	HDR	<div></div> HDR ?

The colors used in the table above denote the effect of the change in the output parameters on the quality of the video. The meaning of each color is given in the legend below.

Passthrough

The parameter is being sent through without adjustment

Increase

The parameter is being sent through with minimal effect on quality

Reduction

The parameter is being sent through, but some quality may be lost

Problem

There is a problem with the output that must be addressed

Dismiss

Refresh

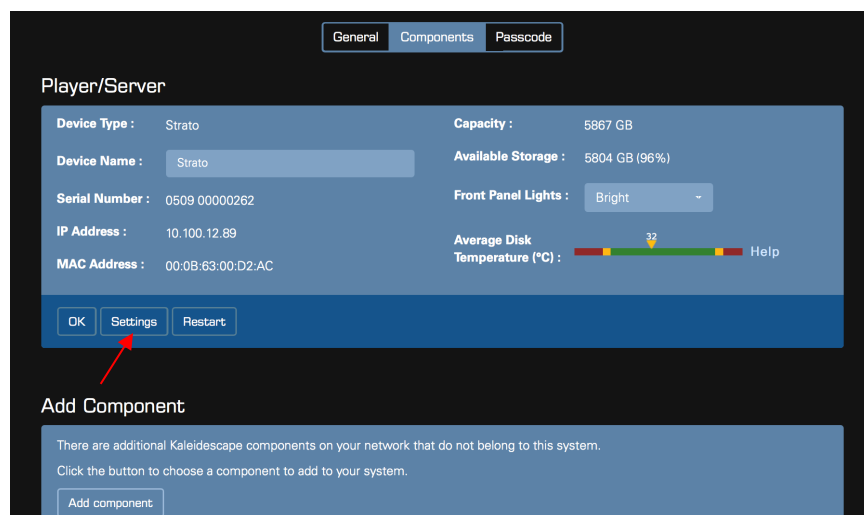
In the example above, Strato is taking full advantage of an 18 Gbps connection to play a 60 fps 4K HDR movie on a display that supports the maximum possible HDMI 2.0a connection. Note how HDR content shows differences in the Colorspace and Dynamic Range lines compared to the examples above.

About Lossless Audio

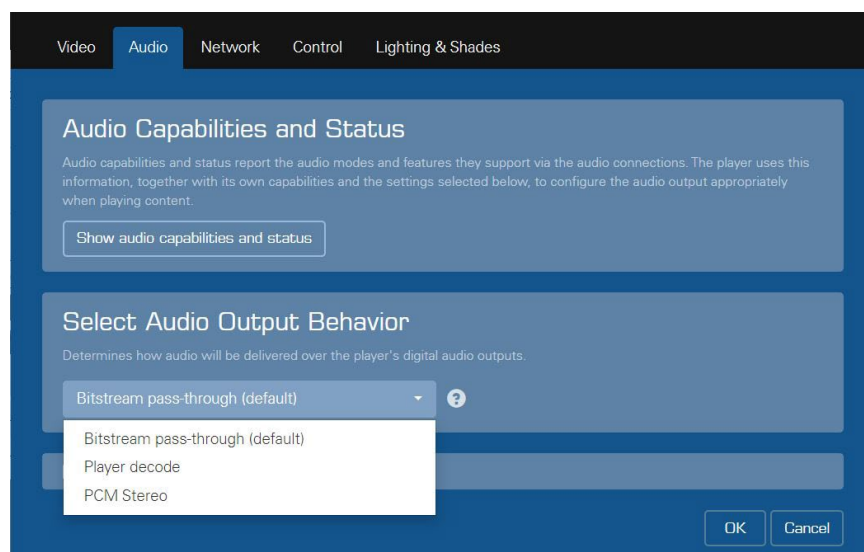
Strato supports advanced, lossless audio formats including Dolby TrueHD, DTS-HD MA, Dolby Atmos, and DTS:X. Strato sends these formats as a bitstream over HDMI to a compatible audio processor.

