

ABOUT TELESTREAM

Telestream® specializes in products that make it possible to get video content to any audience regardless of how it is created, distributed, or viewed. Throughout the entire digital media lifecycle, from capture to viewing, for consumers through high-end professionals, Telestream products range from desktop components and cross-platform applications to fully-automated, enterprise-class digital media transcoding and workflow systems. Telestream enables users in a broad range of business environments to leverage the value of their video content. www.telestream.net

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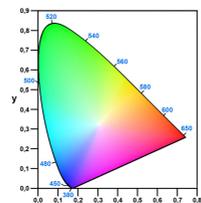


Color Grading In A Wide Gamut Environment Using The PRISM Waveform Monitor

Steve Bilow, Senior Product Marketing Manager

Color Gamut and Vision

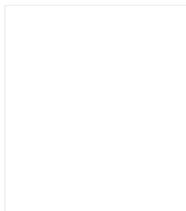
Our human visual system can distinguish a far wider range of colors than those we can show on today's displays. We knew this long ago. Back in 1931, the International Commission on Illumination (CIE) documented this in the initial version of the 'CIE chart'. We use this diagram, with its distinct horseshoe shape, to represent all the visible colors that the typical eye can see. We call this as the CIE 1931 Color Gamut.



CIE 1931 Color Gamut

Quality is More Than Resolution

Displays can't replicate the power of the human retina but we still need to do our best to make digital cinema and video images more realistic and vibrant. That's why the technologists who developed the standard for high definition television strove to improve the resolution from standard definition as well as improving colorimetry as display technology transitioned from CRTs to LCD. The ITU Recommendation ITU-R BT.709-6, known in the vernacular as ITU 709 or Rec. 709, specifies a triangle that is 33% of the total colors represented by the CIE 1931 Color Gamut.



Rec 709 Color Gamut

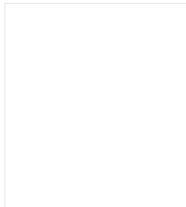
Dynamic Range is Only Part of the Story

Fast forward another generation and we arrive at the notion of high dynamic range (HDR) video. Video HDR is **NOT** the same thing as the HDR that your iPhone and Photoshop users do - but that is a topic for another day. The fundamental advantage of video HDR is enhanced detail in both near-black and near-white luminance. This results in much clearer specular highlights, richer blacks, and more shadow detail. But the dynamic range is *still* not the only factor in image quality. It's the range of chroma values, which equates principally to color fidelity, that brings an image to life. Chroma is at least as important as resolution and dynamic range.

A wide color gamut represents more colors than a narrower one and results in more vibrant tones and more realistic imagery. Because industry professionals know that, when we specified the parameters for 4K UHD television, both HDR and Wide Color Gamut (WCG) were well defined. Only when UHD, HDR, and WCG are combined does an image truly come to life.

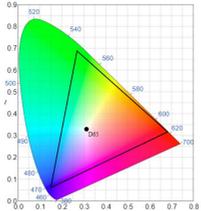
Color Gamut Constraints

The color gamut defined for UHD is called ITU.2020 and its triangle includes 63% of our old friend the CIE 1931 color space.



Rec 2020 Color Gamut

That is a heck of a lot of color values. But here's the rub. Right now your television can't display the ITU.2020 color space. So, colorists are frequently asked to work in ITU.2020 but to constrain the color values within those available in a 'middle' space (yet another color gamut!) called DCI P3. This was created by the digital cinema industry to come close to human visual perception while remaining within the technical capabilities of the technology of the day. The DCI P3 triangle sits between ITU.709 and ITU.2020 and covers approximately 44% of what mother nature gave to us humans.



Perception is Subjective, Standards Aren't

The visual system is part of the same structure that is the human brain. Your retina develops from the diencephalon of your embryonic brain at only a few weeks of gestation. Even physically, vision and cognition are tightly connected. In other words, no matter how accurate your retina will act as a receiver, your brain will introduce a level of subjectivity. This is certainly not just because vision and neurobiology are interlocked. It's even more about the phenomenology of perception. That too is a topic for another day but, for whatever reasons that we are subjective perceivers, it's impossible to keep track of all the constraints using your broad color gamut receiver, but your subjective perceptual apparatus! Working in one color gamut but constraining your palette to another is exactly why you need a waveform monitor like the Telestream PRISM.

PRISM Family of Software Defined, Small Form-Factor Waveform Monitors

The Power of PRISM in Color Grading

Simply put, you cannot identify an individual color that is outside of a specific gamut by eye. Fortunately, you can do it with an instrument like Telestream's PRISM Waveform Monitor. This instrument is built from foundational technology developed over decades by the Tektronix Video team which is now part of Telestream. The instrument continues to push beyond earlier technological boundaries to include several tools useful to color grading.

PRISM plays a vital role in the daily work processes of creative video professionals like colorists. Suppose a colorist needs to grade a program in ITU.2020 but to restrict the choices of colors to DCI P3.

Using a CIE Color Gamut Display

You can configure PRISM for either ITU.709 or ITU.2020 colorimetry and then use our CIE display, which includes 709, P3, and 2020 gratitudes, to easily see gamut extents in all spaces concurrently.

PRISM Waveform Monitor Displaying a CIE Color Gamut Chart

Diamonds and Vectors

The CIE display is only one tool that is available for colorists and editors within PRISM. You can even use a variety of applications simultaneously displaying in multiple tiles (4 on a single display MPS model, up to 8 on a dual display MPD). PRISM allows you to view different applications simultaneously. Allowing the user to customize the various displays to suit your way of working. For instance, besides the CIE display, the user can configure other tiles to be the waveform, Diamond, vector, and stop display traces. Additionally, a picture display can be used with color overlays to aid in illustrating areas of the image at certain levels or areas containing colors outside color gamut limits.

PRISM Waveform Monitor Displaying a Diamond Display

PRISM Waveform Monitor Displaying a Vector Display

In Other Words...

To summarize the practical example, imagine a colorist working on a program in ITU.2020 color space. That program may be viewed on an HDTV. It might be displayed on a 4K UHD TV, a projector, a video wall, a computer monitor, a tablet, or a smartphone. It needs to look correct in all of these environments so the colorist must restrict their colorspace to a DCI P3 range. With PRISM, that colorist has a diverse set of applications that both make the job easier than in the past and that adapt to their preferred techniques and style. Even better, the next colorist to come into the room, who has a different style and wants to use different techniques, can reconfigure the user interface to meet their need by simply loading their layout and tool selection from a preset.

That is the power of PRISM to help professional colorists ensure that every color they use is displayable across myriad devices. PRISM offers advanced applications to help creative professionals deliver increasingly compelling visual television experiences.

To learn more about PRISM colorimetry tools, [CLICK HERE](#).

If you enjoyed this post, have a look at another one related to postproduction by checking out what we've introduced in the way of audio tools. [CLICK HERE](#).

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