



StadiumVision



Cisco StadiumVision Content Creation Design and Specifications Guide for the Cisco DMP 4310G and SV-4K

Release 4.0

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About This Guide

This document serves as the master reference guide for creating content for the Cisco StadiumVision solution. It is intended for Cisco StadiumVision technical marketing engineers, product managers, creative services delivery team, and customers to prepare the graphics and content they want to deploy with Cisco StadiumVision.

Cisco Creative Services for Cisco StadiumVision

The Cisco StadiumVision solution combines high-definition video delivery with state-of-the-art digital signage to deliver distinctive in-venue sports and entertainment experiences. Several crucial factors contribute to the success of any digital signage deployment – not the least of which is the quality of the content. To sponsors and advertisers, the quality of the displayed content can significantly contribute to the effectiveness of their advertising campaign. To a venue, the quality of the displayed content can make an even greater contribution to their ability to generate incremental sponsorship revenue.

To help venues ensure the quality of their content and to achieve a high level of return on their investment, Cisco offers Creative Services. This service provides a comprehensive content strategy designed to address the goals of both sponsors and advertisers and of the venue, with top-quality digital content created by our team of award-winning creative experts.

To more information, please contact the Cisco Creative Services team or your local Cisco account representative.

Related Documentation

- [*Cisco StadiumVision Director External Content Integration Guide*](#)
- [*Cisco StadiumVision Director Operations Guide*](#)
- [*Cisco StadiumVision Headend Design and Implementation Guide*](#) (on ciscoet.com)

- [Cisco StadiumVision Local Control Areas Design and Implementation Guide](#)
- [Cisco StadiumVision SV-4K Media Player Deployment Guide](#)
- [Cisco StadiumVision Video Endpoint \(DMP\) Design and Implementation Guide](#)
- [Release Notes for Cisco StadiumVision Director, Release 4.0](#)

Document History

Table 1. Document Revision History

Date	Description
December 23, 2015	Changed H.254 to H.264 in this table and in the "Supported Video and Audio Formats" on page 19 .
December 4, 2015	Added a guideline to the "Basic HTML Pass-Through Content Guidelines " on page 28 indicating that external URL content in a script needs to be a minimum of 60-seconds. In addition, minor text changes to existing guidelines were made.
November 2, 2015	Updated the "Guidelines for Custom Screen Templates" on page 8 to clarify non-video content behavior in layered regions.
July 28, 2015	<ul style="list-style-type: none"> • Added H.264 profile specifications to the "Supported Video and Audio Formats" on page 19. • Added 'X-Frame-Options' header error information as well as clarified that only one external content type should be used on a media player at any given time "External URL, HTML Pass-Through Content Support" on page 27. • Defined the maximum number of scripts in the "Guidelines for Event States and Event Scripts" on page 23. • Updated the "Basic HTML Pass-Through Content Guidelines " on page 28 to indicate that the background color of a web page should be defined. • Updated the "Best Practices for HTML Features Using Hardware-Acceleration" on page 1 to include current SV-4K HTML5 information.

Document History

Date	Description
May 19, 2015	<ul style="list-style-type: none">• Added information about default fonts for the SV-4K media player and guidelines for web fonts for external URLs in "Basic HTML Pass-Through Content Guidelines" on page 28
May 1, 2015	<p>Updated the following for the Cisco StadiumVision Director Release 4.0.0-525:</p> <ul style="list-style-type: none">• Updated the "Guidelines for Event States and Event Scripts" on page 23 and "Guidelines for Creating Playlists" on page 25.• Added "Macroblocking" on page 18.• Updated the SV-4K "Supported Video and Audio Formats" on page 19.
March 20, 2015	First release of this document for Cisco StadiumVision Director Release 4.0.0-402.



Screen Template Specifications

This chapter defines the screen templates supported by Cisco StadiumVision Director.

Default Screen Template


Cisco StadiumVision Director includes default screen templates to make it easy to create event scripts. The dimensions for the default screen templates are fixed and cannot be changed.

Alternatively, you can create custom screen templates (where you specify different sizes for the screen template regions) and overlay screen templates (where you have a non-video or video region overlapping a video or mixed media region).

[Table 2](#) defines the default screen templates that are included with Cisco StadiumVision Director 4.0 and when installing a full ISO image from Release 3.0 and later. Installing a full ISO image would remove previously available templates.

Table 2. Default Screen Templates

Template Name	Content Type	Dimensions	Region Layout
Full Screen Video	Displays full-screen video.	Video: 1920x1080	video
Full Screen Graphic	Displays full-screen graphic.	Graphic: 1920x1080	graphics
3-Region L-wrapper	Displays live video footage in Region 1, a playlist of advertisements in Region 2, and a ticker with scores or news in	Video: 1624x914 Ads: 296x914 Ticker:	video ads ticker

Template Name	Content Type	Dimensions	Region Layout
	Region 3. Also referred to as an "L-wrapper."	1920x166	
Full Screen Dual Video	Displays a full screen video in each video region (video 1 and video 2). Using luma keying on video region 2, you can enable select areas of video region 1 content to be visible through video region 2. The Full Screen Dual Video template is only available to use on the SV-4K media player.	Video 1: 1920x1080 Video 2: 1920x1080	



NOTE: Obsolete templates (such as 3-Region, Welcome, Exit, Emergency, Outside Emergency, 3-Region, 3-Region double) might still appear in your system if you have upgraded from earlier releases.

Template Resolutions

The default Cisco StadiumVision Director screen template size is 1920x1080.

Full Screen Default Templates

The full screen templates that come with the Cisco StadiumVision Director software are used to display full-screen video (or mixed media) or full-screen graphics. [Figure 1](#) shows an example of a video (or mixed media) in the full screen template. [Figure 2](#) shows an example of a graphic in the full screen template. Both are fixed screen templates and cannot be customized.

Figure 1. Full Screen Video (or Mixed Media) Template Example



Table 3. Full Screen Video or Mixed Media Template Dimensions

Content Type	Dimensions
Region 1: Video or Mixed Media	Region 1: 1920x1080
Full Screen Video	1920x1080

Figure 2. Full Screen Graphic Template Example



Table 4. Full Screen Graphic Template Dimensions

Content Type	Dimensions
Region 1: Graphic	Region 1: 1920x1080
Full Screen Graphic	1920x1080

3-Region L-Wrapper Default Template

[Figure 3](#) shows an example of the content for the 3-Region L-wrapper template that comes standard with Cisco StadiumVision Director. This is a fixed screen template and cannot be customized.

Figure 3. 3-Region L-Wrapper Template





Table 5. 3-Region L-wrapper Region Template Dimensions

Content Type	Dimensions
Region 1: video or mixed media	Region 1: 1624x914
Region 2: non-video	Region 2: 296x914
Region 3: non-video	Region 3: 1920x166

[Table 6](#) lists the characteristics of the 3-Region L-wrapper screen template.

