



BrightSign®

TECHNICAL NOTES

Optimizing Video Quality

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INTRODUCTION

BrightSign players are capable of high-quality video playback at 60 frames per second—without dropped frames, hiccups, or video corruption. However, since the digital A/V landscape includes a diverse array of formats, codecs, connectors, video modes, and resolutions, it is possible to reduce the quality of video playback by not configuring your digital signage content properly. This tech note outlines the factors that affect video quality and the steps you can take to ensure that you get the best results.

Summary

To achieve optimal video quality, you must minimize the amount of processing that the player and display device must perform on the video:

- **Avoid downscaling video:** Match the resolution of the authored content to the native resolution of the display. Upscaling the video will also provide close to optimal video performance. For example, displaying 1080p (1920x1080) video in a 1280x720 zone may cause performance degradation, while displaying a 720p (1280x720) video in a 1920x1080 zone should cause no noticeable issues with performance.
- **Use progressive video modes:** Avoid using interlaced video modes (e.g. 1920x1080x60i), especially if the video displays text. Note that the LS422, HD120, HD220, and HD1020 players automatically use interlaced video modes to display 1080p50, 1080p59.94, and 1080p60 video.
- **Match the video frame rate to the native frame rate of the display:** The progressive frame rate of the video should be the same as (or a multiple of) the frame rate of the display. For example, if a display outputs 4K (3840x2160) at a maximum frame rate of 30p, then the 4K video should be at either 30p or 60p. Conversely, you should avoid playing video at a frame rate less than that of the display.

- **Avoid using overscan when possible:** The best solution is to select a video mode that doesn't overscan at the chosen output.
- **Use an optimal bitrate:** The maximum recommended CBR (constant bit rate) is 25Mbps for HD, XD, and LS players, while the recommended CBR for 4K players is 30 to 40 Mbps.

Scaling

Scaling occurs when the processor on the device alters the original resolution of the video before it is output to the display. The resolution of the video can be increased (upscaled) or decreased (downscaled). Scaling can occur on both full-screen videos and video windows/zones that only take up a portion of the screen.

It is preferable to exactly match the resolution of the video to the native resolution of the display (or the size of the video zone in the display area). Upscaling the video should cause no noticeable performance degradation. On the other hand, downscaling can only be achieved via decimation (that is, throwing away half the vertical lines), which may result in noticeable video quality issues.

Overscan

Overscan, which is a type of upscaling, is performed on videos to account for variation in the screen edges of different TV models. The overscan mode on BrightSign players upscales the video by approximately 5%. Most modern TVs have an "exact scan" mode that eliminates the need for overscan entirely. Overscan can be disabled in BrightAuthor by selecting **No overscan – use full screen area** in the **New project** window or in the **Edit > Layout** tab (overscan can also be disabled in BrightScript).

Overscan is only needed for TV modes (e.g. 720p, 1080p), and should never be applicable for VGA modes (e.g. 1370x768, 1600x1200); however, there is some inconsistency in the way that different TVs and monitors deal with overscan settings.

Display manufacturers use different terminology to refer to no overscan:

- **Panasonic:** "1:1 mode"
- **Samsung/LG:** "just scan"
- **Toshiba:** "exact scan"
- **Vizio:** No overscan settings, but the "wide" display mode will disable overscan.

Interlacing

Interlacing is a legacy of cathode ray tube (CRT) TVs and should be generally avoided with LED, LCD, and plasma displays. While CRT TVs show an interlaced signal natively, LED, LCD, and Plasma displays must de-interlace the input prior to displaying it, thereby reducing the video quality. Many displays (especially monitors intended for use with PCs) do not de-interlace video properly, causing video flicker—even with static images.

We do not recommend using interlaced video (e.g. 1080i); however, if you must use interlaced video, you can specify whether the de-interlacing should be handled by the display or the BrightSign player:

- To have the display handle the de-interlacing, select an interlaced video mode in BrightAuthor (e.g. 1920x1080x50i) in the **New project** window or in the **File > Presentation Properties > Main** tab.
- To have the player handle the de-interlacing, select a progressive mode with the appropriate resolution (e.g. 1920x1080x50p).

Note: *The LS422, HD120, HD220, and HD1020 players automatically use interlaced video modes to display 1080p50, 1080p59.94, and 1080p60 video.*

Codecs and Formats

BrightSign players support numerous [video codecs and container formats](#), but some applications require specific video codecs/formats:

- **Seamless Looping:** Use an *.mp4* or *.mov* file with H.264 encoded video (for 4K, use an *.mov* file with H.265 encoded video). If the looping video includes audio, use PCM audio encoded with the SOWT codec.
- **BrightWall and Enhanced Synchronization:** Use an *.mp4* or *.mov* file with H.264 encoded video (for 4K, use an *.mov* file with H.265 encoded video). It is also possible to use a transport stream (*.ts* file), but the video must begin with a presentation timestamp (PTS) of zero.
- **Media Streaming:** If you're using a BrightSign player to stream content to other networked devices, the video must be formatted as a transport stream (*.ts*) file.

Bitrates

For HD and XD players, the recommended constant bit rate (CBR) is 25Mbps maximum. If you are using the video as part of a larger presentation area (with other zones decoding images, audio, or a second video), the CBR should be significantly less than 25Mbps.

If your video content is encoded using a variable bit rate (VBR), an average bitrate of 25Mbps may include peaks at up to 40Mbps. The video may experience performance issues at these peaks, so it is recommended to use an average bitrate significantly less than 25Mbps if the video is VBR encoded.

For 4K players, we recommend a constant bit rate (CBR) between 30 and 40 Mbps. Note that the second video decoder can simultaneously support a 1080p video at up to 40 Mbps as well.