Cisco StadiumVision SV-4K and DMP-2K Media Player Deployment Guide

Release 4.1

July 29, 2016

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Contents

About This Guide

This guide is for installers and administrators of Cisco StadiumVision venues who are responsible for both the physical installation and initial configuration of the SV-4K and DMP-2K media player with TV displays.

Revision History

Table 1 provides information about when this document was changed.

Table 1. Revision History Table

Date	Description
July 29, 2016	Revised SV-4K and DMP-2K dimensions with addition of bracket length in illustrations and in "Guidelines for Mounting the SV-4K and DMP-2K" on page 10.
June 15, 2016	Revised Appendix C for additional DHCP server information from updates in the *Cisco Connected Stadium Design Guide*.
May 16, 2016	Initial version for Cisco StadiumVision Director Release 4.1.0-419.

Getting Started with the SV-4K and DMP-2K Media Player

This module provides a workflow summary with information about the SV-4K hardware, software features, and key considerations before deploying the SV-4K and DMP-2K media player.

It is intended for anyone who is responsible for installing and configuring the SV-4K and DMP-2K media player, and for anyone interested in understanding its general operation.

It includes the following topics:

Workflow Summary to Get Started with the SV-4K and DMP-2K Media Player

> **NOTE:** Before you deploy the SV-4K and DMP-2K media player, be sure that you have already installed Cisco StadiumVision Director and that you are familiar with the Cisco StadiumVision Director software.

Table 2 provides a summary of the tasks and related information to get familiar with the SV-4K and DMP-2K media player.

Table 2. Getting Started Task Summary

Getting Started Task	For more information see:
Understand the DMP-2K hardware.	"Operating Environment for the SV-4K and DMP-2K Media Player" on the facing page. "Dimensions of the DMP-2K Media Player " on page 4. "Ports on the DMP-2K Media Player " on page 4. "Cabling Information for the SV-4K and DMP-2K Media Player" on page 9. "LEDs on the SV-4K and DMP-2K Media Player" on page 11. "IR Remote for Cisco StadiumVision Director" on page 15.
Understand the SV-4K hardware.	"Operating Environment for the SV-4K and DMP-2K Media Player" on the facing page "Dimensions of the SV-4K Media Player" on page 6. "Ports on the SV-4K Media Player" on page 1. "Cabling Information for the SV-4K and DMP-2K Media Player" on page 9 "LEDs on the SV-4K and DMP-2K Media Player" on page 11 "IR Remote for Cisco StadiumVision Director" on page 15 "Default Settings for the SV-4K and DMP-2K Media Player" on page 16
Understand the SV-4K and DMP-2K features.	"Unsupported SV-4K Hardware Features " on page 19 "Cisco StadiumVision Director Software Feature Map for the SV-4K and DMP-2K" on page 17
Understand the Differences Between the SV-4K, DMP-2K, and Cisco DMP 4310G.	"Key Considerations for the SV-4K and DMP-2K" on page 19.

Getting Started Task	For more information see:
Review deployment best practices.	"Best Practices for SV-4K and DMP-2K Deployment" on page 23
Perform pre-deployment site planning and configuration.	"Planning the SV-4K and DMP-2K Media Player Deployment" on page 25

Information About the SV-4K and DMP-2K Media Player Hardware

This section includes the following topics:

Operating Environment for the SV-4K and DMP-2K Media Player

Table 3 describes the supported environment for proper operation of the SV-4K and DMP-2K media player.

Table 3. Supported Operating Environment for the SV-4K and DMP-2K

Operating Environment	Supported Conditions
Temperature	0° C to 40° C
Humidity	Up to 90% maximum humidity, non-condensing

Dimensions of the DMP-2K Media Player

The DMP-2K media player is smaller than the SV-4K. Figure 1 shows the dimensions of the DMP-2K device.

Figure 1. DMP-2K Dimensions
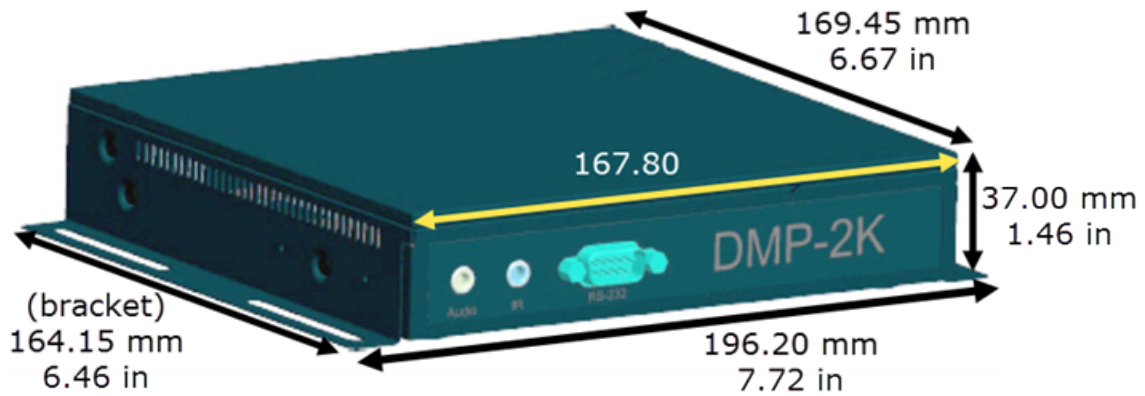
Ports on the DMP-2K Media Player

Figure 2. DMP-2K Front Panel
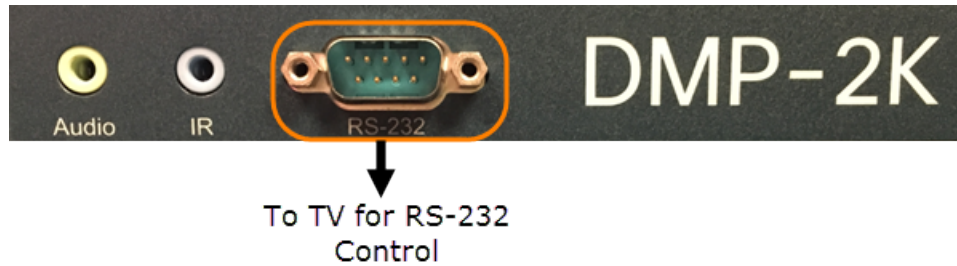
Table 4. DMP-2K Front Panel Port Descriptions

Port Name	Usage	Description
Audio[1]	Required only for connections that do not support audio, such as HDMI-to-DVI connections from device to the TV.	3.5 mm female audio connector for analog stereo signal.
IR	The DMP-2K does not have an internal infrared receiver. You must use the included IR extender cable to support an IR remote.	3.5 mm infrared in/out.
Serial	Connect to TV serial port for control of the TV via RS-232 commands.	RS-232 serial interface with male DE-9 connector. This connection is used for TV control.

Figure 3. DMP-2K Rear Panel

Table 5. DMP-2K Rear Panel Port Descriptions

Port Name	Usage	Description
12V 5A	Not for production use in Cisco StadiumVision Director. NOTE: The DMP-2K is qualified for Cisco StadiumVision Director using Power over Ethernet (PoE+) via the Ethernet port.	60-watt/12-volt/5-amp power supply.
SPDIF	Provides audio from the primary video routed by Cisco StadiumVision Director to the SPDIF port.	Sony/Phillips Digital Interface.
HDMI	Connect to HDMI In port on the TV.	High-Definition Multimedia Interface (HDMI) output connector to transmit digital audio/video content.

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[1]The analog audio out port is designed to drive line-level impedances in the higher Ohm range, such as for commercial grade speaker systems. Headphones are typically just a few Ohms and not recommended for use with this port.

Port Name	Usage	Description
	NOTE: Consumer Electronics Control (CEC) is not supported.	
USB 3.0	Not supported.	Single USB 3.0 port (backward-compatible).
Ethernet	Connect to switch network for PoE+.	RJ-45 10/100/1000 Base-T Ethernet port.

Dimensions of the SV-4K Media Player

The SV-4K media player is larger than the
Cisco DMP 4310G. Figure 4 shows the dimensions of the SV-4K device.

Figure 4. SV-4K Dimensions
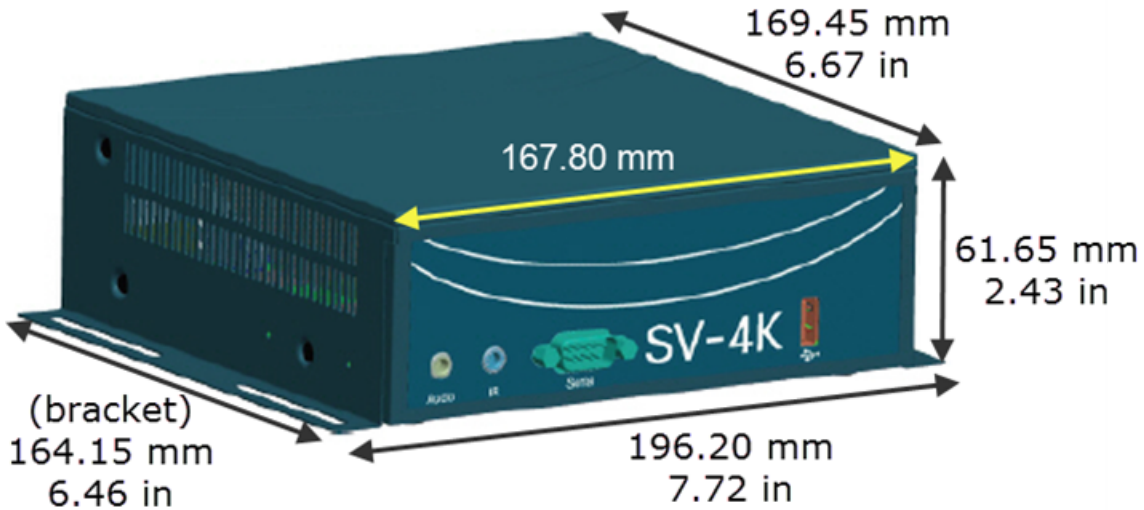
Ports on the SV-4K Media Player

Figure 5. SV-4K Front Panel

Table 6. SV-4K Front Panel Port Descriptions

Port Name	Usage	Description
Audio[1]	Required only for connections that do not support audio, such as HDMI-to-DVI connections from SV-4K to the TV.	3.5 mm female audio connector for analog stereo signal.
IR	The SV-4K does not have an internal infrared receiver. You must use the included IR extender cable to support an IR remote.	3.5 mm infrared in/out.
Serial	Connect to TV serial port for control of the TV via RS-232 commands.	RS-232 serial interface with male DE-9 connector. This connection is used for TV control.
USB	Not supported.	USB 2.0 port

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[1]The analog audio out port is designed to drive line-level impedances in the higher Ohm range, such as for commercial grade speaker systems. Headphones are typically just a few Ohms and not recommended for use with this port.

Figure 6. SV-4K Rear Panel

Table 7. SV-4K Rear Panel Port Descriptions

Port Name	Usage	Description
12V 5A	Not for production use in Cisco StadiumVision Director. 📌 **NOTE:** The SV-4K is qualified for Cisco StadiumVision Director using Power over Ethernet (PoE+) via the Ethernet port.	60-watt/12-volt/5-amp power supply.
SPDIF	Provides audio from the primary video routed by Cisco StadiumVision Director to the SPDIF port.	Sony/Phillips Digital Interface.
HDMI Out	Connect to HDMI In port on the TV. 📌 **NOTE:** Consumer Electronics Control (CEC) is not supported.	High-Definition Multimedia Interface (HDMI) output connector to transmit digital audio/video content.
HDMI In	Connect to HDCP-compliant laptop or other device.	HDMI input connector to receive digital audio/video content from an HDMI-enabled source.
USB 3.0 A B	Not supported.	Two USB 3.0 ports (backward-compatible).
Ethernet	Connect to switch network for PoE+.	RJ-45 10/100/1000 Base-T Ethernet port.

Cabling Information for the SV-4K and DMP-2K Media Player

Table 8 describes the cables that ship with the hardware.