In order to enjoy lossless audio output from your Strato, you should check that the HDMI audio decode mode is set to its default setting of Bitstream pass-through. This audio output is set in the player's Browser Interface Settings page. Go to the system's Browser Interface, and click on the Settings tab. You should see the Components page.

In the section for your Strato, click the **Settings** button:



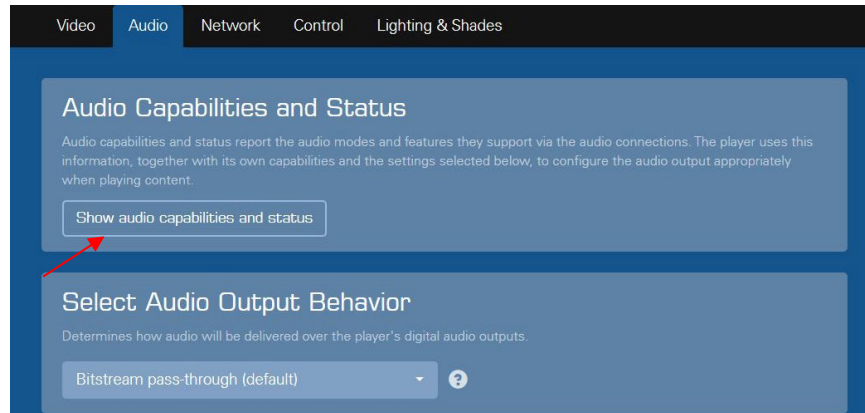
In the window that opens, click the **Audio** tab, then select **Bitstream pass-through**. Click OK to save the setting.



Bitstream audio can be output from one HDMI port at a time. Strato sends the bitstream audio to the DIGITAL AUDIO HDMI port if it detects a connection on that port. Otherwise, it sends the bitstream audio to the VIDEO HDMI port.

HDMI Audio Output Status

As with HDMI video, there is also a way to view the capabilities and status of Strato's audio connections. On the Settings – Audio page, click the **Show audio capabilities and status** button.

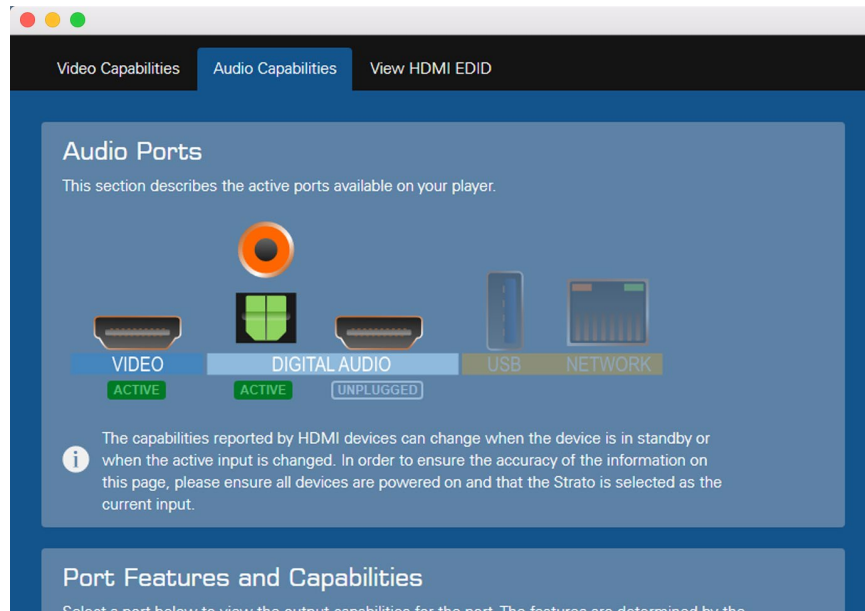


You will see a new “Audio Capabilities” view, divided into three sections:

- ▶ Audio Ports
- ▶ Port Features and Capabilities
- ▶ Audio Output Status

These sections are described below.