Table 6. 3-Region L-wrapper screen template characteristics

Region	Description
Region 1	<ul style="list-style-type: none"> • 16:9 aspect ratio. • Supports live video broadcasts. For more details on video formats, refer to the Cisco StadiumVision Director Video Headend Design and Implementation Guide for your release.
Region 2	<ul style="list-style-type: none"> • Supports playlists of advertisements. • Due to the small dimensions of region 2, use graphic-intensive ads rather than ads that have a lot of small text in this region.
Region 3	<ul style="list-style-type: none"> • Designed for displaying a graphic and/or information in the form of a ticker. • The ticker content can be from a compatible RSS feed approved by the stadium. • The ticker region can be customized with the stadium logo (with the ticker content playing in the remaining space).

Full Screen Dual Video Default Template (SV-4K Media Players Only)

Beginning with Cisco StadiumVision Director Release 4.0, a full screen dual video default template is available for the SV-4K media player. Dual video regions allow you to overlay two video regions; a secondary local or multicast video region and a primary video region.

The dual video template provides the following capabilities:

- Show two video feeds at the same time.
- Place video-based advertisements.
- Promote a moment of exclusivity during an event.
- Apply luminance (luma) keying to the secondary video region.



NOTE: The dual video template is only supported on the SV-4K media player.

[Table 7](#) lists the specifications of the dual video regions.

Table 7. Full Screen Dual Video Template Specifications

Region	Specification
Video 1	<ul style="list-style-type: none">• Can be controlled using an infrared remote (IR) remote or local control.• In the template, video region 1 appears as the bottom or primary layer.• Supports audio.• Source: Local or multicast video.
Video 2	<ul style="list-style-type: none">• Cannot be controlled through an IR remote or local control.• In the template, video region 2 fully overlaps video region 1.• Luminance (luma) keying is applied to second video region (it cannot be disabled or changed in the template).• Does not play audio.• Source: Local or multicast video.



NOTE: The luma key default is set to #ff2000. To enable luma keying, click the checkbox. To change the global luma key value from the **Management Dashboard**, go to **SV Director Configuration > System Configuration > Global DMP Settings > SV-4K Settings**.



NOTE: For additional information on luma keying, refer to the [Cisco StadiumVision Director Operations Guide](#).

Guidelines for Dual Video Screen Templates (SV-4K Media Players Only)

When using the dual video template for the SV-4K, consider the following:

- A combination of up to full-HD (1920x1080) at either 30 or 60 fps for local video and multicast video are hardware-accelerated.
- While using multicast videos for both video regions is supported, it is recommended to use a combination of multicast and locally stored videos for the video regions.
- Video regions must be placed below any non-video content for consistent playback and performance.
- Match the template region aspect ratio with the aspect ratio of the video content that will play in that region.
- If the secondary video region is not displaying verify that there are no staging errors, that the secondary region is not behind the primary region, and the resolution does not exceed 1920x1080.
- In the dual video template, the secondary region (video 2) will appear above the primary region (video 1). Utilizing luma keying on video region 2, you can enable select areas of video region 1 content to be visible through video region 2. If you want to change the order of the dual video regions, copy the locked template to create a custom template and change the order accordingly.



NOTE: Cisco StadiumVision Director Release 4.0 only supports HD/SD video. It does not support 4K content (PNG, local video, streaming video).

Custom Screen Templates

Cisco StadiumVision Director supports custom screen templates that allow you to change the size and arrangements of the regions on the screen to fit the sponsor/venue needs. Refer to [Figure 4](#) for an example.

Figure 4. Custom Template Example



Guidelines for Custom Screen Templates

Consider the following guidelines when creating custom screen templates:

- Regions can contain non-video content (static graphics), video, or a combination of both (in a mixed media region).
- The number of allowable regions will vary based on the media player.
- Up to 5 regions are supported for each screen template, more than 5 may cause degradation. Results may vary depending on what type of non-video content is used. For example, a very simple widget may not cause degradation but a very complex widget could.

[Table 8](#) provides the number of content regions that you can have when creating custom templates.

Table 8. Number of Allowed Content Regions When Creating Custom Templates

Region Type	SV-4K	DMP 4310G
Non-Video (Graphics)	Zero or more	Zero or more
Video Region 1 or Mixed Media	Up to one	Up to one
Video Region 2 or Mixed Media	Up to one	Not Supported

- A custom template designed for SV-4K media players can contain up to two video regions.
 - Using luma keying on video region 2, you can enable select areas of video region 1 content to be visible through video region 2.
 - You can change the order of the video regions by changing their relative layer order in the template.

-
- When layering regions, the non-video content (graphics, widgets, etc.) will always appear above the video content.



IMPORTANT: When layering two video/mixed media regions on the SV-4K, if the playlist for the first video/mixed media region includes both video and non-video content, then the non-video content in the first region will always appear on top of the video in the second video region.

If you must include non-video content in region 1, then a workaround is to create a local video of the static content and use that in the playlist so that it remains in the primary region.

- To optimize performance, the video and graphic aspect ratio sizes should match the aspect ratio of the region. Multi-screen template stretching is not currently supported on SV-4K media players.
- All regions must fit within the 1920x1080 dimensions. If you are using an overlay, then you can have two regions that are both 1920x1080.



NOTE: SV-4K media players support negotiation to many resolutions, however when the negotiated resolution is less than 1920x1080, the template will be cropped to that lower resolution.

Overlay Screen Templates

Overlay screen templates are custom templates that allow a non-video region (graphics) to overlap a video (or mixed media) region on the DMP 4310G and SV-4K media players.



TIP: On the SV-4K media player, you can also create a custom template that allows for [dual video regions](#).

This overlay feature can be assigned to any region. Using the overlay feature you can display:

- A full-screen video (or mixed media) region with a full-screen non-video (graphics) content region overlaid on top.
- A brand/graphic overlaid in a small region of the screen.
- A ghosted brand/graphic such as a transparent logo where some of the colors in the logo are transparent and others are not.



NOTE: When creating an overlay screen template on the SV-4K media player that has a primary video and a non-video region on top, be sure the image is designed to fit on the canvas. If the image is placed off the canvas, only part of the image will appear.

The recommended file format for graphics when using an overlay template is 8-bit or 24-bit PNG (transparent pixels supported). When you create the PNG file, you must make the pixels transparent for the full-size video region. JPG files are not recommended because they do not preserve transparency.



NOTE: The Global MIB Variable on the Cisco DMP 4310G needs to be changed to “Color Key Off” or you will not be able to create graphics with 00 Black (R:0 G:0 B:0) or anything black will appear transparent. Graphics always overlay video—you cannot put video over graphics.

General Guidelines for All Screen Templates

When creating screen templates and populating content, consider the following:

- Templates are ordered by name.
- For Proof of Play, you can have more than one region with an ad playlist.
- Regions are listed from top-to-bottom layer order, where the top layer appears at the top of the list.
- Layers are numbered, where the video region always appears at the bottom of the list (Region 1).