Table 8. Cables Shipped with the Hardware

Cable	Length	Purpose
HDMI-to-HDMI	2 M	(Required) Connects the SV-4K HDMI Out (male) to the HDMI In (male) port on the TV for digital audio and video support. Compliant with HDMI version 1.4.
RS-232 DE-9 DCE/DTE Straight Through	2 M	(Required for TV control) Connects the SV-4K serial DTE (male) port to a serial DCE (female) port on the TV.
IR Extender	2 M	(Required for IR Remote) Connects to the IR port on the SV-4K front panel to serve as an infrared signal receiver for the SV-4K.

Other Cabling Considerations

It is important for you to assess the ports available on the TVs at the venue so that you can get any additional adapters or cable types that are needed to connect the SV-4K and DMP-2K to the TV.

Null Modem (Crossover) Cable

The SV-4K and DMP-2K is a DTE serial device. Therefore, if the TV also has a DTE (male) serial port, then you will need to use a null modem (crossover) cable for the TV control connection.

HDMI-to-DVI Adapter

If the TV does not support HDMI In, then you cannot use the standard HDMI-to-HDMI cable that ships with the SV-4K and DMP-2K. However, if the TV supports a DVI-D connection, then you can acquire a DVI adapter for the HDMI cable to make the HDMI-to-DVI connection.

Since this type of connection only supports video, you will also need to connect the SV-4K audio port to the audio input ports on the TV if audio support is required.

Other HDMI Cable Adapters

The HDMI cable that ships with the media player is compliant with HDMI version 1.4. If you are using any other cable adapters, be sure that they support HDMI version 1.4 if you plan to support 4K video content.

Audio Cables

Audio cables are not generally needed. However, there are a couple of cases where you might need to make an audio connection to the SV-4K:

- If you need to support an HDMI-to-DVI connection from the SV-4K to the TV since this supports video only.

- If you need to connect to external audio distribution equipment when audio is to be distributed within an area.

RS-232 Serial Pinout

Table 9 provides the pinout for the DE-9 serial connector on the front panel of the SV-4K and DMP-2K.

Table 9. SV-4K and DMP-2K Serial DE-9 Pinout

Pin	Description	Pin	Description
1	NC	2	Receive data into the device
3	Transmit data out of the device	4	Available 5V@500mA
5	Ground	6	NC
7	RTS	8	CTS
9	NC		

Guidelines for Mounting the SV-4K and DMP-2K

Consider the following guidelines before mounting the SV-4K and DMP-2K:

- Do not fit in Sunbrite cases that might be in use for some Cisco DMP 4310G outdoor deployments.

- Full dimensions (width / height / depth) with mounting brackets:

  - DMP-2K

196.20 mm / 37.00 mm / 169.45 mm

(7.72 in / 1.46. in / 6.67 in)

- ○ SV-4K

196.20 mm / 61.65 mm / 169.45 mm

(7.72 in / 2.43 in / 6.67 in)

The bracket length is 164.15 mm / 6.46 in.

- Weight:
  - ○ DMP-2K—1 lb 14 oz / 850.5 grams
  - ○ SV-4K—2 lb 4 oz / 1020.6 grams
- Attach to the wall using the brackets on each side of the device using 4 screws (one for each bracket slot) that measure between 3.5 mm and 4.2 mm in diameter.
- Avoid blocking the right side panel so that LEDs can be seen for troubleshooting.
- Ensure all air vents are clear for proper cooling.
- Choose a location that works with the required IR extender cable for infrared support.

  Unlike the DMP 4310G, there is no IR receptor built into the SV-4K device.

> **IMPORTANT:** The tested range is about 20 ft. However, to achieve this range you must be sure to have the receiver facing outward. The receiver is enclosed and not visible.

LEDs on the SV-4K and DMP-2K Media Player

The device has 8 LEDs in two banks of 4 on the right panel of the device. Figure 7 shows normal operation for the device on a Cisco StadiumVision network.

Figure 7. SV-4K LED Bank
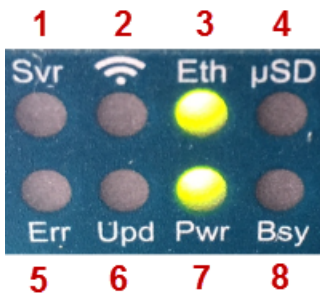
> **NOTE:** Some of the LEDs apply to hardware features that are not enabled for Cisco StadiumVision Director Release 4.1.

Table 10 identifies the SV-4K LEDs that are applicable to operation in Cisco StadiumVision Director.

Table 10. SV-4K LED Descriptions

LED		LED		LED		LED	
1	**Svr** N/A	2	**WiFi** N/A	3	**Eth** (green) Flashes when connecting to Ethernet network. Displays when connected.	4	**µSD** N/A
5	**Err** (red) Flashes a certain number of times to indicate errors ([Table 11](#)).	6	**Upd** (yellow) Flashes when the device is being upgraded. The Update and Error LEDs will flash in unison to indicate an error during firmware update ([Table 12](#)).	7	**Pwr** (green) Displays when the device is powered on and not in reset mode.	8	**Bsy**(green) Flashes when there is file-system activity.

Table 11. Error (Err) LED Descriptions

Error LED (number of flashes)	Description
2	Unspecified error.
3	Device is in network recovery mode and using DHCP Option 43 to contact Cisco StadiumVision Director for provisioning.
4	No upgrade file found.
5	Failed to load kernel module.
	or
	OS initialization failed (Init shell script failed).
6	Board is not capable of running the current firmware version.
7	A piece of on-board hardware is not working correctly.
8	Problem related to storage device (USB or SD card). (Not applicable in Release 4.0)
9	Problem related to the registry/NAND.
10	The autorun script encountered a load/run error.
11	WiFi related error.
12	Unable to find a bootable image.
13	The root file system has failed verification, which is used to detect whether the file system has been tampered with. You can recover a unit that is showing this error code by performing an update using safe mode.
14	Boot loader failure.

Table 12. Update (Upd) LED Descriptions

Update LED (number of flashes)	Description
2	Erase failed.
3	Write failed.
4	Verify failed.
5	Failed to find UBI partition.
6	Attempt to write unsigned CFE to unit with secure boot enabled.
7	Failed to find UBI partition.
8	Failed to create/attach UBI partition.
9	Unexpected error.
10	Upgrade script exited abnormally.
11	Upgrade took longer than expected.
12	Update completed but update file could not be deleted.

IR Remote for Cisco StadiumVision Director

All media players use the same IR Remote device shown in Figure 1. Generally, the IR Remote is used for TV control. However, even if you are not using the IR Remote for TV control, it is important to realize that the IR Remote also allows you to get information to troubleshoot the media player.

> 📌 **NOTE:** The IR Remote is not automatically shipped with the Cisco StadiumVision Director media players and must be ordered separately.

Figure 8 shows the description for each of the buttons on the Cisco StadiumVision Director IR Remote.

Figure 8. Cisco StadiumVision IR Remote Button Descriptions
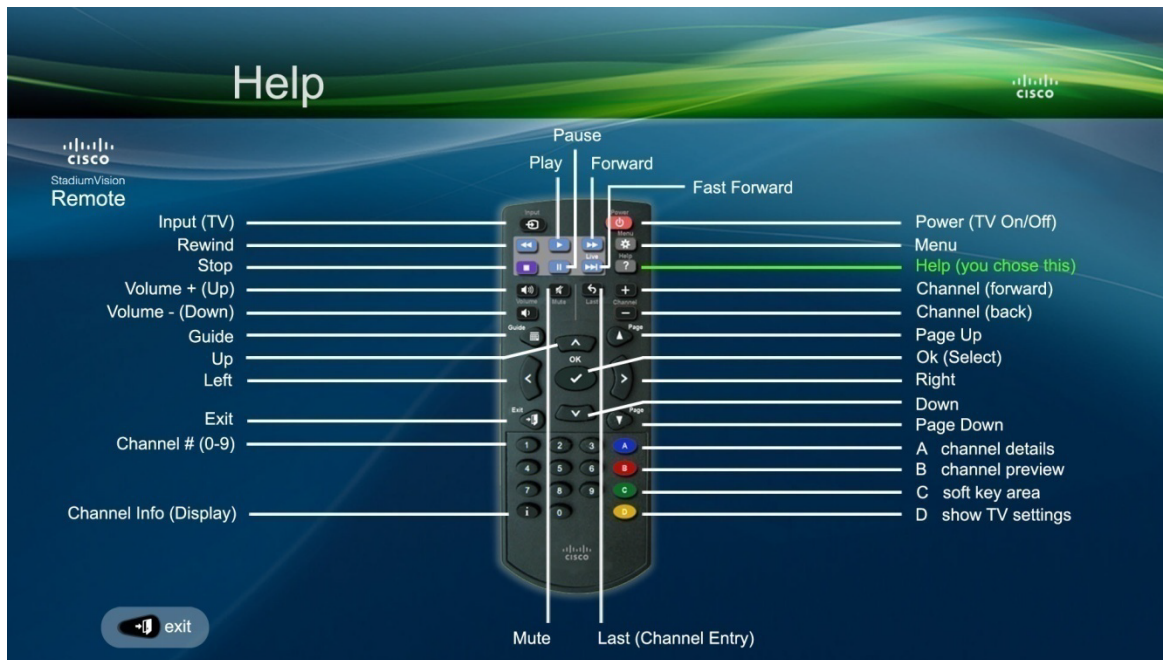
IR Remote Sensor and IR Extender

Unlike the DMP 4310G, the IR extender is required for the SV-4K and DMP-2K media player because the SV-4K and DMP-2K does not have its own IR receiver. For more information, see the "Guidelines for Mounting the SV-4K" on page 1.

The IR remote also is a critical troubleshooting tool so it is important to ensure that all media players can be IR-controlled even if it is not needed during normal operation.

Default Settings for the SV-4K and DMP-2K Media Player

The SV-4K and DMP-2K device ships from the factory with certain default settings. Upon running the start-up sequence and in communication with Cisco StadiumVision Director, the SV-4K and DMP-2K default settings are changed.

RS-232 Default Settings on the SV-4K and DMP-2K

After processing the HTML run-time module from Cisco StadiumVision Director, the SV-4K and DMP-2K is set to the following RS-232 default settings:

> **NOTE:** The SV-4K and DMP-2K use the same defaults as the Cisco DMP 4310G, which matches the default settings of most TVs.

- Baud—9600 (factory default is 115200)
- Parity—None
- Data Bits—8
- Stop Bits—1
- Flow Control—None (factory default is hardware flow control only)

For information about the new RS-232 commands for the SV-4K and DMP-2K, see "Appendix B: Serial Commands for theSV-4K and DMP-2K Media Player" on page 71.

Other Default Settings

By default, the following functionality is disabled on the SV-4K and DMP-2K media player:

- Secure Shell (SSH)

Feature Summary for the SV-4K and DMP-2K Media Player

This section includes the following topics:

Cisco StadiumVision Director Software Feature Map for the SV-4K and DMP-2K

[Table 13](#) provides an at-a-glance view of the supported software features in Cisco StadiumVision Director for the SV-4K and DMP-2K.