Audio Ports



The Audio Ports section at the top of this page shows a visual representation of the rear ports of the player. It will show when an audio port is active, in standby, or unplugged. In the cases of the coax and optical ports, they will always show as active regardless of whether connected to anything or not. The state of the port is important as the reported capabilities of the port may be dependent on its current state.

The example above shows that a video device is active on the video HDMI port, but no device is detected on the audio HDMI port. If a device is expected on the audio HDMI port, check the cables and that power is on the connected device.

Port Features and Capabilities

this page, please ensure all devices are powered on and that the Strato is selected as the current input.

Port Features and Capabilities

Select a port below to view the output capabilities for the port. The features are determined by the capabilities reported by the connected devices, when available, and by your player's current configuration. The player uses this information to determine which audio codec(s) to use for the playback of audio content.

HDMI

Optical/Coax

Audio HDMI

This port will output the following formats as listed below:

	Lossy	Lossless	Object Based
Dolby	(Unsupported)	(Unsupported)	(Unsupported)
DTS	(Unsupported)	(Unsupported)	(Unsupported)
PCM	Up to 192 kHz/24-bit, Stereo		
Status	HDCP Basic Audio HBR Bandwidth		

Audio Output Status

The Port Features and Capabilities section details the capabilities reported or inherent to the port. Select each port to see the codecs available for each port. The above example shows a connection directly to a commercial 4K TV with only PCM capabilities.

this page, please ensure all devices are powered on and that the Strato is selected as the current input.

Port Features and Capabilities







Select a port below to view the output capabilities for the port. The features are determined by the capabilities reported by the connected devices, when available, and by your player's current configuration. The player uses this information to determine which audio codec(s) to use for the playback of audio content.

HDMI

Optical/Coax

Audio HDMI

This port will output the following formats as listed below:

	Lossy	Lossless	Object Based
Dolby			
DTS			
PCM	Up to 192 kHz/24-bit, 7.1 ch		
Status	HDCP Basic Audio HBR Bandwidth		

Audio Output Status

The above example, however, shows a connection to an audio receiver via the HDMI connection. This receiver has many more reported capabilities.

Audio Output Status

Audio Output Status

This section lists the status of your player's output ports as well as the parameters of the source media being played.

	Media	HDMI	Optical/Coax	Audio HDMI ⓘ
Bandwidth	HBR	LBR ⓘ	LBR ⓘ	—
Codec	DTS-HD MA	PCM ⓘ	DTS ⓘ	—
Sampling Rate	48 kHz	48 kHz	48 kHz	—
Channels	Multichannel	Stereo ⓘ	Multichannel	—

The colors used in the table above denote the effect of the change in the output parameters on the quality of the audio. The meaning of each color is given in the legend below.

Passthrough

 The parameter is being sent through without adjustment

Equivalent

 The parameter is being sent through with minimal effect on quality

Reduction

 The parameter is being sent through, but some quality may be lost

Dismiss

Refresh

The Audio Output Status shows the original format of the playing media along with what is currently being output by each port. In the above example, the media is multichannel DTS-HD Master Audio but the player is directly connected to a display that is only capable of stereo PCM.

PCM Up to 48 kHz/16-bit, Stereo

Audio Output Status

This section lists the status of your player's output ports as well as the parameters of the source media being played.

	Media	HDMI	Optical/Coax	Audio HDMI ⓘ
Bandwidth	HBR	HBR	LBR ⓘ	—
Codec	Dolby TrueHD + Dolby Atmos	Dolby TrueHD + Dolby Atmos	Dolby Digital ⓘ	—
Sampling Rate	48 kHz	48 kHz	48 kHz	—
Channels	Multichannel	Multichannel	Multichannel	—

The colors used in the table above denote the effect of the change in the output parameters on the quality of the audio. The meaning of each color is given in the legend below.

Passthrough

 The parameter is being sent through without adjustment

Equivalent

 The parameter is being sent through with minimal effect on quality

Reduction

 The parameter is being sent through, but some quality may be lost

Dismiss

Refresh

In the above example, the media contains Dolby Atmos encoding and the receiver is fully capable of taking advantage of it on the HDMI channel.

