

Wireless Video Optimized LogC4

An Intermediate Encoding for ALEXA 35 SDI Outputs

TECHNICAL NOTE

November 6th, 2023

Table of Contents

Table of Contents	2
Introduction	3
Wireless Video Optimized LogC4 overview	3
Why does ALEXA 35 use LogC4?	3
Why should I use WVO LogC4?.....	3
When should I use WVO LogC4?	4
How does WVO LogC4 work?.....	4
Wireless versus cable	5
How to use WVO LogC4	5
On-set WVO encoding (camera settings).....	5
On-set WVO decoding	6
Contact	6

Introduction

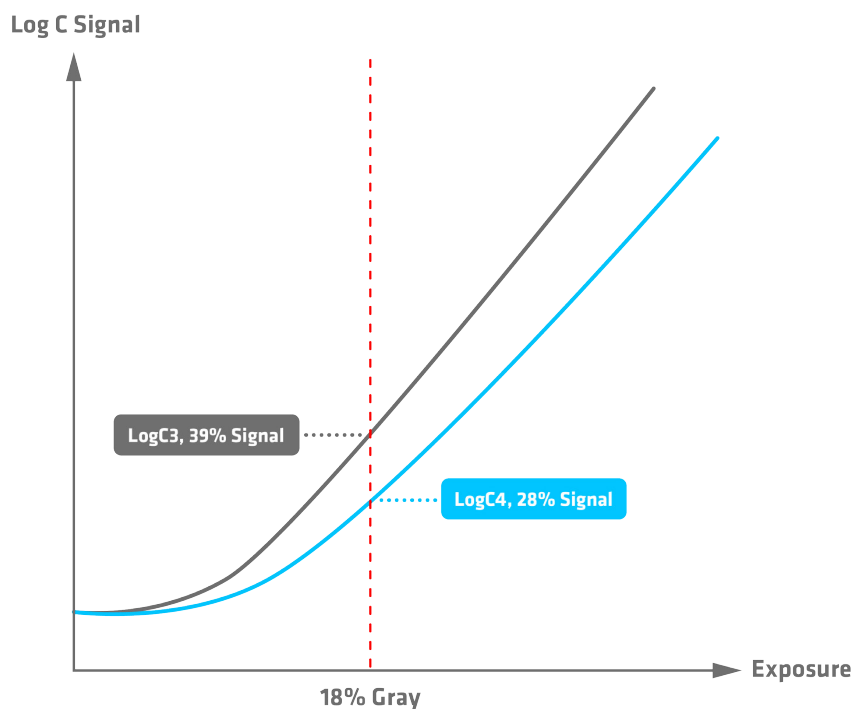
Wireless Video Optimized LogC4 (WVO LogC4) is an intermediate encoding for ALEXA 35 SDI outputs that is designed to improve monitoring image quality when transmitting LogC4 over wireless video transmitters. The WVO encoding is an option built into the ALEXA 35 from Software Update Package SUP 1.1 on. A matching WVO decoding LUT must be used after signal reception in the wireless video transmitter to reconstitute regular LogC4.

Please note, that a WVO-encoded image without the decoding LUT is not compatible with any LogC4 LUT or image analysis tools, such as a false color display in a monitor. Judging images without the decoding LUT will mislead and could result in serious exposure issues.

Wireless Video Optimized LogC4 overview

Why does ALEXA 35 use LogC4?

The ALEXA 35 captures 17 stops of dynamic range, 2.5 stops more than previous ARRI digital cameras. This expanded dynamic range is great for cinematographers. However, it cannot be contained in the LogC3 encoding of previous ALEXA cameras. Therefore a new encoding had to be created for the ALEXA 35: LogC4, which can encompass the entire dynamic range of 17 stops. As a consequence, LogC4 encodes some image content (like skin tones) darker and with lower contrast than LogC3. 18% gray, for instance, lands at 28% signal in LogC4, in contrast to 39% in LogC3.



Why should I use WVO LogC4?

Wireless video transmitters are designed to transmit high-contrast images, like a Rec 709 signal, for instance. Transmitting low-contrast signals, like a LogC4 signal, is more challenging for the wireless system and can result in banding artefacts.