Table 13. Software Feature Map for the SV-4K and DMP-2K

Cisco StadiumVision Director Feature	SV-4K	DMP-2K	DMP 4310G
4K Video [1]	Yes	No	No
AC3/AC3+ (Dolby Digital audio decode) [2]	Yes	Yes	No
Auto-Registration	Yes	Yes	Yes
Bulk Administration Tool (BAT)	Yes	Yes	Yes
Cisco StadiumVision Director Remote Server	No	No	Yes
Closed Caption	Yes	Yes	Yes
Command Center Monitoring[1]	Yes	Yes	Yes[3]
Content Replacement[4]	Yes	Yes	Yes
Content Synchronization (between same media player models only)	Yes	Yes	Yes[5]
Custom applications using GAR	No	No	Yes
Custom fonts (through Software Manager)	Yes	Yes	Yes
Dual Video Regions	Yes	Yes	No
External Content Integration	Yes	Yes	Yes
Event Script Scheduler	Yes	Yes	Yes
Flash content (SWF)	No	No	Yes
Group/Zone configuration	Yes	Yes	Yes
HDMI-In as a Video Source[1]	Yes	No	No
Luma key support for second video region.	Yes	Yes	No
Management Dashboard Commands[6]	Yes	Yes	Yes
Management Dashboard Firmware configuration	Yes	Yes	Yes
Management Dashboard Model Filtering	Yes	Yes	Yes

Cisco StadiumVision Director Feature	SV-4K	DMP-2K	DMP 4310G
Management Dashboard Monitoring	**Yes**	**Yes**	**Yes**
Network Time Protocol (NTP) configuration	**Yes**	**Yes**	**Yes**
Precision Time Protocol (PTP) configuration	**Yes**	**Yes**	No
POS Integration with Dynamic Menu Board (DMB) GAR application	No	No	**Yes**
POS Integration with DMB using Widgets	**Yes**	**Yes**	**Yes**
Proof of Play (PoP)	**Yes**	**Yes**	**Yes**
Proxy device support[7]	No	No	**Yes**
Self-Service Content (SSC)	No	No	**Yes**
Suite Ordering	No	No	**Yes**
Ticker (legacy) from Control Panel Setup	No	No	**Yes**
Ticker (RSS in External Content Integration)	**Yes**	**Yes**	**Yes**
Touchscreen	No	No	**Yes**
TV Control using RS-232 and IR Remote	**Yes**	**Yes**	**Yes**
Video Encoding as a Channel[1]	**Yes**	No	No
Video Streaming Through HDMI-Out[1]	**Yes**	No	No
Widgets tool	**Yes**	**Yes**	**Yes**

[1]Introduced in Cisco StadiumVision Director Release 4.1.

[2]Support for AC3+ audio decodes is introduced with the SV-4K and DMP-2K firmware version 6.0.51.

[3]Thumbnail view in CCM is not supported on the Cisco DMP 4310G.

[4]Content replacement for the SV-4K and DMP-2K is only supported through an update of the playlist. Performing content replacement from the Control screen using the content replacement icon is unsupported.
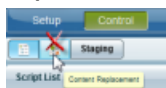
[5]The Cisco DMP 4310G does not support PTP. Therefore, there will be more variance across DMPs when playing the same video file.

[6]SV-4K and DMP-2K supports a subset of original Dashboard commands. See the "Appendix A: Management Dashboard Commands for the SV-4K and DMP-2K Media Player" on page 67.

[7]Cisco DMP 4310G proxy support works only with scripts that are being run exclusively on Cisco DMP 4310G devices.

Unsupported SV-4K Hardware Features

The following SV-4K hardware features are not supported in Cisco StadiumVision Release 4.1:

- TV control via HDMI/CEC

- Unsupported hardware ports:
  - SD (and microSD)
  - USB (2.0 and 3.0)

- WiFi

> 🚩 **IMPORTANT:** The SV-4K does not support content import and/or playback using the SD or USB ports.

Key Considerations for the SV-4K and DMP-2K

When you deploy an SV-4K and DMP-2K, there are several things that you should know about its operation. This section highlights some of the important differences from the Cisco DMP 4310G that you should be aware of when deploying the SV-4K and DMP-2K media player.

This section includes the following topics:

- Firmware Provisioning on the SV-4K and DMP-2K, Page 19
- Auto-Provisioning on the SV-4K and DMP-2K, Page 21
- IR Receiver for the SV-4K and DMP-2K, Page 21
- Storage and Memory on the SV-4K and DMP-2K, Page 22
- Synchronization on the SV-4K and DMP-2K, Page 22
- Switch Communication on the SV-4K and DMP-2K, Page 23

Firmware Provisioning on the SV-4K and DMP-2K

The SV-4K and DMP-2K firmware is not provisioned the same way as the Cisco DMP 4310G. The primary difference is that the SV-4K and DMP-2K firmware upgrade cannot

be manually launched by Management Dashboard DMP command, but is done automatically when the SV-4K and DMP-2K device boots.

> ⚑ **IMPORTANT:** Before you power on the SV-4K and DMP-2K device for the first time, be sure that you have completed the following configuration and tasks:
>
> - Switch configuration, including the required LLDP for proper POE+ operation.
> - DHCP server configuration.
> - Uploaded the released firmware to Cisco StadiumVision Director.
> - Configured the auto-registration settings for the SV-4K and DMP-2K to properly provision its firmware.

However there are some common configuration tasks. Table 14 provides a summary of the firmware provisioning tasks for the SV-4K and DMP-2K and DMP 4310G in the Management Dashboard.

Table 14. Summary of Firmware Provisioning Tasks on the Media Players

Firmware Provisioning Tasks	SV-4K DMP-2K	DMP 4310G
Upload firmware to Cisco StadiumVision Director in the Management Dashboard	Yes	Yes
Configure "Firmware image to use" and "init.version" under Auto Registration Settings. ⚑ **IMPORTANT:** Release 4.1 introduces a new firmware requirement for "Base firmware image to use" and "base.version" for the SV-4K and DMP-2K. See the *Release Notes for Cisco StadiumVision Director Release 4.1* and *Cisco StadiumVision Director Software Installation and Upgrade Guide*.	Yes	Yes[1]
Upgrade the firmware from the Management Dashboard by selecting DMPs and running the Firmware Upgrade command to push the firmware to the device.	**No**	Yes

[1]The DMP 4310G also uses the "init.build" property which does not apply to the SV-4K media player.

Auto-Provisioning on the SV-4K and DMP-2K

- The SV-4K and DMP-2K are automatically provisioned with global configuration settings from Cisco StadiumVision Director—but not in the same way as occurs for the Cisco DMP 4310G.

  As part of the start-up sequence, the device retrieves the Cisco StadiumVision Director configuration, which includes all of the global settings for the SV-4K and DMP-2K, such as NTP configuration, jitter settings, and so on.

- The SV-4K and DMP-2K global settings are configured in the Management Dashboard by going to:

  SV Director Configuration > **Global DMP Settings** > **SV-DMP Common Settings**.

- The SV-4K and DMP-2K configuration in Cisco StadiumVision Director is provisioned each time that the SV-4K and DMP-2K device boots.

> 🚩 **IMPORTANT:** If you are running Cisco StadiumVision Director on a virtual server, then you should reference a reliable NTP server running on a bare metal server, rather than relying on a clock from a VM environment that can drift and is not accurate. NTP for Cisco StadiumVision Director is configured using the TUI, and can be the same external server as is used for the Cisco DMP 4310G devices. For more information, see the *Cisco StadiumVision Director Server Administration Guide*.

HDCP Support on the SV-4K and DMP-2K

The SV-4K and DMP-2K natively support content that uses Intel's High-bandwidth Digital Content Protection (HDCP) through the installation of a protection key on the media player.

From the HDMI Out port, the SV-4K and DMP-2K support HDCP versions 1.4 and 2.2.

From the HDMI In port, the SV-4K can receive HDCP 1.4 and send as HDCP 2.2.

IR Receiver for the SV-4K and DMP-2K

There is not an embedded IR receiver on the SV-4K and DMP-2K. You must use the IR extender cable to use the IR Remote.

Storage and Memory on the SV-4K and DMP-2K

The SV-4K and DMP-2K devices have different sizes of solid-state storage and RAM (Table 15):

Table 15. Storage and Memory on the SV-4K and DMP-2K

DMP Model	Total SSD	Available for Content	RAM
SV-4K	120 GB (minimum)	100 GB	3 GB
DMP-2K	64 GB	65536 MB	2 GB

> **TIP:** The amount of RAM can make a difference in how the same content might play on different media player models. This difference might more likely be seen when playing HTML pass-through (URL) content.

To find information about available storage, select an SV-4K and DMP-2K device in the Management Dashboard device list. Then, go to **Settings** > **Storage** in the device details area of the dashboard.

> **NOTE:** The amount of available storage shown in the Management Dashboard reflects the total amount of space available on the SSD, not the actual storage pool available for content.

Beginning in Release 4.1, you also can find information about available storage if you view device details from thumbnail view in CCM.

Synchronization on the SV-4K and DMP-2K

The SV-4K and DMP-2K supports synchronization of content played among a group of SV-4K and DMP-2K devices using the Network Time Protocol (NTP) and Precision Time Protocol (PTP). NTP and PTP settings are provisioned globally for all SV-4K and DMP-2K media players.

The Cisco StadiumVision Director server is provisioned as the default NTP source for all media players. When PTP is configured, only the SV-4K and DMP-2K PTP master derives its clock using NTP.

> **IMPORTANT:** If you are running Cisco StadiumVision Director on a virtual server, then you should reference a reliable NTP server running on a bare metal server, rather than relying on a clock from a VM environment that can drift and is not accurate. NTP for Cisco StadiumVision Director is configured using the TUI, and can be the same external server as is used for the Cisco DMP 4310G devices. For more information, see the *Cisco StadiumVision Director Server Administration Guide*.

Switch Communication on the SV-4K and DMP-2K

The SV-4K and DMP-2K communicates with the Cisco Connected Stadium switch using the required Link Layer Discovery Protocol (LLDP) rather than MediaNet. The SV-4K and DMP-2K determines available power (when using PoE+) over LLDP.

Best Practices for SV-4K and DMP-2K Deployment

Using Bar Code Scanners and TV Labels at Installation Time

> **NOTE:** This practice requires that you have already defined your Location names in Cisco StadiumVision Director.

To increase the speed and accuracy of media player deployment:

- Prepare TV labels with the Cisco StadiumVision Director Location name in bar code format.

- Obtain a bar code scanner to record the Location bar code and MAC address from the media player.

- Use the BAT tool to upload data to Cisco StadiumVision Director.

Installer Workflow Example

An installer can follow these steps to use a bar code scanner with TV labels:

1. Mount the TV and media player.

2. Connect the TV and media player cables.

3. Attach a pre-printed label to TV.

4. Scan the Location bar code on the TV.

5. Scan the MAC address bar code on the media player.

6. Provide scanner to the supervisor or network administrator who downloads the data and formats it to be compatible with the Cisco StadiumVision Director BAT TSV format.

   For more information, see the Cisco StadiumVision Director Bulk Adminstration Tool guide.

Planning the SV-4K and DMP-2K Media Player Deployment

This module describes aspects of the SV-4K and DMP-2K deployment that need to be considered and executed prior to the actual installation and provisioning of the SV-4K and DMP-2K media players.

It is intended for installers, network administrators, and administrators of Cisco StadiumVision Director.

Workflow Summary to Plan Deployment of the SV-4K and DMP-2K Media Player

Table 16 provides a summary of the tasks and related information to plan for the deployment of the SV-4K media player.

Table 16. Deployment Planning Task Summary

Planning Task	For more information see:
Plan Groups/Zones/Locations.	"Zones, Groups and Locations Planning" on the next page
Perform TV qualification.	• "TV Requirements for SV-4K and DMP-2K Compliance" on the next page • "Guidelines for TV and Content Resolution with the SV-4K and DMP-2K Media Player" on page 27
Prepare for SV-4K and DMP-2K installation.	• "Using Bar Code Scanners and TV Labels at Installation Time " on page 23 • "Guidelines for Mounting the SV-4K" on page 1
Determine cabling requirements.	"Best Practices for SV-4K and DMP-2K Deployment" on page 23
Plan the Connected Stadium switch configuration.	"Connected Stadium Switch Requirements" on page 31

Planning Task	For more information see:
Plan the DHCP server configuration.	"External DHCP Server Requirements" on page 30
Determine the network time (clocking) sources.	"How to Configure NTP and PTP on the SV-4K and DMP-2K Media Players" on page 37

Zones, Groups and Locations Planning

> **IMPORTANT:** Mixed groups that contain different media player device types are not recommended. Cisco StadiumVision Director will provide a warning about such groups if you attempt to configure them.