Hovering over the ⓘ symbol (or tapping it if using a tablet) will display additional details regarding any element that is not performing at its optimum value.

Troubleshooting HDMI Connections

If Strato is connected to a display using high quality cables that satisfy the specification given earlier in this document, and if all components support HDMI 2.0 and HDCP 2.2, problems should be rare. However, if they do occur, here are some things you can try.

Check HDMI Port Capabilities

Some display devices and A/V components do not support 18Gbps HDMI 2.0 and HDCP 2.2 on every port. This includes certain Sony displays. Ensure that you are using an HDMI port that supports 18Gbps HDMI 2.0 and HDCP 2.2.

Check Device Settings

Some display devices modify their HDMI behavior based upon user settings. For example, some Samsung displays have an “HDMI UHD Color” setting that must be enabled before the display will accept an 18 Gbps signal, and some Sony displays have a similar “HDMI signal format” setting.

Check Device Software/Firmware

4K Ultra HD – especially at 18 Gbps data rates – is a new and demanding format. Some displays, audio processors, or other components may need software or firmware updates to handle it properly. Check with manufacturers to ensure that the software in all your components is up to date.

Use the Video Capabilities and Status Tool

Use the Video Capabilities and Status tool described in the previous section. Verify that the “Supported 4K Ultra HD Modes” and the “Supported HDMI Features” match the published specifications of your display device. If they do not, the display may be incorrectly reporting its capabilities, or an intermediate device (audio processor, active HDMI cable, etc.) may not match the capabilities of your display. Double-check the intermediate devices and consider temporarily connecting Strato directly to the display to help isolate the problem. You can also consider using the Advanced Video Settings (described below) to override some features.

Check HDCP Status

If the onscreen display works properly, but you get video dropouts or no picture at all when playing a movie, the problem may be related to HDCP copy protection. The onscreen display does not require HDCP, but movie playback does. The Video Capabilities and Status Tool should give you an indication of HDCP status during movie playback (click Refresh if necessary). Sometimes a marginal cable will pass a video signal but be unable to maintain the HDCP connection.