NOTE: You can manually drag a video region to be on top of other regions; however, the rendering of the regions below the video region will not be predictable, and can be completely invisible.

- A plus sign icon adds a non-video region.
- A film icon adds a video or mixed media region.
- Switching a non-video region to a video region might produce a warning if there is already an existing video region.
- Saving an existing template with regions removed will produce a force dialog for confirmation. In addition, when a template that is used in an event script is edited (including when one is adding a region) a force dialog appears for confirmation. You should also edit the scripts that use the changed template to verify that the added or removed regions contain the appropriate content and changes occur as expected.



NOTE: Cisco StadiumVision Director Release 4.0 only supports HD/SD video. It does not support 4K content (PNG, local video, streaming video). Review the list of supported content in the [Content Rules and Specifications](#) section.

Best Practices for Video Walls

When implementing video walls, consider the following best practices:

- Use the same media player model (either all DMP 4310G or all SV-4K media players) throughout the video wall.
- Use the same TV model throughout the video wall with a uniform bezel size (ultra narrow bezel strongly recommended).



NOTE: TV screens with an ultra narrow bezel help ensure the best viewing experience without important text or data being cut off.

- While using multicast videos for both video regions is supported, it is recommended to use a combination of multicast and locally-stored videos for the video regions (or local video for both video regions).
- Create video to be the same size as the video region where it will be rendered. This avoids any unnecessary video scaling.
- Use consistent video aspect ratio, and design video regions so that they are consistent with the aspect ratio of video content.
- Use constant bit rate (CBR) for local video files for best performance in video walls.

Prerequisites for Video Walls

Before you deploy video walls and create the content for them, be sure that the following conditions are met:

- Local video or image content to be played in an SV-4K video wall first must be created in the overall format of the video wall to be supported, and then edited into separate 1920x1080 files that contain the segment of content to be shown on each display. Stretching a piece of content across multiple screens is not supported on the SV-4K.

For example, in a 2x2 SV-4K video wall (4 screens), the original content should be in 3840x2160 format (that is, 2 times 1920x1080).

Then, it should be broken into four individual files of 1920x1080 format to show the appropriate portion of the content for the 4-screen display.

- For SV-4K content synchronization:
 - Each SV-4K media player must be in its own group.
 - All content (and for all TVs in a video wall zone) must be deployed using the same template.
 - For each region, the playlists must have the same number of items, type of item, and duration of each item, or have no playlist at all in the region (empty).

[Table 9](#) shows an example of playlist content for a 2x2 SV-4K video wall with a mix of local video and image content. Notice that all first items in each of the four playlists are of the same type (PNGs), with the same duration, but the content itself is not the same. Likewise, the second item in each playlist is video content with the same duration, but different files.

Table 9. 2x2 Video Wall Playlist Example for the SV-4K

	Playlist 1	Playlist 2	Playlist 3	Playlist 4
1	30s: PNG 1-1	30s: PNG 1-2	30s: PNG 1-3	30s: PNG 1- 4
2	34s: MP4 2- 1	34s: MP4 2- 2	34s: MP4 2- 3	34s: MP4 2- 4
3	21s: MP4 3- 1	21s: MP4 3- 2	21s: MP4 3- 3	21s: MP4 3- 4

- Trim local video item duration to boundaries in seconds and not fractions of seconds.



IMPORTANT: If your imported video content duration is in fractions of seconds, then the Content screen shows the actual item duration for the video. However, the system actually rounds that content duration for the playlist to even time boundaries (in seconds). Also, if you manually change the item duration within the Cisco StadiumVision Director UI, the content playback will be truncated.

- For SV-4K zone-based video wall synchronization:
 - Each SV-4K media player must be in its own group.
 - Collectively, the SV-4K groups that are part of the video wall are placed in a zone.

-
- The "Use as Video Wall" checkbox is selected when you create the zone for the SV-4K groups.

Restrictions for Video Walls

Before you create video walls with the SV-4K , consider the following restrictions:

- Multicast video is not supported for a multi-screen video wall. For example, the SV-4K cannot stretch multicast content across four displays to convey a single image.
- All SV-4K screens in the video wall should use 1920x1080 format.
- Widgets, external URLs, and multicast video tuning synchronization are not supported by the SV-4K DMP-to-DMP content synchronization feature.
- When using zone-based content synchronization for video walls, one SV-4K device controls synchronization. If that SV-4K stops showing video, then all SV-4K displays in the video wall stop showing content.

Video Wall Design Examples

This section provides examples of some of the more common and currently deployed video wall designs in Cisco StadiumVision venues.



TIP: Be sure to consult with the video wall experts from the Cisco Creative Services team for any of your video wall ideas, including non-standard configurations. This team can help you with ideas, best practices, and wiring diagrams to ensure a successful deployment.

2x3 TV-Based Tile Matrix Video Wall Example

[Figure 5](#) shows a video wall commonly used in a concourse area, with a larger game feed for groups of patrons to watch, along with rotating sponsor content displayed beside the game.

Figure 5. 2x3 Video Wall Content Example



A 2x3 video wall is the most common video wall that Cisco recommends because in the left 2x2 group of displays, the game feed maintains the proper 16:9 aspect ratio of the HD game feed.

The right 2x1 group of displays can work independently from the game feed and show sponsor, social, or other content throughout the game. The user also can change the type of content that plays during the game. For example, during half-time or period break, when there is no game feed, the user can switch the 2x2 to play full screen sponsor content, while changing the 2x1 to show upcoming events or team branded content so that there are not any sponsor conflicts.

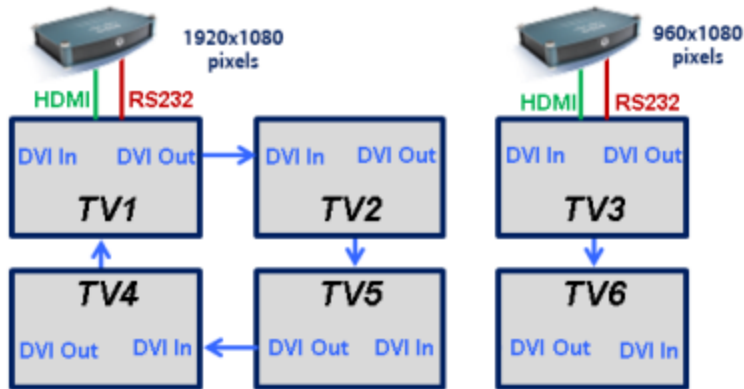
[Figure 6](#) shows the cabling for the 2x3 video wall example, where two Cisco DMP 4310Gs are used to break the wall into different display areas.

The first DMP provides the 2x2 game feed and the second DMP provides the 2x1 sponsor ads.