TV Planning for the SV-4K and DMP-2K Media Player

This section includes the following topics:

- TV Requirements for SV-4K and DMP-2K Compliance, Page 26

- Guidelines for TV and Content Resolution with the SV-4K and DMP-2K Media Player, Page 27

- Restrictions for Control Panel TV Display Specifications with the SV-4K and DMP-2K Media Player, Page 28

- Configuring Resolution Under Control Panel Display Specifications, Page 28

TV Requirements for SV-4K and DMP-2K Compliance

For the optimal experience with the SV-4K and DMP-2K media player, be sure that the site TV displays are compliant with the following specifications and resolution:

- High-bandwidth Digital Content Protection (HDCP)

- High-Definition Multimedia Interface (HDMI)

- RS-232 serial interface

- Capable of 1080p HD display

Guidelines for TV and Content Resolution with the SV-4K and DMP-2K Media Player

The SV-4K and DMP-2K is set to run in full high-definition (HD) 1920x1080 mode by the runtime software.

> **IMPORTANT:** It is highly recommended that your TV supports a minimum of 1080p HD resolution. Lower resolution displays might need some additional configuration of the TV Display Specification configuration in Cisco StadiumVision Director to attempt to optimize the display. In some cases these TVs might cut off an area of the screen, rather than resize the graphics to the area as the Cisco DMP 4310G does.

The quality and expected resolution for video and graphics display for the SV-4K and DMP-2K can be affected by several things:

- The resolution of the TV display and its ability to negotiate to 1080p.

- The configuration of the sv4k.videoMode serial command in the Display Specifications area of the Cisco StadiumVision Director Control Panel:

  - When set to a resolution, this value specifies the SV-4K and DMP-2K signal resolution.

  - If the resolution is set to auto-detection, then the TV negotiates the signal resolution with the SV-4K and DMP-2K as long as the TV supports negotiation.

  > **IMPORTANT:** If you are using a 4K display, you must configure a fixed resolution value of 3840x2160x60p in the sv4k.videoMode serial command in the TV display specification.

- The template region size.

- The size of the original graphic and whether any scaling needs to happen.

  > **NOTE:** For more information about content and template guidelines, see the *Cisco StadiumVision Content Creation Design and Specification Guide*.

Restrictions for Control Panel TV Display Specifications with the SV-4K and DMP-2K Media Player

Before you configure TV display specifications for use with the SV-4K and DMP-2K media player, consider the following restrictions:

- The following Basic Info options are not supported:
  - X Position / Y Position
  - X Scaling / Y Scaling

Configuring Resolution Under Control Panel Display Specifications

The Display Specification for a TV can either be configured for auto-detection of resolution by the TV, or set to a fixed resolution in the Cisco StadiumVision Director Control Panel.

Figure 9. SV-4K and Display Signal Resolution
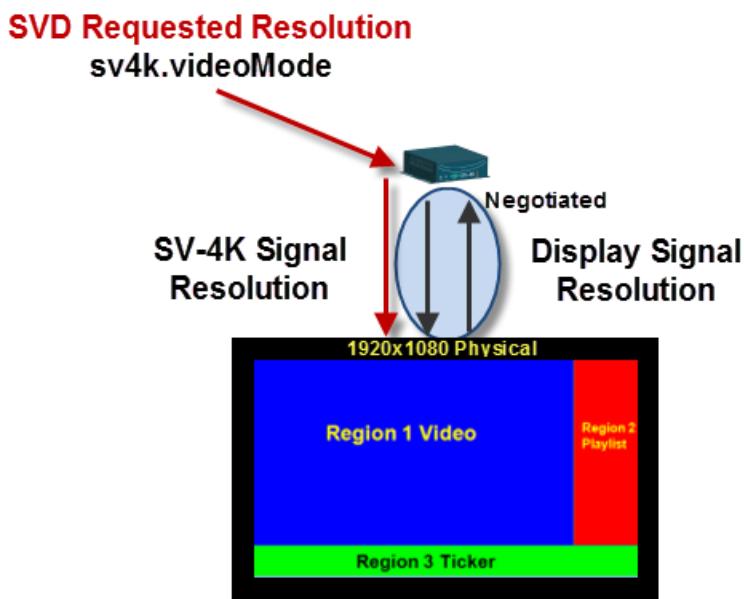
- If the resolution is set to auto-detection, then the TV and the SV-4K negotiate the signal resolution, as long as the TV supports auto-negotiation (Figure 9).

- If a resolution is specified in the Control Panel, then the content is resized according to that setting. This is the requested SV-4K signal resolution shown in red in Figure 9.

- If the signal resolution of the SV-4K is set below 1920x1080 for any reason, video content will be resized according to the template in use.

- The template in use and the corresponding content must match the signal resolution.

To set the resolution for a display, complete the following steps:

1. Go to **Control Panel** > **Setup** > **Devices** > **Display Specifications**.

2. Select the TV that you want to configure.

3. Click **Serial Commands**.

4. Find the sv4k.videoMode command (Figure 10).

Figure 10. SV-4K Resolution Setting in Display Specifications
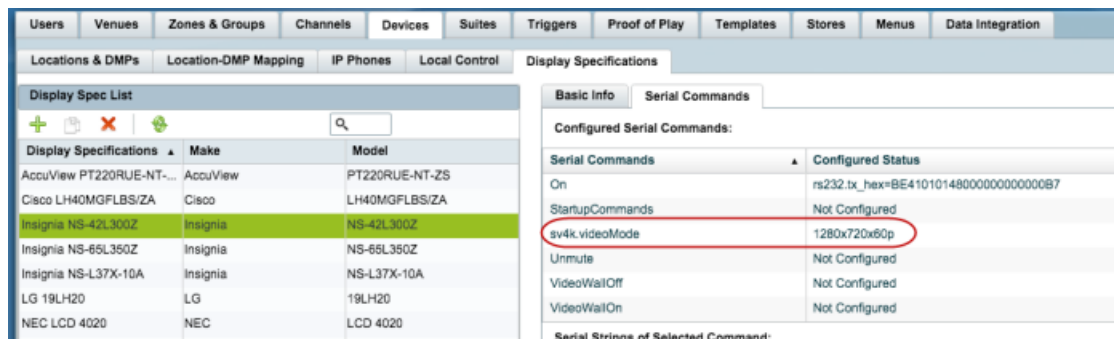
5. Specify one of the values in Table 17 according to the desired resolution behavior.

Table 17. SV-4K Resolution Values

sv4k.videoMode Value	Resolution
3840x2160x60p[1]	Fixed at 2160p
1920x1080x60p	Fixed at 1080p
1280x720x60p	Fixed at 720p
Not Configured	Auto-detected
Auto	Auto-detected

[1]This specification is required for 4K TV displays in Release 4.1.

6. Click **Save**.

7. Reboot the SV-4K device.

Network and Switch Planning

This section includes the following topics:

- External DHCP Server Requirements, Page 30
- Connected Stadium Switch Requirements, Page 31

External DHCP Server Requirements

The SV-4K and DMP-2K media player requires configuration of an external DHCP server to provide IP addressing to the devices. This service can be configured using Cisco Network Registrar (CNR) or another external server at the venue.

This section highlights some of the key requirements to plan your DHCP configuration. However, it does not describe all of the details for you to perform the configuration.

> **NOTE:** For more information and details about DHCP configuration, see the *Cisco Connected Stadium Design Guide* available to qualified Cisco StadiumVision partners.

DHCP Configuration Guidelines for the SV-4K and DMP-2K Media Player

Consider the following guidelines before configuring a DHCP server for the SV-4K and DMP-2K:

- Do not configure the Connected Stadium Switch as the IOS DHCP server for Cisco StadiumVision.

- Be sure to set the DHCP server for an infinite lease of IP addresses to the SV-4K and DMP-2K devices.

- If you are supporting a deployment with mixed models of media players (such as Cisco DMP 4310G and SV-4K devices), you will need to configure an Option 43 string for each model.

- If the DHCP server is limited to a single Option 43 string per DHCP pool (such as with a Cisco DHCP server), then be sure to configure a separate DHCP scope for each media player model.

- Configure the DHCP Option 60, Vendor Class Identifier string:

  ○ DMP-2K string for new, factory-shipped devices: "Cisco DMP-2K"

  > 📌 **NOTE:** For early device prototypes, the DMP-2K string is "BrightSign DMP-2K".

  ○ SV-4K string for North America: "Cisco SV-4K-NA"

  ○ SV-4K string for all other regions: "Cisco SV-4K-ROW"

- Configure the converted DHCP Option 43, Vendor Specific Option URL:

  http://*x.x.x.x*:8080/StadiumVision/dmp_v4/scripts/boot.brs

  where "*x.x.x.x*" is the IP address of the Cisco StadiumVision Director server.

  > 🚩 **IMPORTANT:** The option 43 string must be converted to TLV format for compatibility with the SV-4K and DMP-2K. For more information, see "Appendix: SV-4K and DHCP Option 43" on page 1.

Connected Stadium Switch Requirements

This section highlights some of the key requirements to plan your Connected Stadium switch configuration. However, it does not describe all of the details for you to perform the configuration. For configuration details, see the *Cisco Connected Stadium Design Guide* available to qualified Cisco StadiumVision partners.

Switch Configuration Requirements for the SV-4K and DMP-2K Media Player

Be sure that the Connected Stadium switch meets the following configuration requirements to support the deployment of the SV-4K and DMP-2K media players:

- Supports PoE+ (IEEE 802.3at) with 30W of port power.

- Configures Internet Group Management Protocol (IGMP).

  IGMPv1, IGMPv2, and IGMPv3 are supported.

- Configures Link Layer Discovery Protocol (LLDP), which is required to determine available power using PoE+ and also supports the IOS Civic Location feature.

> **NOTE:** For more information and details about the switch configuration, see the *Cisco Connected Stadium Design Guide* available to qualified Cisco StadiumVision partners.

Deploying the SV-4K and DMP-2K Media Player

This module describes the workflow and tasks to deploy the SV-4K and DMP-2K media player.

It is intended for Cisco StadiumVision Director administrators and installers.

Prerequisites for SV-4K and DMP-2K Deployment

Before you deploy SV-4K and DMP-2K media players, be sure that the following requirements are met:

- The pre-deployment tasks are completed. For more information, see "Planning the SV-4K and DMP-2K Media Player Deployment" on page 25.

- The SV-4K and DMP-2K hardware is not yet powered up.

Workflow Summary to Deploy the SV-4K and DMP-2K Media Player for the First Time

Table 18 provides a summary of the tasks and related information to deploy the SV-4K media player.

> **IMPORTANT:** It is essential to follow the order of deployment tasks provided in Table 18 to be sure that the SV-4K and DMP-2K device can be properly provisioned.

Table 18. SV-4K Deployment Task Workflow

Deployment Task	For more information see:
Configure the Connected Stadium switch for SV-4K and DMP-2K operation (LLDP, IGMP).	• "Connected Stadium Switch Requirements" on page 31 • For details about the configuration, see the *Cisco Connected Stadium Design Guide* available to qualified Cisco StadiumVision partners.
Configure the DHCP server with Option 60 and Option 43.	• For requirements, see "External DHCP Server Requirements" on page 30 • For Cisco CNR configuration, see the *Cisco Connected Stadium Design Guide* available to qualified Cisco StadiumVision partners.
⚠	**CAUTION:** Release 4.1 introduces a new, mandatory multi-firmware version upgrade process for the SV-4K and DMP-2K. Immediately after installing Cisco StadiumVision Director Release 4.1, you must configure the new auto-registration settings in the Management Dashboard. Failure to perform this configuration can cause the media player to repeatedly boot.
Mandatory— Read and understand the new firmware and auto-registration process for the SV-4K and DMP-2K media players.	• *Release Notes for Cisco StadiumVision Director Release 4.1*. • *Cisco StadiumVision Director Software Installation and Upgrade Guide*.
Obtain the firmware.	Refer to the following topics in the "Upgrading the SV-4K and DMP-2K Media Player" module: • "Downloading the SV-4K and DMP-2KFirmware". • "Uploading the SV-4K and DMP-2K Firmware to Cisco StadiumVision Director".
Configure *base* and *production* firmware settings for auto-registration.	"Configure the SV-4K and DMP-2K for Auto-Registration" topic in the "Upgrading the SV-4K and DMP-2K Media Player" module.
Configure global DMP settings.	"Configuring the SV-4K and DMP-2K Global Settings" on the facing page
Power on the SV-4K and DMP-2K device.	—
Verify the startup sequence.	"Verifying the SV-4K and DMP-2K Startup Sequence" on page 47

Configuring the SV-4K and DMP-2K Global Settings

This section includes the following topics:

Information About Time Protocols and Synchronization on the SV-4K and DMP-2K Media Players

This section includes the following topics:

Network Time Sources for the SV-4K and DMP-2K Media Players

The SV-4K and DMP-2K supports two different network time sources under the global SV-4K settings:

- Network Time Protocol (NTP)—This is the default.