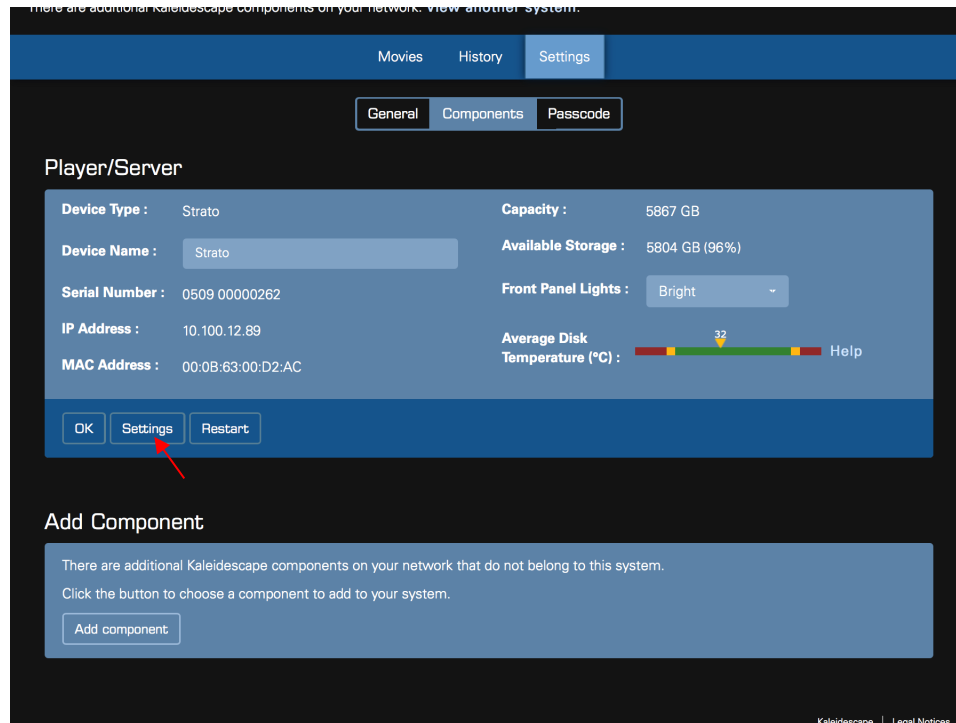
Try Alternate Cables

Problems with signal integrity, such as signal loss in a long cable, may also affect Strato's ability to detect display capabilities and achieve an HDCP connection with the display. Try connecting Strato to the display using a different cable or try temporarily relocating Strato and using a shorter cable that meets the requirements in this document to see if the problem goes away.

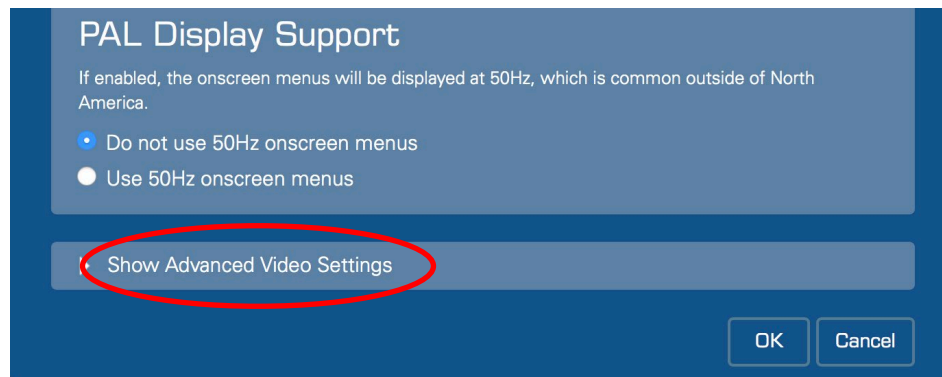
Reduce HDMI Speed

Intermittent problems are almost always related to signal integrity. The display and intermediate devices may all support 18 Gbps connections, but the cable may be unable to carry that speed reliably. You can try temporarily forcing Strato to use 13.5 Gbps or 10.2 Gbps instead. This can help to identify whether the problem is related to signal transmission.