NOTE: This cabling design is best suited for the Cisco DMP 4310G, and is not the recommended design for the SV-4K media player. Instead, a single player per display is preferred for video walls. For more information, see the ["DMP Connection Per TV Display in a Video Wall"](#). In addition, use of any resolution other than 1920x1080 is not technically supported on the SV-4K (although it might work).

Figure 6. 2x3 Video Wall Cabling Example for the Cisco DMP 4310G Using TV Tile Matrix Functionality.



These dedicated DMPs provide the video signal for the group of TVs that the DMP is connected to through the daisy-chain. Depending on the screen manufacturer, the RS-232 connections can also be daisy-chained if this feature is available.

When operating in tile matrix mode, the TVs are fed the same video signal. Based on the TV's tile matrix configuration, the TV knows to first scale input video to the size of the configured x,y dimensions, and then to display its "piece" of the overall display based on its configured position within the matrix.



NOTE: If you want to show multiple types of content, such as four different channels on each of the screens, then you need to connect a Cisco DMP 4310G behind each TV.

Other Video Wall Configurations

While the 2x3 video wall is the most commonly used video wall configuration, using the information and concepts for the ["2x3 TV-Based Tile Matrix Video Wall Example " on page 13](#), you can create any number of different video wall configurations.



IMPORTANT: These video wall examples require a different number of DMPs and cabling than the 2x3 video wall.

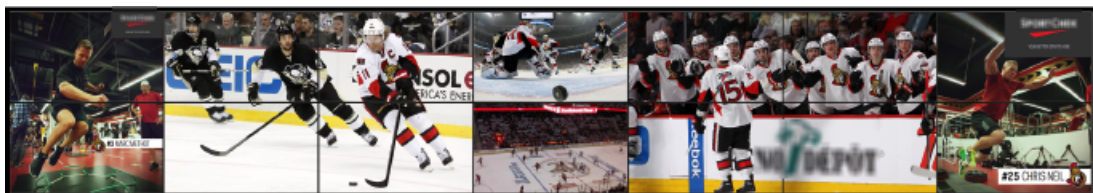
Figure 7. 4x4 Video Wall Example



Figure 8. 3x5 Video Wall Example



Figure 9. 2x7 Video Wall Example





Content Rules and Specifications

Before you import content, be sure your content is in the correct format, is the appropriate size, and has the correct dimensions for where it will be displayed. If the content is not the correct size for the region into which it will be placed, the image will either be cropped or there will be blank space in the region.

Content Dimensions

The content dimensions will depend on whether the image will play in full screen mode or in one region of a multi-region screen template. If it is shown in full screen mode, the image should match the resolution of the graphics screen:

Both Media Players: 1920x1080

Here are some things to consider regarding content:

- If the content will be shown in a region of a multi-region screen template, it is advised that the content match the dimensions of that specific region.

Video Sources

Cisco StadiumVision supports two basic sources of video content:

- Video from the headend (in-house, terrestrial TV, satellite and cable providers feeds, typically multicast).
- Video locally stored and played through a video playlist or a mixed media playlist (beginning in Release 3.1).

Video From the Headend

The format of video provided from the headend is dependent upon the source. See the [Cisco StadiumVision Video Headend Design and Implementation Guide](#) for more details.

Guidelines for Video Content

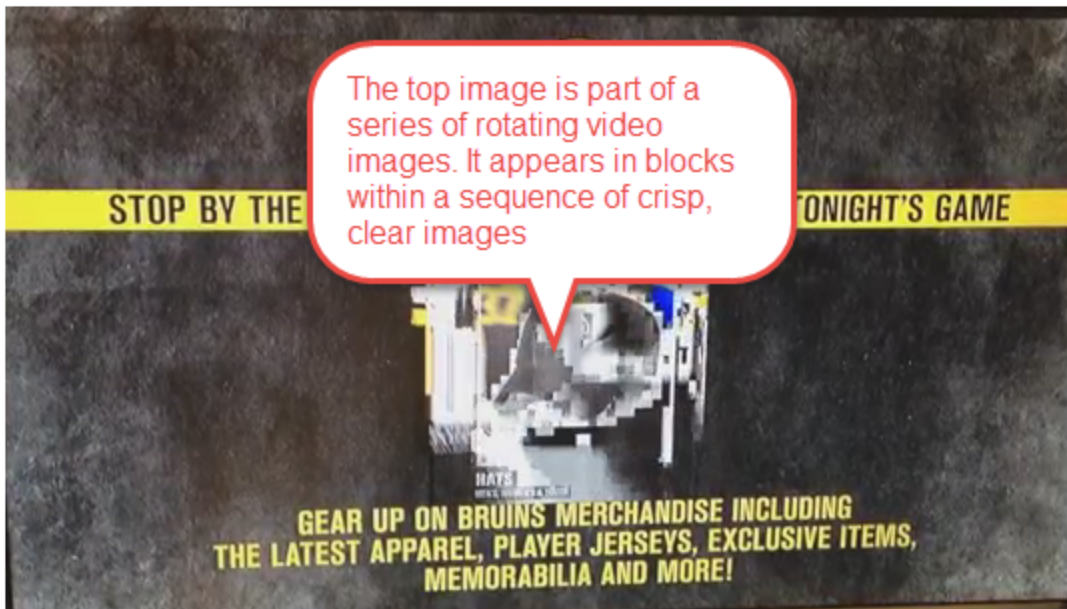
Consider the following guidelines for deployment of video content in Cisco StadiumVision Director:

- Video files can range in size, however the maximum supported file size is 2 GB.
- Be sure that your video content meets the requirements described in the ["Supported Video and Audio Formats" on the facing page](#)
- For SV-4K video content:
 - Use a combination of multicast and locally stored videos for the video regions. While using multicast or locally-stored videos for both video regions is supported, it is recommend to use a combination of multicast and locally-stored videos for the video regions (or local video for both video regions).
 - Create video content that is the same size as the video region in which it will be rendered. This avoids any unnecessary video scaling.
 - The audio track for any local video content should be sampled at 48 kHz.
 - All local video content must include an audio PID (even if silent, without an audio source present).
 - Use progressive video modes instead of interlaced to achieve optimal video display.

Macroblocking

Video content that contains large IFrames can cause macroblocking during playback on SV-4K media players. Macroblocking is a video artifact where areas of a video image appear as small blocks or squares as shown in the following figure.

Figure 10. Macroblocking Video Content Example



Using CBR video is a requirement and you must also adhere closely to the content guidelines to mitigate the issue. However, if you are using the Adobe Creative Cloud video encoding tool, you might have to use the special settings to work around a problem with non-standard H.264 support. The rendition settings include using VBR as detailed below.



NOTE: Please pay special attention to the Key Frame Distance setting below.

- Render settings:
- VBR, 1 pass
- Target: 10 Mbps
- Max: 12 Mbps
- Key Frame Distance: 9

For more information, see CSCut02474 in the [Cisco StadiumVision Director Release Notes for Release 4.0](#).