- Precision Time Protocol (PTP)—Required for video wall synchronization feature and for DMP-to-DMP synchronization.

NTP and PTP settings are provisioned globally for all SV-4K and DMP-2K media players.The Cisco StadiumVision Director server is provisioned as the default NTP source for all media players.

> **NOTE:** When PTP is configured, only the SV-4K and DMP-2K PTP master derives its clock using NTP.

For the most accurate synchronization for video playback across SV-4K and DMP-2K devices, the time on the target media players must be almost the same. NTP does not provide this level of time synchronicity and accuracy, so PTP is also required.

PTP Master and Members

The SV-4K and DMP-2K DMP is capable to serve as a PTP master or as a PTP member, where members obtain their time from the master. The PTP master, in turn, will get its time from an NTP server.

By default, all SV-4K and DMP-2K devices are designated as eligible master candidates.

DMP-to-DMP Content Synchronization

The DMP-to-DMP Content Synchronization feature for the SV-4K and DMP-2K media player synchronizes content rendering of playlist items on the displays.

This synchronization includes transitioning from one item to the next (such as for still images), and more accurate playback and rendering of local video content. For local video, this serves as the foundation for implementing video ribbon boards and video walls. This requires cabling of a single media player per display.

> **NOTE:** Widgets, external URLs, and multicast video tuning synchronization are outside the scope of this feature.

Improved content synchronization was first introduced in Cisco StadiumVision Director Release 3.2 on the DMP 4310G through the use of the Network Time Protocol (NTP).

Cisco StadiumVision Director Release 4.0 and later supports enhanced content synchronization methods for the SV-4K and DMP-2K only, with close synchronization of playlist item transition using the Precision Time Protocol (PTP).

Zone-Based Video Wall Synchronization

Zone-based video wall synchronization is an alternative form of synchronization available for SV-4K and DMP-2K devices participating in a video wall.

The primary benefit of this form of synchronization is that if any SV-4K and DMP-2K device that is not the leader in the video wall reboots, it will "catch up" to play whatever content item that the rest of the video wall is currently playing. This form of synchronization is recommended for dedicated video walls that are running video content longer than 15 minutes.

If an SV-4K and DMP-2K device reboots in a video wall that is *not* using zone-based video wall synchronization (using normal DMP-to-DMP synchronization), the tradeoff is that the rebooting device synchronizes with the rest of the video wall at the next content item in the playlist, or at replay of a single-item playlist.

Use Cases for Video DMP-to-DMP Synchronization with PTP

PTP is particularly beneficial for the following use cases in the Cisco StadiumVision network:

- Using video background for Dynamic Menu Boards (DMBs) that show a PiP of the live event.

   With the DMP 4310 devices, the background is implemented as a SWF, whereas with the secondary video feature on the SV-4K and DMP-2K, the background can be more visually appealing by using local video content.

- Sponsored moment of exclusivity.

   When a team scores a goal, a secondary video using the luma key feature can be shown onscreen overlaying a full screen video showing the live event.

- Video-based ads.

   Ads in region 2 or 3 (or L-wraps) can now be video content. For L-wraps, the luma key will need to be used so that the live multicast video can be seen.

How to Configure NTP and PTP on the SV-4K and DMP-2K Media Players

By default, both NTP and PTP services are automatically enabled for SV-4K and DMP-2K media players. The SV-4K and DMP-2K media players use PTP to achieve optimal synchronization. However, an NTP source also must be used to provide initial clocking to the devices that are elected PTP masters in the network.

This section includes the following topics:

Restrictions for PTP on the SV-4K and DMP-2K Media Players

Before you configure PTP on the SV-4K and DMP-2K media players, consider the following restrictions:

- By default, PTP messages will not cross VLANs and PTP master candidates need to be identified for each VLAN and configured in the Management Dashboard.

  However, Cisco StadiumVision Director Release 4.1 introduces a configurable Precision Time Protocol (PTP) Time To Live (TTL) setting in the Management Dashboard. The PTP TTL specifies the number of VLANs that can be crossed for selection of a PTP master. The default value of 1 (recommended) means that each VLAN will elect its own PTP master.

  > **NOTE:** For ease of configuration for venues with multiple VLANs, the system is configured by default to list all SV-4K and DMP-2K devices as eligible PTP master candidates. However, be aware that although this simplifies configuration, the time that it takes for the devices to arbitrate a master device in each network will vary, and depends on the number of eligible devices in each network.

- Content synchronization for video playback on the SV-4K and DMP-2K media player relies on precise time across DMPs using PTP. The behavior is similar to content synchronization on the Cisco DMP 4310G. If SV-4K devices are playing video and one of the devices reboots, the rebooting unit will restart video playback from the beginning and will only synchronize with the other players when the next item in the playlist is rendered.

If SV-4K and DMP-2Ks are participating in zone-based content synchronization for video walls, with some enhanced synchronization capability, the rebooting unit will synchronize with the current item being played by the device leader in the video wall. For more information, see the "Working with Video Walls" section of the *Cisco StadiumVision Director Operations Guide*.

Guidelines for NTP and PTP on the SV-4K and DMP-2K Media Players

Before you configure NTP and PTP on the SV-4K and DMP-2K media players, consider the following guidelines:

- For new installations of Cisco StadiumVision Director, PTP is the default time source for the SV-4K and DMP-2K media players, with NTP as the default time source for the elected PTP master.

NTP Guidelines

- Each media player designated as PTP master (per VLAN) will use NTP as its time source. The other SV-4K and DMP-2K devices in the network operate using a PTP reference clock from the elected PTP master.

- When PTP is disabled (not recommended), all SV-4K and DMP-2K players use NTP to set their local clock.

> **NOTE:** For synchronized video playback, NTP alone cannot be relied upon for SV-4K and DMP-2K devices and PTP must be used.

- The default NTP synchronization interval with the host time server is one hour and is configurable.

- An NTP source must be configured in Cisco StadiumVision Director. By default, the Cisco StadiumVision Director server is configured as the SV-4K and DMP-2K NTP host (just as with the Cisco DMP 4310G).

> **CAUTION:** If you are running Cisco StadiumVision Director on a virtual server, then you should reference a reliable NTP server running on a bare metal server, rather than relying on a clock from a VM environment that can drift and is not accurate.

For more information about configuring an NTP source in Cisco StadiumVision Director, see the "Configuring the Cisco StadiumVision Director Server System Settings" module in the *Cisco StadiumVision Director Server Administration Guide*.

PTP Guidelines

- PTP version 2 is supported only for the SV-4K and DMP-2K media players and applies globally to all devices in the Cisco StadiumVision Director network when configured.

- PTP configuration includes a PTP domain and a set of master candidates:

  - PTP domain—Default is 0.

    Be sure that this domain does not conflict with any other PTP domain (and multicast addressing) in use in your network, and revise as needed. See Table 3 for more information.

  - PTP master candidates—Default is *.

    This specifies that all SV-4K and DMP-2K devices in the network are eligible as master candidates and will go through arbitration to designate a master for their respective subnets.

- If you revise the default PTP master candidates configuration, you must configure one or more SV-4K and DMP-2K devices as master candidates in a semicolon-separated list of IP addresses for each VLAN.

  A minimum of two master candidates per network is recommended.

- If there is an in-house PTP master for your network, leave the "PTP master candidates" property value blank. However, this configuration is only supported for venues without multiple subnets.

Modifying the PTP and NTP Configuration on the SV-4K and DMP-2K Media Players

By default the NTP and PTP services are automatically enabled and configured for SV-4K and DMP-2K media players.

Use this task if you need to modify the default settings described in Table 19 and Table 20.

To modify the standard NTP and PTP configuration on the SV-4K and DMP-2K media players, complete the following tasks:

1. From the Management Dashboard, go to:

    SV Director Configuration > **System Configuration** > **Global DMP Settings** > **SV-DMP Common Settings**

Figure 11. Overview of the SV-4K PTP Properties
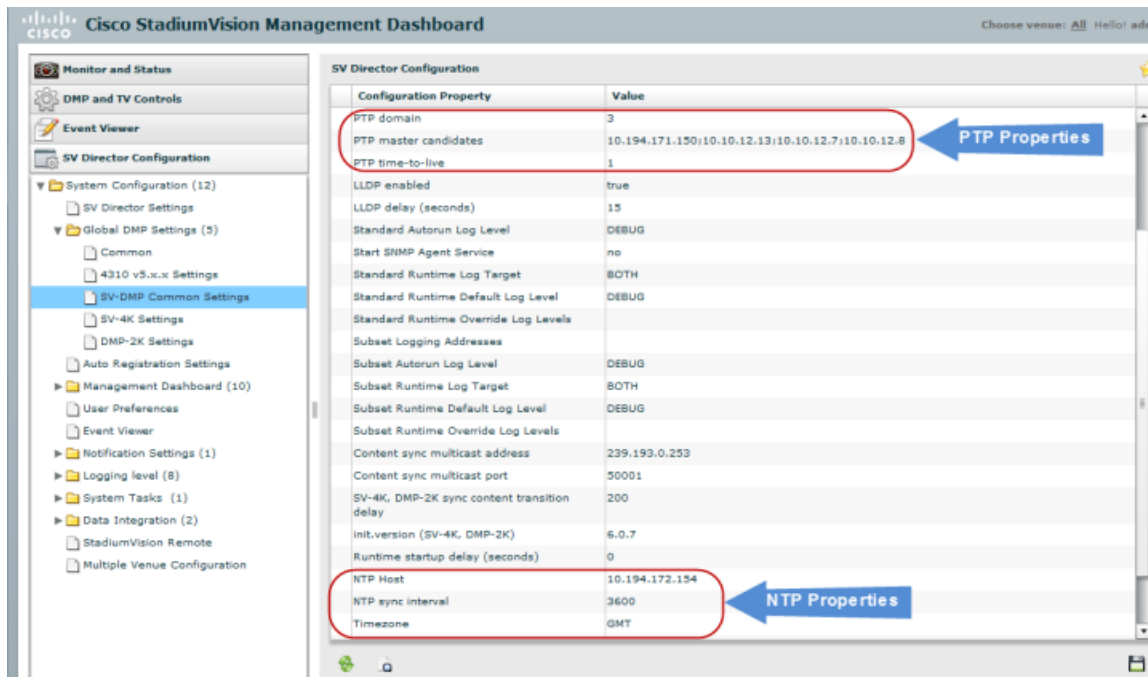
2. (Optional) Change the global NTP properties as required for your network. Refer to Table 19.

3. (Optional) Change the global PTP properties as required for your network. Refer to Table 20.