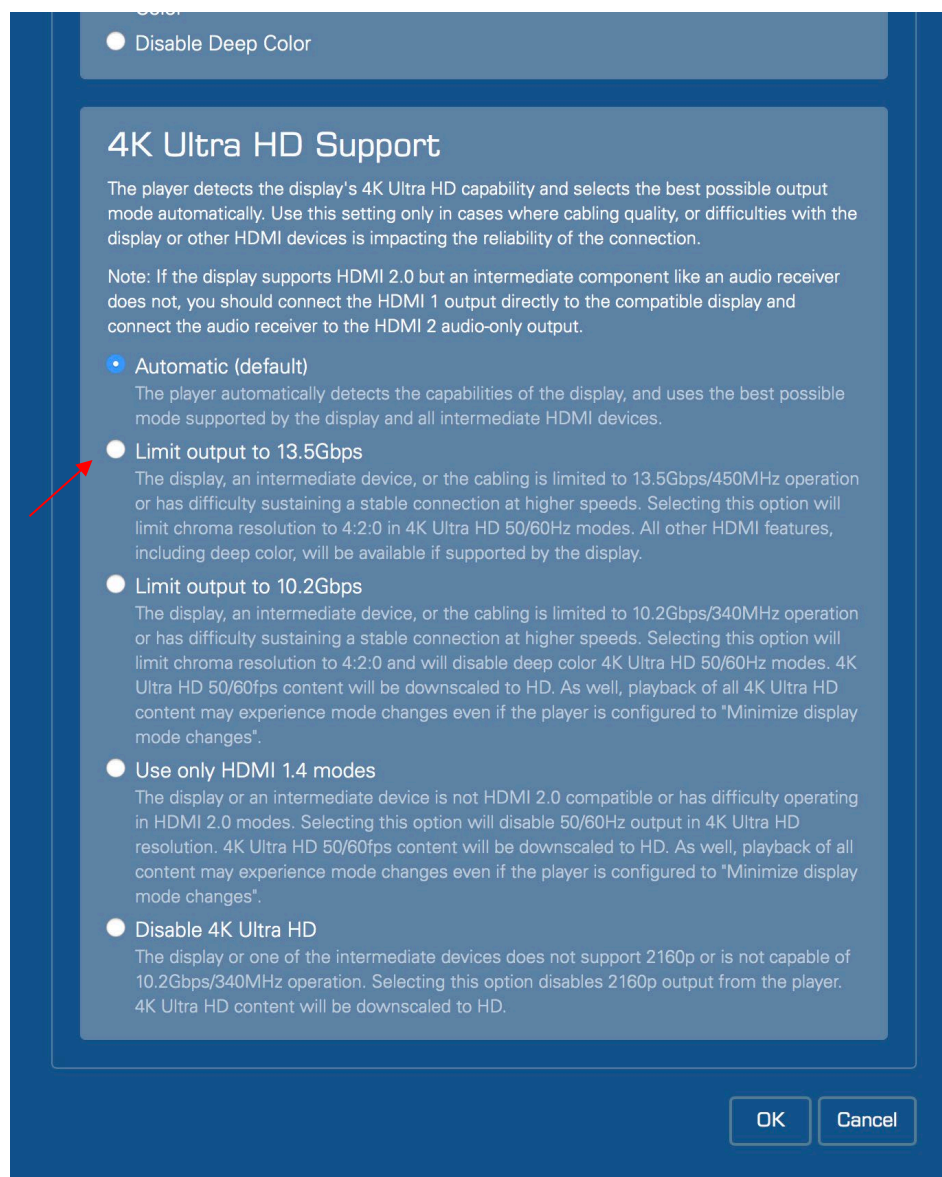
To force Strato to use a lower speed connection, go to the system's Browser Interface, and click on the Settings tab. You should see the Components page. In the section for your Strato, click the Settings button:



In the window that opens, scroll to the bottom and click "Show Advanced Video Settings":



Scroll down to the “4K Ultra HD Support” section and click the radio button next to HDMI 2.0 13.5 Gbps or HDMI 2.0 10.2Gbps, then click OK. Try 13.5 Gbps first, since this imposes fewer limitations on how content is displayed.



Once you’ve clicked OK to save the setting, stop your content if it was playing, and then try playing your content again.

The advanced settings can also be used to compensate for problems that arise when a display or intermediate device does not correctly report or pass EDID information.

Changes in the HDMI Display Chain During Playback

In certain installations (typically involving an HDMI matrix switch), it is possible for an HDMI device to join the display chain while movie playback is occurring. For example, a second zone may select the same video source.

If the first zone supports HDMI 2.0 and HDCP 2.2 but the newly added zone does not, the addition of the second zone will cause the HDCP 2.2 link to become invalid. Video in the first zone will go blank, and the second zone will also see no video signal. If playback is stopped and then resumed, Strato will have an opportunity to reconfigure the HDMI output and playback may be able to proceed (although at reduced resolution for 4K Ultra HD content).

Try to avoid situations in which different HDCP and HDMI versions may come and go to avoid disruptions to the viewing experience.

Control Systems

There are several Kaleidescape options available for controlling Strato.

- ▶ Kaleidescape Mobile App (free download for iOS, iPad OS, and Android)
- ▶ Kaleidescape Second Screen (free download for iPad OS)
- ▶ Kaleidescape Remote (included)
- ▶ Kaleidescape Child Remote (optional purchase)

Strato can also be controlled by several types of third-party control devices.

- ▶ Infrared (IR) remotes
- ▶ Home control systems (which may include touch panels, handheld remotes, mobile apps, etc.)