Supported Video and Audio Formats

The tables below define the supported video and audio formats for full-screen video stored locally on the media players and played through a video playlist.



NOTE: Cisco StadiumVision Director Release 4.0 only supports HD/SD video. It does not support 4K content (PNG, local video, streaming video).



NOTE: For local video playback on the media players, Constant Bit Rate (CBR) is recommended for best performance. Variable Bit Rate (VBR) will also work but synchronized video playback could be compromised.

Table 10. Supported Video/Audio Formats for Localized Files for the DMP 4310G

Format	DMP 4310G
Format	HD/SD is supported. MPEG-2 TS (Transport Stream) required for seamless looping of video files. MPEG-4 Cisco StadiumVision Director supports .mpg, .mpeg, .mp4, .m2t, .m2ts, and .ts file types.
Video Resolution	1920x1080
Aspect Ratio	Widescreen 16x9 (1.0 Square Pixels)
Field Order	Progressive
Video Bit Rate	20 Mbps
Video Bit Rate Encoding	CBR (Constant Bit Rate) GOP Settings: M Frames 3 N Frames 15
Audio Format	MPEG
Audio Layer	MPEG-1, Layer II
Audio Mode	Stereo
Audio Sample Size	16 bit
Audio Frequency	48 kHz
Audio Bit Rate	128

Table 11. Supported Video/Audio Formats for Localized Files for the SV-4K

Format	SV-4K
Format	HD/SD is supported. MPEG2-TS (Transport Stream) MPEG-4 Cisco StadiumVision Director.mpg, .mpeg, .mp4, .m2t, .m2ts, and .ts file types. mp4 is recommended to reduce black frames. H.264 Specifications: Support for Main or High Profiles up to level 4.2, AAC audio, CBR audio (VBR is not supported).
Video Resolution	Maximum supported resolution: 1920x1080.
Aspect Ratio	Widescreen 16x9
Field Order	Progressive
UDP multicast and File-Based Video	Codec: H.264 Encapsulation: MPEG2-TS or MPEG-4
Video Bit Rate	Recommended 30 to 40 Mbps constant bit rate (CBR). Note that a second video decoder can simultaneously support a second 1080p video at up to 40 Mbps.
Audio Streaming	Cisco StadiumVision Director does not support streaming audio, for example audio-only tracks.
Local Audio Sample Rates	48 kHz

Static Graphic Formats

Static graphics are used for advertisements or informational messages that do not require motion. This could include Welcome messages for luxury suites or directional information after an event. Static graphics are stored locally on the media players. [Table 13](#) lists the allowable formats for static graphics.



NOTE: Cisco StadiumVision Director Release 4.0 only supports HD/SD video. It does not support 4K content (PNG, local video, streaming video).

Table 13. Static Graphic Formats

Graphic Format	SV-4K	DMP 4310G
JPEG, non-progressive; 8-bit RGB. CMYK, grayscale, and duotone are not supported.	Yes	Yes
JPEG, progressive	Yes	No
PNG	Yes 8, 16, 24, and 32-bit (24-bit with 8-bit transparency) recommended	Yes 8 and 24-bit recommended
Flash Player 7, Action Script 2.0 Support Only	No	Yes, however it is not recommended given flash performance is not optimal.

Guidelines for Static Graphics

- The maximum number of files you can import at one time is 100. Therefore, if you have a large number of graphic files to upload, place them in a zip file and upload the zip file. Otherwise, upload them in batches of 100 files or less. The total file size must be less than 100 MB.
- For vertical content, graphics and video are not rotated by the DMP. Therefore, they need to be created in a vertical format and then rotated 90 degrees to be oriented for a vertical screen.
- Content file names can have "-" and "_", but not white space(s) and other special characters.

Event States and Event Scripts

Event states and event scripts control when and what content displays over the course of an event. For example, a Welcome message for Pre-game, a food promotion at halftime and an Exit message at the end of the game. An event state is a period of time in which the group of screens will exhibit the same behavior e.g., the same screen template, playlists and channel. Event states can change over the course of time (Pre-Game, In-Game, Post-game etc).

Guidelines for Event States and Event Scripts

Consider the following guidelines when creating event states and event scripts:

- Cisco StadiumVision Director displays the default video channel / non-event state on the media players when an event script is not running on it.
- When you use Proof of Play content in your playlist, and especially when your PoP content is included near or up to the end of the playlist, you should define a final script state (without any PoP content) that runs for at least 60 seconds so that all PoP data has time to be captured by Cisco StadiumVision Director. This last event state is commonly set up to turn off the displays in the venue.
- When you configure a script action for a zone, then by default all groups within that zone inherit the defined action. You can override this inheritance by configuring a script action for a particular group within that zone.
- When a zone contains multiple groups, and if you configure script actions for a particular group, those actions will apply only to that group.
- Cisco StadiumVision Director supports only one RS-232 command per event state.
- Maximum number of simultaneous scripts (when per-script multicast is in use) is 20.

Groups and Zones

Groups and zones allow you to apply attributes to a number of screens with a single action. They simplify the control of advertisements in sponsored areas of the stadium, enabling all the screens in a sponsored zone to have the same branded messages, the same playlists, and the same video content.

Group and zone associations can be made any time prior to pushing an event script and can be used for multiple events.

Best Practices for Groups and Zones

- The more groups and zones you have, the more complicated the deployment becomes. Do some careful planning to make your

organization both simple and useful.

- To simplify the deployment, keep the number of unique advertising areas, exit directions, and welcome screens to a minimum.
- While it is possible for a zone to have different screen templates throughout the course of an event, the more screen templates you use, the more complex the deployment and administration becomes. To simplify the system management, limit the number of screen templates for a given zone.

Guidelines for Zones and Groups

Consider the following guidelines when creating zones and groups:

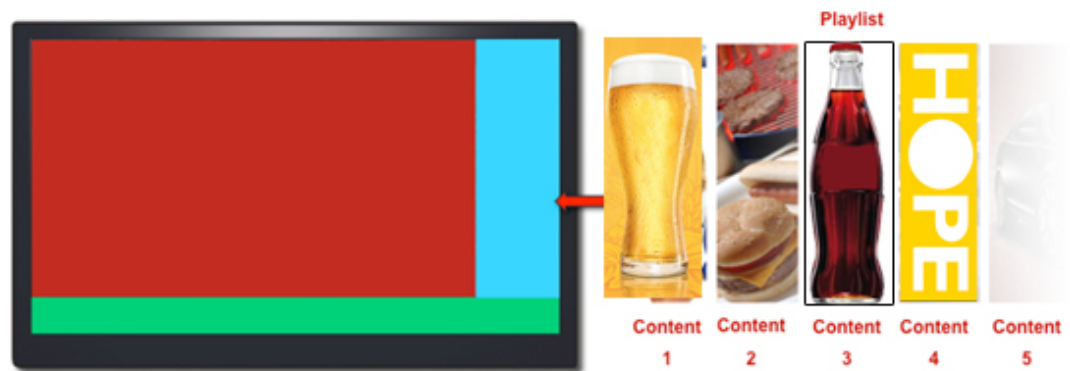
- A DMP can be in different zones during each event.
- A DMP that is in multiple zones and groups cannot have more than one action assigned to it for a given event state.
- A DMP can be in only one group at a given state. However, a DMP can switch groups when in a different event state.
- The maximum number of groups that is supported for a zone is 20; however, typically you'll have three or four groups for a given zone.
- The maximum number of zones supported in a venue is 100; however, 20 zones is typical for a given venue.
- The background for an RSS ticker can change per group/zone.
- All zone and group names must be unique.