4. Click the disk icon to Save changes.

5. Reboot the SV-4K and DMP-2K devices.

Table 19. Global SV-4K Settings—NTP Properties

Property (Registry Key)	Description	Values
NTP Host (Globaldmpsetting.sv4k.deploy.ntpc. hostname)	IPv4 address of the NTP server from which the PTP master (or if PTP is disabled, all SV-4K devices) will synchronize clocks.	Default—IP address of the Cisco StadiumVision Director server.
NTP sync interval (Globaldmpsetting.sv4k.deploy.ntpc.interval)	Number of seconds that the SV-4K waits before trying to synchronize its time with the configured NTP host.	3600 (Default)
Timezone (Globaldmpsetting.sv4k.deploy.ntpc.timezone)	Code for the timezone to be used.	GMT (Default)

Table 20. Global SV-4K Settings—PTP Properties

Property (Registry Key)	Description	Values
PTP domain (Globaldmpsetting.sv4k.init.ptp.domain)	Domain number for the SV-4K PTP network, which defines the multicast address for PTP communication. The value must be a valid domain number per IEEE 1588-2008 and correspond to your network PTP configuration.	For IEEE-1588 PTP, possible values are: 0—(Default) 224.0.1.129 1—224.0.1.130 2—224.0.1.131 3—224.0.1.132 PTP is disabled when the property is unset (blank).
PTP master candidates (Globaldmpsetting.sv4k.init.ptp.master.host)	**Note:** In a multi-venue scenario, or multi-VLAN scenario, where PTP multicast traffic does not cross venues, designate PTP master(s) in each venue or VLAN, or use the default "*" configuration. Eligible SV-4K devices for master candidate selection.	Possible values are: • *—(Default). Wildcard pattern that specifies all SV-4K devices in the network as eligible PTP master candidates. • Semicolon-separated IPv4 addresses of SV-4K devices for each subnet. • blank—Specifies that a PTP master source external to Cisco StadiumVision Director is used. This configuration is only valid for a venue without SV-4K devices in multiple subnets.
PTP time-to-live (Globaldmpsetting.sv4k.init.ptp.ttl)	Number of VLANs that can be crossed for selection of a PTP master.	1 (Default) **Note:** Best practice is to retain the default value of 1 for election of a PTP master per video wall. With a TTL > 1, degradation in local video synchronization can occur.

Verifying PTP Operation for the SV-4K and DMP-2K Media Player

This section describes how to verify the PTP configuration and also the operation of PTP for your SV-4K and DMP-2K devices.

To verify the PTP operation for the SV-4K and DMP-2K media player, complete the following steps:

1. Open your browser and navigate to one of the DMPs:

   http://*sv4kdmp2k-ip-address***/ptp.html**

2. Enter the username and password.

   For more information, see the "Verifying PTP Operation for the SV-4K and DMP-2K Media Player" above.

3. Identify the PTP master by finding the unit that has an "offsetFromMaster" value of 0.0.

   Figure 12 highlights the PTP master and shows a network where PTP is operating successfully with 12 SV-4K members.

Figure 12. Successful PTP Clock Status

PTP clock status

```
Status from local PTP:
sending: GET CURRENT_DATA_SET
        90ac3f.fffe.038649-0 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      0
                offsetFromMaster 0.0  <--
                meanPathDelay     0.0

Status from remote PTP devices:
sending: GET CURRENT_DATA_SET
        90ac3f.fffe.03863d-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 333.0
                meanPathDelay     12613.0
        90ac3f.fffe.03863b-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster -597.0
                meanPathDelay     13332.0
        90ac3f.fffe.03863c-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster -366.0
                meanPathDelay     13741.0
        90ac3f.fffe.03863f-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 334.0
                meanPathDelay     12543.0
        90ac3f.fffe.03863e-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 849.0
                meanPathDelay     13017.0
        90ac3f.fffe.038641-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster -323.0
                meanPathDelay     13228.0
        90ac3f.fffe.03864f-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 239.0
                meanPathDelay     12560.0
        90ac3f.fffe.038645-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 90.0
                meanPathDelay     12642.0
        90ac3f.fffe.038647-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 1328.0
                meanPathDelay     13542.0
        90ac3f.fffe.03863a-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster 33.0
                meanPathDelay     14068.0
        90ac3f.fffe.038646-1 seq 0 RESPONSE MANAGMENT CURRENT_DATA_SET
                stepsRemoved      1
                offsetFromMaster -1768.0
                meanPathDelay     14699.0
```

Verifying the Deployment of the SV-4K and DMP-2K Media Player

This module includes the following topics:

Verifying the SV-4K and DMP-2K Startup Sequence

> 🚩 **IMPORTANT:** Before you power on the SV-4K and DMP-2K device for the first time, be sure that you have completed the following configuration and tasks:
>
> - Switch configuration, including the required LLDP for proper POE+ operation.
> - DHCP server configuration.
> - Uploaded the released firmware to Cisco StadiumVision Director.
> - Configured the auto-registration settings for the SV-4K and DMP-2K to properly provision its firmware.

When you have completed these deployment tasks, you are ready to connect a new SV-4K and DMP-2K device to the Cisco StadiumVision Director network.
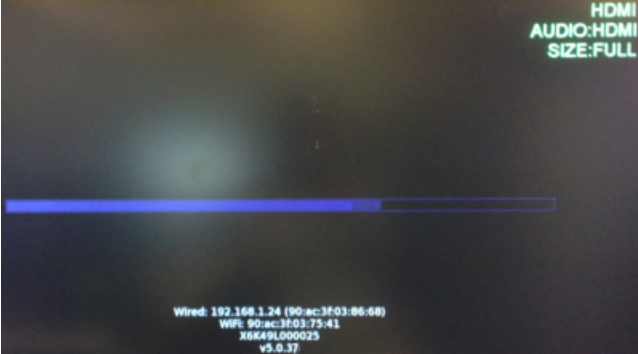
Startup Sequence Flow for the SV-4K and DMP-2K Media Player
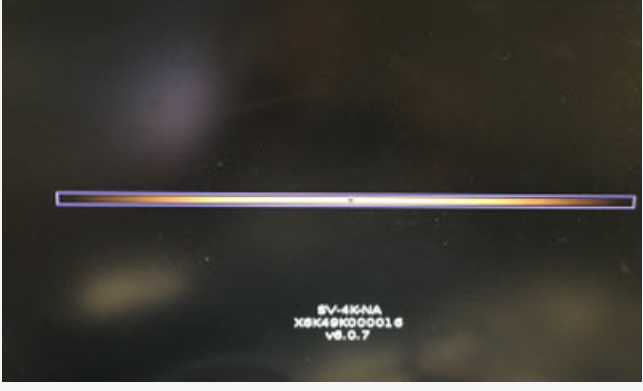
Table 21 provides a summary of the tasks and related information to deploy the SV-4K and DMP-2K media player.
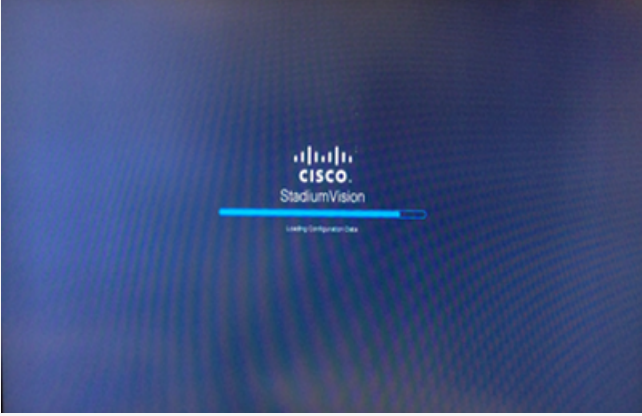
NOTE: The provisioning and registration process uses a random wait time to prevent large number of devices sending requests to the servers at the same time. As a result, the time for each SV-4K and DMP-2K device to finish the startup sequence will be different.

Table 21. SV-4K and DMP-2K Startup Task Sequence

Startup Task	TV Display:
SV-4K and DMP-2K obtains IP address from DHCP server.	
SV-4K and DMP-2K contacts the Cisco StadiumVision Director server.	
Err LED blinks for a short period (normal).	
SV-4K and DMP-2K reboots.	**IMPORTANT NOTE:** During the initial provision process, or after factory reset, the SV-4K and DMP-2K DMP will reboot multiple times before completing the process. Do not interrupt. This can take several minutes.
Firmware upgrade message	The following message appears if firmware upgrade is needed: **Current system version is out of date. Restart and update!**

Startup Task	TV Display:
(As applicable; Only after the SV-4K and DMP-2K has been initially deployed)	The device reboots to complete the upgrade process. The TV repeats display of the screens for obtaining the IP address from DHCP server and contacting Cisco StadiumVision Director server again before bypassing the firmware upgrade step.
Firmware upgrade in progress	
Configuration files from Cisco StadiumVision Director server download.	

Startup Task	TV Display:
HTML runtime starts.	
Verify SV-4K and DMP-2K device has registered in **Control Panel** > **Setup** > **Devices**.	 If Location has not yet been specified, the Type will be DMP.

Monitoring and Maintaining the SV-4K and DMP-2K Media Player

This module describes the workflow and tasks to monitor and maintain the working operation of the SV-4K and DMP-2K media player. It is intended for Cisco StadiumVision Director administrators and installers.

For more information, see also the *Cisco StadiumVision Director Operations Guide*.

This module includes the following topics:

Performing a Regular Reboot of the SV-4K and DMP-2K Media Players

The best practice for maintaining normal operation of the SV-4K and DMP-2K media players is to perform a daily reboot of the devices.

> **NOTE:** The Cisco StadiumVision Director reboot task applies globally to all media player devices.

For information about how to configure the Reboot DMP system task, see the How to Configure the Reboot DMP System Task task note.

Verifying SV-4K and DMP-2K Media Player Compliance

The Management Dashboard allows you to compare values on the SV-4K and DMP-2K device against required values configured in the Cisco StadiumVision Director SV-4K and DMP-2K settings.

Figure 13 shows how an SV-4K and DMP-2K device should appear when it is fully compliant with the configured Cisco StadiumVision Director settings:

- Required Value—Value configured in Cisco StadiumVision Director, or automatically set by the system.

- Value on Device—Setting that the SV-4K and DMP-2K device is running.

Figure 13. Normal Compliance for an SV-4K and DMP-2K Device

Table 22. SV-4K and DMP-2K Compliance Property Descriptions

Property Name	Description
init.sshd	Unused. Value is always 1 and is not configurable.
init.DHCP	Value is always "on." Static IP addresses are not supported.
init.BCNT	Unused. This value is not configurable.
init.startService_rs232	Value is always "yes."
init.startService_ntpc	NTP client service on the SV-4K and DMP-2K device. Value is always "yes."
init.version	SV-4K and DMP-2K firmware version.
ntpc.timezone	Timezone for the SV-4K and DMP-2K.
ntpc.hostname	Name of the NTP server for the SV-4K and DMP-2K. For PTP slaves, setting the time via NTP is disabled on SV-4K and DMP-2K.

Property Name	Description
ntpc.interval	Interval (in seconds) after which the PTP master synchronizes its time with the NTP host.
msi.sw_vlan	Switch VLAN reported by LLDP for the SV-4K and DMP-2K. "$svd_ignore" setting in Cisco StadiumVision means that the value is not used for compliance verification.
init.startService_snmp	(New in Release 4.1) SNMP agent service on the SV-4K and DMP-2K device. Default value is no.

To verify SV-4K and DMP-2K media player compliance, complete the following steps:

1. From the Management Dashboard, run the **Get Status** command for selected SV-4K devices:

   a. Go to:

      DMP and TV Controls > **Monitoring** > **Get Status**

   b. In the Select Devices panel, select all SV-4K devices that you want an updated status for.

   c. To execute the command, click the play (>) button located at bottom left of the panel.

2. In the Device List panel, select the SV-4K device that you want to verify.

3. Go to the device details area at the bottom of the panel and click **Compliance**.

Clearing the Storage on the SV-4K and DMP-2K Media Player

The SV-4K and DMP-2K devices have different sizes of solid-state storage:

- The SV-4K provides a minimum of 120 GB of solid-state storage, with 100 GB available for content.

- The DMP-2K provides 64 GB of solid-state storage.

If you begin to run out of storage or otherwise need to recover the SSD, you can clear the storage on the media player.

To find information about available storage, select an SV-4K and DMP-2K device in the Management Dashboard device list. Then, go to **Settings** > **Storage** in the device details area of the dashboard.

> **TIP:** The HTML runtime must be running on the SV-4K and DMP-2K media player to use this task.

Beginning in Release 4.1, you also can find information about available storage if you view device details from thumbnail view in CCM.