Kaleidescape provides control modules along with touch panel templates and sample programs for most leading control systems. Kaleidescape also provides databases and IR codes for popular IR remotes.

For specific product support including modules and reference manuals, go to support.kaleidescape.com/article/control-systems.

Communication

A control device can communicate with Strato with IR, or by using a simple text-based protocol over the network.

For more information on control connections, refer to the *Kaleidescape System Control Protocol Reference Manual* at support.kaleidescape.com/article/Control-Protocol-Reference-Manual and the IR Hex codes at support.kaleidescape.com/article/IR-Control-Hex-Codes.

Kaleidescape Control Devices

Kaleidescape Mobile App

The Kaleidescape Mobile App provides a rich experience for selecting and purchasing movies, and controlling the playback of feature films, concerts and TV shows.

Browse and search the greatest films in Kaleidescape's catalog anytime, anywhere and buy with ease.

The Kaleidescape Mobile App's touchpad remote allows a user to focus on the big screen rather than the phone. Beyond basic navigation, the application also supports a set of gestures to facilitate complex navigation. See the Mobile App Gesture Guide for more details.

The app can be used stand-alone or is even more powerful when integrated with third-party control systems. Learn more in the guide [Integrating with the Kaleidescape Mobile App](#)

The app is available for free download on iOS, iPad OS, and Android.


Kaleidescape Second Screen (for iPad OS only)

The Kaleidescape Second Screen app provides an immersive experience for browsing and searching your collection of movies. The app extends the Kaleidescape experience to the iPad, displaying your movie collection with vivid high-resolution cover art, synopses, and other details.

The app can be used stand-alone or is even more powerful when integrated with third-party control systems. Learn more in the guide [Integrating with Kaleidescape Second Screen](#).

Kaleidescape Remote

Strato comes with a backlit IR remote control. It features one-button access to features such as Intermission and Shuffle, while the Movies

button  toggles views between List, Covers and Collections. The

Music button  provides quick access to the Songs collection.

The Volume and Mute buttons can be programmed to control the volume on the TV or other audio device:

1. Press and hold the Info and Pause buttons at the same time. When the indicator light at the top of the remote begins blinking, release the buttons. The indicator light stays on. The Kaleidescape Remote is now in programming mode.
2. Place a remote that already controls the volume flat on a table with the Kaleidescape Remote about 6 inches (15 cm) away.



3. The following steps have to be repeated for the Mute button and both Volume buttons.
 - Check that the indicator light is still on. If it is off, repeat Step 1.
 - Press and release the button on the Kaleidescape Remote for the function you want to program.
 - Press and hold the button for the same function on the remote that already controls the volume for two seconds.
 - The indicator light on the Kaleidescape Remote blinks twice to indicate success. If the indicator light blinks four times, try again.

4. When finished, press the OK button on the Kaleidescape Remote. The indicator light blinks twice to confirm programming is complete.

Please see: [Using the Remote Control](#)

Kaleidescape Child Remote

When the Child Remote is used, the onscreen user interface automatically switches to the simplified child user interface, eliminating all text-based menus in favor of pure graphical navigation of movie covers.

In addition to the preprogrammed Kaleidescape Child Remote, the child user interface commands can be sent to any programmable controller. Refer to [IR Control Hex Codes for Kaleidescape Systems](#) or the [Kaleidescape System Control Protocol Reference Manual](#).

Third Party Control Devices

Kaleidescape provides a wide range of templates, modules, and sample programs for control systems from several manufacturers.

Some manufacturers also provide templates, modules and IR libraries to control Kaleidescape systems.

Control devices can be simple IR remotes or touch panels.

IR Remote Control

The simplest control device is a generic IR remote control for a DVD player.

IR Code Sets

The Kaleidescape movie player supports two major infrared remote control code sets.