Playlists

A playlist is a series of content items connected together (images, widgets) to play for a set duration one-after-the-other in a given region and then repeat. Each playlist operates independently of other playlists, and multiple playlists can be run in a given event script. Playlists also can include tickers and full screen messages.

[Figure 11](#) illustrates a playlist with five images, each shown for 15 seconds and then repeating.

Figure 11. Playlist



Guidelines for Creating Playlists

When creating playlists, consider the following guidelines:

- You cannot have playlists with the same name.
- Each region can have at most one playlist per state.
- For Proof of Play, you can have more than one region with an ad playlist.
- In all releases of Cisco StadiumVision Director, graphic playlists can only play static graphics and certain .swf files*. Prior to Release 3.1, only video content could be in a video playlist. In Release 3.1 and higher, Cisco StadiumVision Director can support Flash can support (DMP 4310G only), static graphics, and video in mixed media playlists.



IMPORTANT: The SV-4K media player does not support Flash content. The Cisco DMP 4310G supports Flash but it is not recommended or supported. For additional information, refer to allowable [Static Graphic Formats](#).

- Once a playlist displays the last content item in the list, it will loop back to the beginning of the playlist.
- The recommended ad rotation time is 30 seconds. 15 seconds is the minimum supported time for all content. As a best practice, we recommend that you never use less than 15 seconds per playlist content items.



NOTE: All playlists from all zones/groups for a given event must be loaded on every media player prior to the event.

- Each playlist can have its own ad rotation time independent of other playlists.
- Content in the playlist is displayed in the order in which it is added unless you re-order your content.



NOTE: As a series of content items transition in a playlist (such as advertisements in Region 2 of a standard 3-region L-wrap template), there will be some variance in the appearance of each content item as the media player displays where that content is presented. Each content item will generally appear on all corresponding media player displays within about one second of each playlist item transition. However, the amount of time that it takes for all displays in your venue to show the same content item within a playlist might exceed a one-second duration based on the following venue conditions: Network infrastructure, number of regions on the display, number of content items in the playlist, and the playlist duration.

Consider the following restrictions and expected behavior when configuring playlists:

- Single video loop—You can configure a playlist to loop continuously when you have a playlist with a *single* video content item set for a duration of zero, with the playlist duration also set to zero.
- Single non-video loop—You can configure a playlist to loop continuously when you have a playlist with a *single* non-video content item by setting the item duration to -1, and setting the playlist duration to a number greater than or equal to zero.
- All playlists will loop their content (for example, once the last item plays, the playlist restarts with the first item) *unless* a duration of zero is configured on the first playlist item.
- To run a playlist one time, you can specify a duration of zero for the last item in the playlist. There is different behavior if the last item is a non-video item versus a video. If the last item has zero duration, and once the rest of the playlist items run, then if the last item is a non-video item, it continuously plays for the duration of the state. If the last item is a video, the video plays one time followed by a black screen for the duration of the state.

-
- To run a playlist one time, you can specify a duration of zero for the last item in the playlist. There is different behavior if the last item is a non-video item versus a video. If the last item has zero duration, and once the rest of the playlist items run, then if the last item is a non-video item, it continuously plays for the duration of the state. If the last item is a video, the video plays one time followed by a black screen for the duration of the state.
 - If a change is made to a playlist and the playlist is currently being displayed, it is possible that items in the playlist that are past an item in the playlist with a duration of zero, could get displayed and the playlist continues until the item with zero duration is reached again.

RSS Tickers and Other External Data Integration

For more information, see the *Cisco StadiumVision Director External Content Integration Guide* for your release on [Cisco.com](https://www.cisco.com).



NOTE: Legacy RSS tickers (from Control Panel Setup) are not supported on SV-4K media players.

External URL, HTML Pass-Through Content Support

Beginning in Cisco StadiumVision Director Release 3.2, you can render simple HTML browser content (with some restrictions) on the media players including an external URL in a playlist and scheduling it in a script.



NOTE: This section describes guidelines for content that comes from an external URL specified in the Control Panel Content screen using the **New External Content** button.

The content is not actually stored in the Cisco StadiumVision Director content repository (CMS) and any changes to the content on the external site page are dynamically updated on the media players when the external URL is referenced, such as when the external URL playlist item is played.

Content Restrictions

Before you use the external URL content, consider the following restrictions. To be supported on the media players, the HTML content located at the external URL cannot contain:

-
- Video
 - Adobe Shockwave Flash
 - ActiveX (IE-only browser feature)
 - 'X-Frame-Options' header



IMPORTANT: If the external URL specifies the 'X-Frame-Options' header, you will encounter an error and the content will not display. The error indicates that the 'X-Frame-Options' is set to 'SAMEORIGIN' and occurs because Cisco StadiumVision Director renders external URLs in an iFrame. This error occurs in all web browsers and firmware versions.



NOTE: Cisco StadiumVision Director Release 4.0 only supports HD/SD video. It does not support 4K content (PNG, local video, streaming video). Refer to ["Basic HTML Pass-Through Content Guidelines"](#) below for additional information.

Basic HTML Pass-Through Content Guidelines

Before you use the Basic HTML Pass-Through Support, consider the following guidelines:

- Rendering simple HTML browser content **is not** intended to display a team or venue homepage. If you want to display a team or venue homepage, it must be recreated using new dimensions (1920x1080).
- It is recommended that the URL for HTML content be local to the Cisco StadiumVision network or on an internal server (or otherwise reachable by the media players). Pointing to an external website is **not recommended** as the SV-4K media player loads the URL into an iFrame. Many websites detect the iFrame and either warn the user or block the content from playing.
- The minimum duration for external URL content in a script is 60-seconds.
- It is strongly advised to use only external URLs that do not set the 'X-Frame-Options' header.
- It is strongly advised to use **only one** external URL content type on the media player at any given time.
- The SV-4K media player uses a default Latin character set to display text. If you attempt to display content written in an East Asian language such as Japanese or Chinese, the text will appear on the screen as a series of indecipherable rectangles.