To clear the storage on the SV-4K and DMP-2K media player, complete the following steps:

1. Go to the Management Dashboard.

2. Select the SV-4K and DMP-2K devices that you want to clear.

3. Go to **DMP and TV Controls** > **DMP Commands** > **Reset Storage** (Figure 14).

   Figure 14. Reset Storage Command
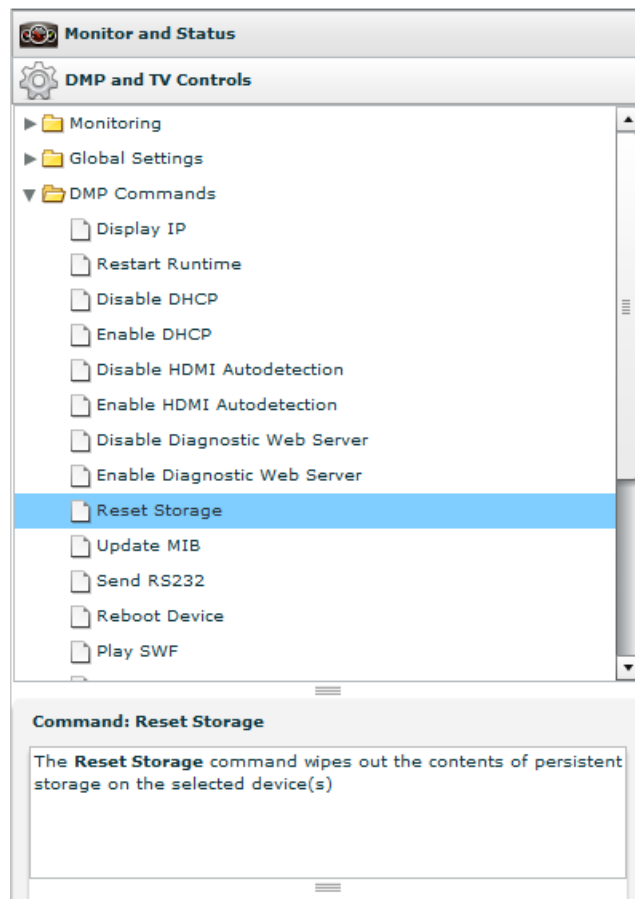
4. Click **Play**.

   The contents of the SSD storage is removed (including the Cisco StadiumVision Director runtime software and script contents) on the SV-4K and DMP-2K devices. The devices will not automatically reboot after this command.

5. Select **Reboot Device**.

6. Click **Play**.

   The selected SV-4K and DMP-2K devices reboot and reprovision firmware and settings.

Clearing Registries on the SV-4K and DMP-2K Media Player by Restoring Factory Defaults

If you need to clear the registry settings on the SV-4K and DMP-2K and re-provision the device, use the **Restore Default Settings** command.

To clear the registries on the SV-4K media player, complete the following steps:

1. Go to the Management Dashboard.

2. Select the SV-4K and DMP-2K devices that you want to clear.

3. Go to **DMP and TV Controls** > **DMP Install** > **Restore Default Settings**.

4. Click **Play**.

   Any persistent device settings on the SV-4K and DMP-2Ks are erased and the box will be in factory default state. The SV-4K and DMP-2K automatically reboots and reprovisions its firmware and settings.

Troubleshooting the SV-4K and DMP-2K Media Player

This module includes the following topics:

Before You Begin Troubleshooting the SV-4K and DMP-2K

Before you begin troubleshooting the SV-4K and DMP-2K, you should follow the information in these topics:

RMA Process for the SV-4K and DMP-2K

The Return Materials Authorization (RMA) process is covered by the Cisco Solution Support Service for Cisco StadiumVision.

Before you open a Cisco Solution Support case for the SV-4K and DMP-2K, complete the following steps:

1. Locate your symptom in the SV-4K and DMP-2K troubleshooting topics and begin to isolate the problem by following the suggested troubleshooting steps.

2. If you cannot resolve the problem with any of the recommended troubleshooting steps, open a Cisco Solution Support case to further troubleshoot and coordinate

the return process with the vendor.

SV-4K and DMP-2K Diagnostic URL

Some of the troubleshooting steps for the SV-4K and DMP-2K recommend that you open a browser and navigate directly to the device using the following URL to further diagnose a problem:

http://*dmp-ip-address*

The diagnostic URL requires a password for use. The password is set in the "defaultDmpAdminPwd" registry key in the Management Dashboard (the same password as for the Cisco DMP 4310G). The default username is "admin."

Be sure to reset the password from the default value as a security best practice.

> ⚠️ **CAUTION:** Do not manually power off the SV-4K and DMP-2K after changing the password. To change the SV-4K and DMP-2K password, you must use the Power Cycle DMP switch command from the Management Dashboard to restart the device properly. To use this command, be sure that you have imported the switch data first.

> 📌 **NOTE:** This password is also used for the Diagnostic Web Server (DWS), and is used by the Cisco DMP 4310G.

Troubleshooting PTP Operation for the SV-4K and DMP-2K Media Player

This section identifies some of the symptoms related to problems with PTP operation:

- Symptom: Local PNGs are not synchronized across SV-4K and DMP-2K devices, Page 59
- Symptom: Playlists do not advance to the next content item on the SV-4K or DMP-2K, Page 59

Symptom: Local PNGs are not synchronized across SV-4K and DMP-2K devices

Troubleshooting steps:

1. Verify the PTP configuration on your SV-4K and DMP-2K devices:

   a. Go to:

      Management Dashboard > **SV Director Configuration** > **Global DMP Settings** > **SV-DMP Common Settings**

   b. Verify that the PTP domain and PTP master candidates property configuration is correct for your network.

2. Open your browser and navigate to one of the devices:

   http://*sv4k-ip-address*/ptp.html

3. Enter the username and password.

4. Look for the message "PTP is not enabled."

   This message might mean that the device was not rebooted after changes to the Management Dashboard settings.

5. If the message appears, reboot the SV-4K or DMP-2K device.

Symptom: Playlists do not advance to the next content item on the SV-4K or DMP-2K

If the current PTP master becomes unreachable (shuts down, or becomes unreachable on the network), the PTP members will be unable to update their clocks and this condition will occur.

Troubleshooting steps:

1. Verify the PTP configuration on your SV-4K or DMP-2K devices:

   a. Go to:

      Management Dashboard > **SV Director Configuration** > **Global DMP Settings** > **SV-DMP Common Settings**

b. Verify that the PTP domain and PTP master candidates property configuration is correct for your network.

2. Open your browser and navigate to one of the devices:

   http://*sv4k-ip-address*/**ptp.html**

3. Enter the username and password.

4. Identify the PTP master by finding the unit that has an "offsetFromMaster" value of 0.0.

   Figure 15. Identify the PTP Master

5. Ping the master PTP device.

6. If the master is not reachable and you have configured alternate masters but they are not reported as master after waiting for a minute, reboot one of the reachable PTP master candidates.

   > **NOTE:** Identifying the alternate master for this step can more easily be done if you are explicitly identifying the IP address of alternate masters, and not using the "*" wildcard to specify possible election of any SV-4K device on the network.

7. If a device shows that it has not synchronized, reboot the device to force synchronization.

Troubleshooting SV-4K and DMP-2K Hardware Operation

This section identifies some of the symptoms related to problems with the SV-4K and DMP-2K media player hardware:

Symptom: "Please Insert Card" message on SV-4K or DMP-2K startup screen

Troubleshooting steps:

1. Verify that an IP address is assigned to the device.

2. Verify proper DHCP Option 43 configuration.

3. Verify that the Cisco StadiumVision Director server is running and reachable.

4. Contact Cisco Technical Support to do further troubleshooting and proceed with RMA process.

Symptom: Pwr and Eth LEDs are not lit and no signs of activity on the SV-4K or DMP-2K

Troubleshooting steps:

1. Verify any visible damage to the Ethernet port on the SV-4K or DMP-2K device.

2. If there is *not* any visible port damage on the SV-4K or DMP-2K:

   a. Connect a 12V 5A power supply to the media player to confirm startup and normal operation.

   b. Replace the Ethernet cable.

   c. Connect the media player to a known-working switch port for another SV-4K or DMP-2K device.

   d. Verify the POE+ settings on the switch.

   > **TIP:** If you have imported the switch settings to Cisco StadiumVision Director, you can view the POE+ settings.
   >
   > From the Management Dashboard, go to:
   >
   > **Tools** > **Settings** > **Switch Management** > **View Switch Details**
   >
   > Power normally displays "29.5" for the SV-4K and DMP-2K after LLDP negotiation with the switch.

   e. If none of these steps locate the problem, contact Cisco Technical Support to proceed with the RMA process.

Symptom: SV-4K or DMP-2K Err or Err/Upd LEDs blinking

Troubleshooting steps:

1. Refer to the LED documentation.

   See the ["LEDs on the SV-4K and DMP-2K Media Player" on page 11](#).

2. Troubleshoot according to the description of the problem.

Symptom: SV-4K and DMP-2K rebooting automatically after startup

Troubleshooting steps:

1. Verify whether multiple devices are doing an auto-reboot.

2. If *multiple* devices are automatically rebooting at startup:

   a. Verify that the devices are obtaining an IP address.

      If the devices are not getting an IP address ("Unable to get IP address" message on the TV display), verify communication to the DHCP server.

   b. Verify proper DHCP Option 43 configuration.

3. If the SV-4K or DMP-2K stays at the loading screen with the progress bar, verify communication with the Cisco StadiumVision Director server.

4. (Advanced) Verify that an HTTP request comes in to the /var/log/httpd/access_log (use the System State Report [SSR]).

   Look for a message like the following:

   ```
   10.194.169.242 - - [13/Oct/2014:13:10:05 -0700] "GET
   /StadiumVision/dmp_v4/scripts/boot.brs HTTP/1.1" 200 89403 "-"
   "-"
   ```

Troubleshooting SV-4K and DMP-2K TV and Video Display Problems

This section identifies some of the symptoms related to problems with the SV-4K and DMP-2K displays:

-
-

Symptom: Black screen on the SV-4K and DMP-2K TV display/no multicast video stream

Troubleshooting steps:

1. Verify if multiple TV displays are showing a black screen for the same multicast video stream.

2. If *multiple* TV displays are showing a black screen for the same multicast stream:

   a. Verify the media player LEDs.

   b. If the LEDs are in normal state, verify that the Cisco StadiumVision Director server has power and is reachable.

   c. If all TV displays are the same and/or new model, test with a different, known-working TV display model.

   d. (Advanced) Test with laptop connected to the same switch port/interface as the device with a problem, and see if the problematic video stream can be displayed using the open source VLC player.

   e. Test a different multicast video stream.

   f. Test with local video content. If local video works, troubleshoot video headend and/or other network problems.

   g. Confirm video output setting on the SV-4K or DMP-2K using a browser to go to: **http://*sv4k-ip-address***.

3. If the problem can be isolated to an SV-4K or DMP-2K device:

   a. Verify that the Pwr/Eth LEDs are on.

   b. Try a different HDMI cable.

   c. Test a different TV display.

   d. (Advanced) Test with laptop connected to the same switch port/interface as the SV-4K or DMP-2K with a problem, and see if the problematic video stream can be displayed using the open source VLC player.

Symptom: No local control when external volume strategy configured

Troubleshooting steps:

1. Is the RS-232 cable connected? Verify the cable connections.

2. Verify the serial cable type being used against the RS-232 requirements for the TV display (null modem [crossover] or straight through).

3. Verify that the external output strategy works on other TV displays.

4. Verify the RS-232 codes from the manufacturer against the TV display specifications in Cisco StadiumVision Director.

Appendix A: Management Dashboard Commands for the SV-4K and DMP-2K Media Player

This module provides a summary of the Management Dashboard commands that are supported by the SV-4K and DMP-2K media player.