- ▶ Code set used by Toshiba DVD players and other manufacturers including Philips, Magnavox, Zenith, Onkyo, and Marantz
- ▶ Code set used by Kenwood DVD players

Types of Remotes

IR remotes (other than the Kaleidescape Remote) fall into the following basic categories:

- ▶ Pre-programmed
- ▶ Learning
- ▶ PC Programmable

Pre-programmed Remotes

Pre-programmed remotes only require setting the remote to control a Toshiba or Kenwood DVD player. Custom buttons that jump directly to Kaleidescape menu selections are not available.

Learning Remotes

Learning remotes can be used two ways: as a general remote with a Toshiba or Kenwood code set or set to accept (learn) Kaleidescape-specific commands from a device that can generate these commands (for example, the Kaleidescape Remote).

PC Programmable Remotes

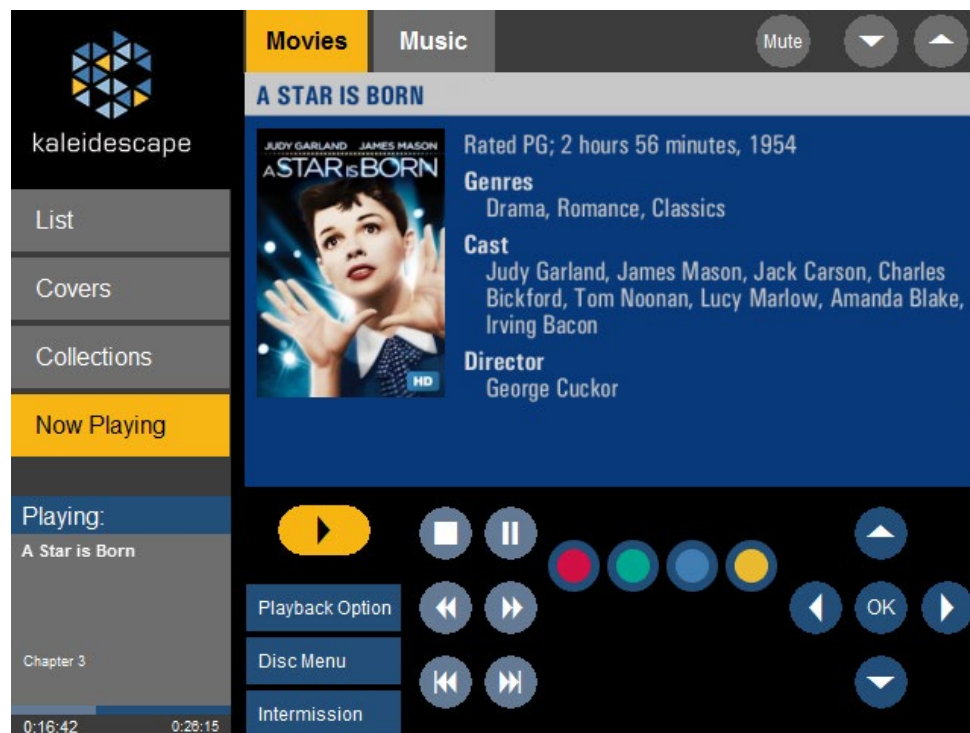
PC Programmable remotes can support commands specific to the Kaleidescape interface and provide a more complete experience. The manufacturer provides software that allows the remote to be programmed via a computer. This type of programming often allows IR codes to be imported in hex format (usually copying and pasting the codes into a text box), or from a Philips CCF file.

For a list of all IR codes (in hex) or CCF format available from Kaleidescape, or for the CCF file, refer to support.kaleidescape.com/article/IR-Control-Hex-Codes.

Templates are available for download for RTI and Elan remotes. Kaleidescape is also included in IR code database libraries for Logitech Harmony and Opus and may be included by other vendors.

Touch Panels

Kaleidescape supports touch panel controls with an Onscreen Display without Video (OSD No Video). This provides supplemental information with text-based details for content. The touch panel replicates the details pages for movies while browsing the onscreen display.



For more information, go to www.kaleidescape.com/support/control-systems.