Therefore, any custom fonts in your HTML content must be implemented by the external URL host as a web font (embedded reference to the font by the web content in the Cascading Style Sheet [CSS]).

- Be sure to define the background color of the web page, rather than relying on the default background color of the web browser.
- Be aware that very large, complex web pages could consume too much memory on the media players and be unable to be supported.
- Depending on how the web page is written, it might not appropriately scale on the media player to the template region size that you are running it in. The web page may have to be recreated in order for it to display with the correct proportions.
- As web page content refreshes for changes, there might be a delay on the media players TV display.

Graphic Specifications for Local TV Control and Commerce Integration

[Table 14](#) defines specifications and locations for creating and storing graphics (or images) used for local TV control and commerce integration in luxury suites.

Table 14. Local TV control and commerce integration graphics specifications

Graphic	Location	Specifications
IP Phone Desktop background	CUCM	Supplied with Cisco StadiumVision Director IP Phone 7975: 320x216x16 IP Phone 9971: 640x480 IP Communicator: 320x212x12
Channel icons used in channel lineup on the IP Phone	Cisco StadiumVision Director	Must be supplied locally with network approval. IP Phone: 24x24, PNG 3 rd party: 40x40, PNG
Food, beverage, and merchandise images used in the ordering process	Quest or Micros	Must be supplied locally. 265x265, JPEG non-progressive

Cisco Unified IP Phone Channel Icons

You can use Cisco StadiumVision Director to associate channel icons for display on the Cisco Unified IP Phone channel guide. Channel icons must be obtained locally (the venue must obtain permission from the network) and must be a 24x24 PNG file.

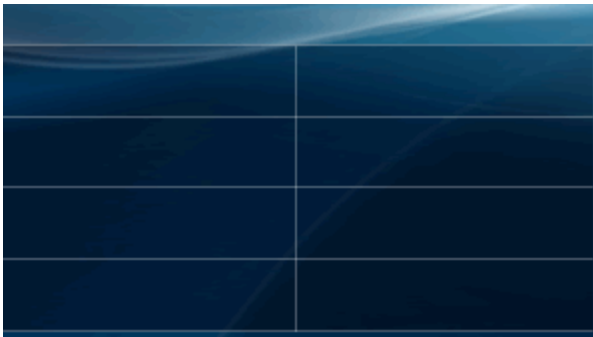
Cisco Unified IP Phone Services Image

Cisco StadiumVision provides a background image (homeBg.png) which is used as the background for the services on the Cisco Unified IP Phone. This is included with the default images. Default images are located at:

```
/opt/sv/servers/config/webapps/StadiumVision/images/phone/phone/phon  
elimages
```

The resolution for the phone services image for the Cisco IP Phone 7975 is 298 x 168. For the Cisco IP Phone 9971 it is 618x432.

Figure 12. Default Services Image



To customize the phone services image, create a background graphic saved out in the .png format and name it BG.png. Store your customized image at:

```
/var/sv/phone/phone/phonelimages
```

To load the custom image you will need a FTP Client and a SNE TAC login account to access this area (which is currently only available to Cisco employees).

Cisco StadiumVision will first look for a customized image, if one is not found then it will use the default image.

Cisco Unified IP Phone Background Image

Cisco StadiumVision Director includes phone background images (download/cucmitems.zip) that need to be uploaded to CUCM. There are two images (one for the Cisco Unified IP Phone and one for the Cisco IP Communicator).

The resolution for the phone background image is:

- Cisco IP Phone 7975—320x216 pixels
- Cisco IP Phone 9971—640x480 pixels

Up to eight phone background images (in PNG format) can be loaded into CUCM.

You can customize the phone background image by including a logo that can be changed for a particular venue or event. The logo should be centered in a space that measures 146x70 approximately 10 pixels from the bottom of the desktop image, as illustrated in [Figure 13](#).

Figure 13. Logo placement on the phone background image



PNG File Specifications for Custom IP Phone Background Images

Each phone background image requires two PNG files:

- Full size image—Version that appears on the phone.
- Thumbnail image—Version that appears on the Background Images screen from which users can select an image. Must be 25% of the size of the full size image.



TIP: Many graphics programs provide a feature that will resize a graphic. An easy way to create a thumbnail image is to first create and save the full size image, then use the sizing feature in the graphics program to create a version of that image that is 25% of the original size. Save the thumbnail version using a different name.

The PNG files for background images must meet the following specifications for proper display on the Cisco Unified IP Phone:

- Full size image (width x height) in pixels:
 - Cisco IP Phone 7975—320x216
 - Cisco IP Phone 9971—640x480
- Thumbnail image (width x height) in pixels:
 - Cisco IP Phone 7975—80x53
 - Cisco IP Phone 9971—123x111
- Color palette—Includes up to 16-bit color (65535 colors). You can use more than 16-bit color, but the phone will reduce the color palette to 16-bit before displaying the image. For best results, reduce the color palette of an image to 16-bit when you create a PNG file.



TIP: If you are using a graphics program that supports a posterize feature for specifying the number of tonal levels per color channel, set the number of tonal levels per channel to 40 (40 red X 40 green X 40 blue = 64000 colors). This is as close as you can posterize to 65535 colors without exceeding the maximum.

Creating a Custom Background Image for the Cisco Unified IP Phone

For more information, see the “Customizing the IP Phone” section of the Cisco Unified IP Phone Administration at the following URLs:

For the Cisco IP Phone 7975:

http://www.cisco.com/en/US/products/hw/phones/ps379/prod_maintenance_guides_list.html

For the Cisco IP Phone 9971:

http://www.cisco.com/en/US/docs/voice_ip_comm/cuipph/9971_9951_8961/7_1_3/english/admin/guide/9971cus.html#wp1038500

Also refer to the [Cisco StadiumVision Local Control Areas Design and Implementation Guide](#) for your release on [Cisco.com](#).

Custom Welcome Messages

Cisco StadiumVision Director Release 4.0 introduces some new features in the External Content Integration feature that allow you to customize suites for different customers with welcome messages and logos using the IP addresses of the media players in those suites to designate the custom content.

For more information, see the [Release Notes for Release 4.0 for Cisco StadiumVision Director](#) and the [Cisco StadiumVision External Content Integration Guide, Release 4.0](#).



HTML Formatting Guidelines for the SV-4K

This section is a guide for generating HTML5 content for playback on the SV-4K media player:



IMPORTANT: This section describes some HTML/HTML5 guidelines that generally should work for the media players. However, there might be cases where certain elements will not display as expected. Be sure to test any of your HTML content before putting it into production to confirm its display meets your expectations.

Best Practices for HTML Features Using Hardware-Acceleration



IMPORTANT: This section describes some of the hardware-accelerated features and guidelines that generally should work for the media players. However, there might be caveats and limitations that are not documented here.