Auto-Registration Commands for the SV-4K and DMP-2K Media Player

Table 23.   Management Dashboard Auto-Registration Commands

Command Name	Supported on SV-4K and DMP-2K?
Change DMP State	**Yes**
Provision DMP	No

DMP Commands for the SV-4K and DMP-2K Media Player

Table 24. Management Dashboard DMP Commands

Command Name	Supported on SV-4K and DMP-2K?
Display IP	**Yes**
Restart Runtime	**Yes**
Disable DHCP	No
Enable DHCP	No
Disable HDMI Autodetection	No
Enable HDMI Autodetection	No
Disable Diagnostic Web Server	**Yes** (SV-4K and DMP-2K only)
Enable Diagnostic Web Server	**Yes** (SV-4K and DMP-2K only)
Reset Storage	**Yes** (SV-4K and DMP-2K only)
Update MIB	No
Send RS232	**Yes**
Reboot Device	**Yes**
Play SWF	No
Stop SWF	No
Play Media URL	No
Stop Media URL	No
Set Alpha Transparency	No

DMP Install Commands for the SV-4K and DMP-2K Media Player

Table 25. Management Dashboard DMP Install Commands

Command Name	Supported on SV-4K and DMP-2K?
Firmware Upgrade	**Yes** (only for firmware upload; not to provision firmware)
Restore Default Settings	**Yes**
Initial Config	No
Stage Template	No

Command Name	Supported on SV-4K and DMP-2K?
Initialize Touchscreen	No
Show Calibration	No
Setup NTP	No

Global Settings Commands for the SV-4K and DMP-2K Media Player

Table 26. Management Dashboard Global Settings Commands

Command Name	Supported on SV-4K and DMP-2K?
Global DMP Settings	No

Monitoring Commands for the SV-4K and DMP-2K Media Player

Table 27. Management Dashboard Monitoring Commands

Command Name	Supported on SV-4K and DMP-2K?
Get Status	**Yes**
Ping	**Yes**
Enable Monitoring	No
Change Monitoring Thresholds	No
Disable Monitoring	No

Switch Commands for the SV-4K and DMP-2K Media Player

Table 28. Management Dashboard Switch Commands

Command Name	Supported on SV-4K and DMP-2K?
Power Cycle DMP	**Yes**
Power On DMP	**Yes**
Power Off DMP	**Yes**
Run Cabling Test using TDR	**Yes**
Show TDR Test Results	**Yes**
Ping Test	**Yes**
Clear ARP Cache	**Yes**

TV Commands for the SV-4K and DMP-2K Media Player

Table 29. Management Dashboard TV Commands

Command Name	Supported on SV-4K and DMP-2K?
TV On	**Yes**
TV Off	**Yes**
Set Display Input	**Yes**
Set Display Banner	**Yes**
Set Closed Caption	**Yes**
Set Volume	**Yes**
Set Video Channel	**Yes**
Show Diagnostics	**Yes**
Hide Diagnostics	**Yes**
Show Diagnostics with Message	**Yes**
Show Custom Swf	No
Hide Custom Swf	No
Display PIN	**Yes**
Hide Channel Guide	**Yes**
Disable User Control	No
Enable User Control	No

Appendix B: Serial Commands for the SV-4K and DMP-2K Media Player

This module provides a summary of the serial commands that are supported by the SV-4K and DMP-2K media player for RS-232 communication with TV displays.

> **NOTE:** These commands are not supported by the Cisco DMP 4310G.

For more informaton about configuring serial commands for RS-232 TV control, see the "Working with TV Displays in Cisco StadiumVision Director" topic of the *Cisco StadiumVision Director Operations Guide*.

Serial Commands for RS-232 TV Control on the SV-4K and DMP-2K Media Players

Table 30 shows a summary of the serial commands for the SV-4K and DMP-2K and their default values.

> **NOTE:** Different TV display models might support only certain RS-232 commands.

Table 30. SV-4K and DMP-2K Serial Commands[1]

Command Name	Value
dmp.Input1response	62203031204F4B303878
dmp.Input2response	62203031204F4B303278
dmp.Input3response	62203031204F4B303478
dmp.Input4response	62203031204F4B303078
dmp.volumeResponseFormat	66203031204F4B5F5F78
dmp.muteOnResponse	65203031204F4B303078
dmp.monitorAPIDelay	2000

---

[1]The commands in this table are supported by the LG 19LH20 TV display.

Command Name	Value
dmp.monitorAVInput	true
dmp.monitorMute	true
dmp.monitorPower	true
dmp.monitorVolume	true
dmp.displayPwrQuery	rs232.tx_hex=6B612030312046460D
dmp.displayAVInputQuery	rs232.tx_hex=6B622030312046460D
dmp.muteQuery	rs232.tx_6B652030312046460D
dmp.volumeQuery	rs232.tx_6B662030312046460D
Input1	rs232.tx_6B622030312030390D
Input2	rs232.tx_6B622030312030320D
Input3	rs232.tx_6B622030312030340D
Input4	rs232.tx_6B622030312030300D

Appendix C: Configuring an IOS DHCP Server to Support the SV-4K and DMP-2K

> 📌 **NOTE:** An IOS Switch is not recommended as a production DHCP server for a venue. This example is provided to allow for simple DHCP support for DMPs primarily used for testing and in a lab.

> 🚩 **IMPORTANT:** If a Cisco IOS DHCP Server is used for IP address allocation for DMP's in a production network, we strongly recommend using database agents to maintain the DMP address bindings in case the switch is rebooted. See IP Addressing: DHCP Configuration Guide, Cisco IOS XE Release 3SE (Catalyst 3850 Switches) for further IOS DHCP Server configuration.

In this example, a Cisco IOS DHCP server is being used. Only a single pairing of options 60 and 43 can be used within a single scope (requiring two different IP scopes if there is a need to support both the Cisco DMP-4310G and the SV-4K media players, for example). This module only provides the procedure for the SV-4K media player.

Example 1. SV-4K DHCP Scope

```
! DHCP Database Agent CLI example
ip dhcp database ftp://user:password@172.16.4.253/router-dhcp write-
delay 120
!
ip dhcp pool SV-4K
network 10.10.1.0 255.255.255.0
default-router 10.10.1.1
option 60 ascii Cisco SV-4K-NA
option 43 hex
5540.6874.7470.3A2F.2F31.302E.3139.342E.3137.352E.3132.323A.3830.383
0.2F53.7461.6469.756D.5669.7369.6F6E.2F64.6D70.5F76.342F.7363.7269.7
074.732F.626F.6F74.2E62.7273
```

> **NOTE:** The periods in the option 43 string are automatically created by the IOS and *are not typed* when creating the ASCII string. An example of the raw ASCII string value as typed can be found below.

Example 2. Creating Option 60

Type the line as shown above. Possible variations are as follows:

Some IOS versions may require the text enclosed in quotes "Cisco SV-4K-ROW". If the IOS doesn't accept a leading quote in the string, then quotations are not needed.

SV-4K string for North America DMPs: "Cisco SV-4K-NA" SV-4K string for all other region DMPs: "Cisco SV-4K-ROW"

Example 3. Creating Option 43

Option 43 is a vendor-specific option. For the SV-4K and DMP-2K media player, it needs to point to a specific URL to execute auto-registration, auto-provisioning, and to receive initial firmware and subsequent upgrades, etc. That URL is:

http://*x.x.x.x*:8080/StadiumVision/dmp_v4/scripts/boot.brs

where *x.x.x.x* represents the IPv4 address of the Cisco StadiumVision Director server.

Different devices require option 43 information be presented in different formats. The SV-4K and DMP-2K media player requires type-length-value (TLV) format for the data string. Specifically, the TLV format is constructed in the following manner:

- The string is built using hex values.
- The string begins with a two-character hex representation of the option 43 Type (an option 43 sub-option).
- The second two-character hex representation is the length of the information string, expressed in the number of ASCII characters of the string.
- Following the length value, the ascii string is typed out by using the two-character hex representation of each character in the string.
- For the SV-4K media player, the type designation is type 85 (decimal), expressed as type 55 (hex).

Example 4. Option 43

For the following URL string:

```
http://10.194.175.122:8080/StadiumVision/dmp_v4/scripts/boot.brs
```

The option 43 string would be as follows (except all on one line, without carriage returns) in the following format:

```
option 43 hex value
```

As shown below, the resulting URL above would be represented by the string below:

option 43 hex (there is a space here between 'hex' and the remainder of the string)

```
a.3830.3830.2f53.7461.6469.756d.5669.7369.6f6e.2f64.6d70.5
f76.342f.7363.7269.7074.732f.626f.6f74.2e62.7273
```

Using the description above and the ASCII lookup table below, the first characters of the string would be explained in the following way:

```
5540687474703A2F2F
```

55 – Type code in hex

40 – Length of the characters to the right of the length value, expressed by counting the number of two-character ascii characters represented (form the chart below). The numbers if characters in the example above is 64.

Decimal 64 = 40 hex.

And the first few characters, one at a time, would be as follows:

```
68 74 74 70 3A 2F 2F
```

H t t p : / /

The IP address is then represented the same way:

```
31 30 2E 31 39 34 2E 31 37 35 2E 31 32 32
```

10.19 4.17 5 .122

The remainder of the string is the text of the remainder of the URL.

> **NOTE:** As a Linux OS device, the Cisco StadiumVision Director server is case sensitive, and the correct letter case must be represented in the ASCII text strings.

The example IP address was 12 characters long which leaves the remainder of the hex string to be 50 characters long. Add the number of ASCII characters in your IP address (including the dots!) to the known 50 characters and create your string length value to replace the 3E.

This technical information can be used to program other 3rd-party DHCP servers.

Figure 16. ASCII Character lookup table

DEC	HEX	Symbol	Description
32	20		Space
33	21	!	Exclamation mark
34	22	"	Double quotes (or speech marks)
35	23	#	Number
36	24	$	Dollar
37	25	%	Procenttecken
38	26	&	Ampersand
39	27	'	Single quote
40	28	(	Open parenthesis (or open bracket)
41	29	)	Close parenthesis (or close bracket)
42	2A	*	Asterisk
43	2B	+	Plus
44	2C	,	Comma
45	2D	-	Hyphen
46	2E	.	Period, dot or full stop

DEC	HEX	Symbol	Description
47	2F	/	Slash or divide
48	30	0	Zero
49	31	1	One
50	32	2	Two
51	33	3	Three
52	34	4	Four
53	35	5	Five
54	36	6	Six
55	37	7	Seven
56	38	8	Eight
57	39	9	Nine
58	3A	:	Colon
59	3B	;	Semicolon
60	3C	<	Less than (or open angled bracket)
61	3D	=	Equals
62	3E	>	Greater than (or close angled bracket)
63	3F	?	Question mark
64	40	@	At symbol
65	41	A	Uppercase A
66	42	B	Uppercase B
67	43	C	Uppercase C
68	44	D	Uppercase D
69	45	E	Uppercase E
70	46	F	Uppercase F
71	47	G	Uppercase G
72	48	H	Uppercase H
73	49	I	Uppercase I
74	4A	J	Uppercase J
75	4B	K	Uppercase K
76	4C	L	Uppercase L
77	4D	M	Uppercase M
78	4E	N	Uppercase N
79	4F	O	Uppercase O
80	50	P	Uppercase P
81	51	Q	Uppercase Q
82	52	R	Uppercase R
83	53	S	Uppercase S
84	54	T	Uppercase T
85	55	U	Uppercase U

DEC	HEX	Symbol	Description
86	56	V	Uppercase V
87	57	W	Uppercase W
88	58	X	Uppercase X
89	59	Y	Uppercase Y
90	5A	Z	Uppercase Z
91	5B	[	Opening bracket
92	5C	\	Backslash
93	5D	]	Closing bracket
94	5E	^	Caret - circumflex
95	5F	_	Underscore
96	60	`	Grave accent
97	61	a	Lowercase a
98	62	b	Lowercase b
99	63	c	Lowercase c
100	64	d	Lowercase d
101	65	e	Lowercase e
102	66	f	Lowercase f
103	67	g	Lowercase g
104	68	h	Lowercase h
105	69	i	Lowercase i
106	6A	j	Lowercase j
107	6B	k	Lowercase k
108	6C	l	Lowercase l
109	6D	m	Lowercase m
110	6E	n	Lowercase n
111	6F	o	Lowercase o
112	70	p	Lowercase p
113	71	q	Lowercase q
114	72	r	Lowercase r
115	73	s	Lowercase s
116	74	t	Lowercase t
117	75	u	Lowercase u
118	76	v	Lowercase v
119	77	w	Lowercase w
120	78	x	Lowercase x
121	79	y	Lowercase y
122	7A	z	Lowercase z
123	7B	{	Opening brace
124	7C			Vertical bar

DEC	HEX	Symbol	Description
125	7D	}	Closing brace
126	7E	~	Equivalency sign - tilde
127	7F		Delete