The following features and effects are hardware-accelerated including:

- SVG graphics combined with CSS transforms
- Effects that use `-webkit-transform`
- Animations that use `-webkit-animation-*` and `-webkit-keyframes`

The following features are not hardware-accelerated and should be avoided:

- Javascript-based animations and effects
- Use of `transform`, `-ms-transform`, `-moz-transform`, or `-o-transform`

-
- Any CSS transitions (for example, `-webkit-transition`)
 - Videos tagged with the `hwz` attribute.



IMPORTANT: The video element, by default, is not hardware-accelerated and is not recommended or supported. Only 2 video regions can be on the screen at the same time. This includes other live and local video regions from Cisco StadiumVision Director.

Content Restrictions

The following list outlines content restrictions associated with HTML5 pages:

- HTML5 content should **not** be used as a general purpose web browser. The media players are a HTML5 player with interactive capabilities, rather than a web-surfing tool.
- The SV-4K does not support Flash content. Any HTML5 pages that have embedded Flash content will not display correctly. Most Flash authoring applications, including the Adobe Creative Suite, have tools that allow you to export Flash content as HTML5.
- The SV-4K does not support the OpenGL API for JavaScript.
- The functionality of streaming-video objects, such as YouTube and Vimeo, can be unreliable.
- The image size on HTML5 pages is limited to 1920x1080x32bpp. The SV-4K will fail to display pages that contain images that are larger than this restriction.

Creating HTML5 Pages

Follow these steps when creating HTML5 content for the SV-4K:

1. Make sure the HTML5 page has the same aspect ratio as your signage display. If you are displaying HTML5 content in a widget that is smaller than the screen, fit the page to the same aspect ratio as the widget.
2. Use a master Div aligned to 0,0 when building an HTML page. This will ensure correct alignment.

Page Refresh Behavior

Every time a page is refreshed, the player will retrieve all page elements again (without caching them). If the page is being hosted on a remote server, the page elements will be loaded as they arrive over the connection, resulting in poor aesthetics for pages that are frequently refreshed.

For pages that will be refreshed often, we suggested that you include code (JavaScript, Ajax, etc.) ensuring that only dynamic elements on the page will be reloaded when the page is refreshed.

Animations and Add-on Libraries

This section outlines some general rules about support for animations and add-on libraries for the WebKit engine on the SV-4K . Please note that performance is not guaranteed or tested for external web content. External web content can negatively impact the operation of your DMPs.

Vector Animations

The SVG protocol should be used to specify vector animations.

Bitmap Animations

Bitmap animations display smoothly when they are 1/3 or less of a 1080p HTML canvas. Setting the canvas size to 720p allows for larger high-quality animations to occupy the screen.

CSS Transforms

All CSS transforms should be specified as WebKit transforms. When performing a transform on a `<div>` or graphics element, we do not recommend specifying the transform in-line.

The following code shows an example of an effective CSS transform for the SV-4K:

```
<style>
  .flipme{
```

```
-webkit-animation-name:flipon;
-webkit-animation-fill-mode:forwards;
-webkit-animation-iteration-count:1;
-webkit-animation-duration:2s;
}
@-webkit-keyframes flipon
{
0% {-webkit-transform:rotateY(0deg);}
30% {-webkit-transform:rotateY(-90deg);}
100% {-webkit-transform: rotateY(360deg);}
image
}
</style>
```

Add-on Libraries

The jQuery and Prototype libraries are supported on the SV-4K. As a general rule, any add-on libraries for animation will work if they use WebKit-based transformations. To determine whether a certain library is compatible, you can look at a non-minified version of the library to see if it uses WebKit-based transforms.

Push Technology

The WebSocket protocol and long polling technique have been tested and proven to work on the SV-4K.

Hiding Scrollbars

It is often desirable to hide the scrollbars of a webpage when it is being used for digital signage. You can add the following snippet to your CSS code to hide the scrollbars:

```
::-webkit-scrollbar { width: 0px;
height: 0px;
background: black;}
```

Disguising Network Latency

When the SV-4K loads HTML content from a URL, there may be a delay based on network latency. You can add a preload image to mitigate this issue.

Known Issues with Firmware

The following are known SV-4K firmware issues.

Position: Fixed and Z-index

Assigning an HTML element the `position: fixed` property will not produce the desired results if the element has a z-index property specified as well. Scrolling the page upward will cause the element to increment downwards until it eventually disappears off the edge of the screen.

Time Localization in JavaScript

The JavaScript `toLocaleTimeString()` call does not retrieve localized time formats (i.e. 24-hour vs. 12-hour clock): Instead, the hour/minute clock defaults to 24-hour time on the SV-4K. The below code provides a workaround in JavaScript if you would like to display time using a 12-hour clock:

1. Create the following function:

```
function format12Hour(date)
{
    var zero = '0';
    hh = date.getHours();
    mm = date.getMinutes(); ss = date.getSeconds() if((hh %
    12) == 0)
    hh = 12; else
    hh %= 12;
    // Pad zero values to 00 hh = (zero+hh).slice(-2);
    mm = (zero+mm).slice(-2);
    ss = (zero+ss).slice(-2);
    return hh + ':' + mm + ':' + ss + ' ' + ((date.getHours()
```

```
< 12) ? 'AM' :  
'PM');  
}
```

2. Optionally, if you would prefer not to display seconds information, you can replace the above “return” line with the following:

```
return hh + ':' + mm + ' ' + ((date.getHours() < 12) ?  
'AM' : 'PM');
```

3. Implement the function in the HTML script as follows:

```
var dateString = (startJSDate.getMonth() + 1) + "/" +  
startJSDate.getDate();  
if (!startDateTime.isDateOnly()) {  
dateString += " -- " + format12Hour(startJSDate);  
}
```

HTML5 Resources

There are a large number of online resources including tutorials, samples, templates, and widgets available to help you get started creating content with HTML5. The HTML5 standard offers huge advantages to web developers, including digital signage authors. The following websites are great places to learn how to create pages using HTML5:

- <http://www.html5report.com>
- <http://www.w3schools.com>

Wordpress

Wordpress is a HTML5 resource that provides an intuitive approach to creating digital signage. Here are some of the benefits of using the Wordpress architecture:

- Wordpress offers advanced HTML5 support, with premade widgets ranging from weather to e-commerce. The system also supports advanced HTML5 options using CSS3 features. The <http://www.jqwidgets.com> site also provides HTML5 widgets.
- You can either run Wordpress from the website or install a Wordpress instance on your own servers.

-
- Wordpress has an ecosystem of template creators that offer sophisticated templates for a wide range of industries.

Template creators include the following:

- <http://www.rockettheme.com/wordpress>
- <http://www.templatemonster.com>
- <http://graphpaperpress.com>

HTML5 Authoring

These are some of the common HTML5 authoring applications:

- Adobe CS Tools: Dreamweaver, Illustrator, InDesign, and Photoshop
- Aptana Studio
- CoffeeCup Software