While most shows have been wirelessly transmitting LogC4 from ALEXA 35 without any complaints, in some situations banding artefacts have been observed. These artefacts are more visible if older 8-bit video transmitters are used and their occurrence is also greatly dependent on image content, the wireless transmission system used, signal strength, the viewing hardware, and the viewing environment.

Please note that this is just a monitoring issue and does not affect the recorded image.

When should I use WVO LogC4?

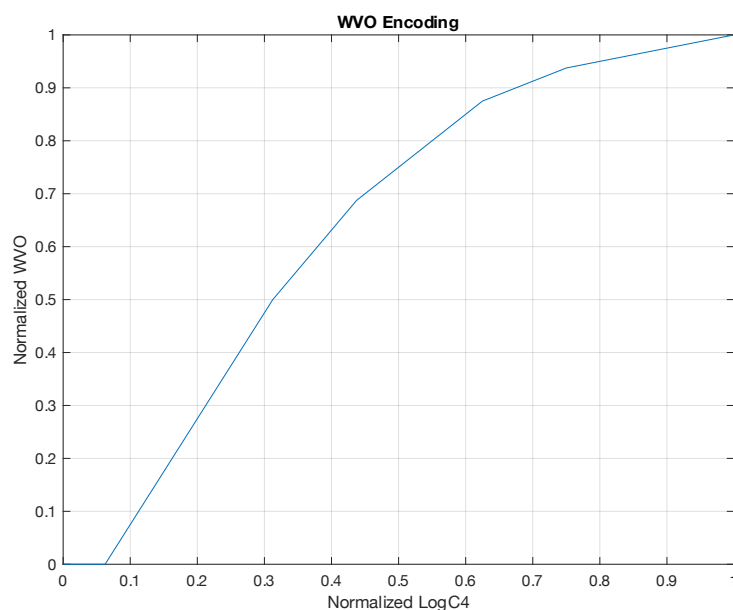
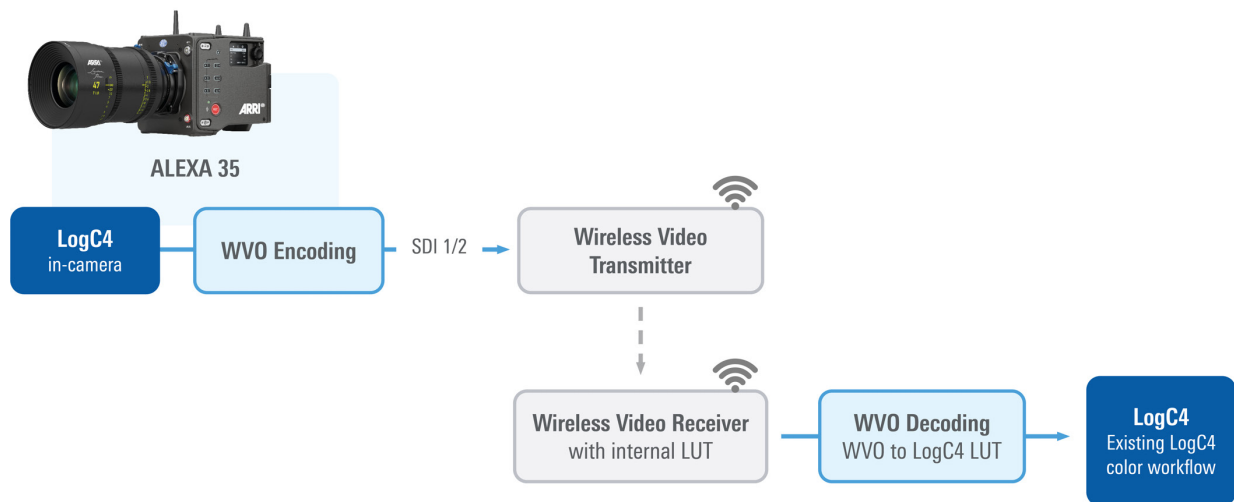
WVO LogC4 can be helpful if you are sending the LogC4 signal from the camera wirelessly for color grading on set and are seeing banding artefacts in the image.

In the following situations you should NOT use WVO LogC4:

- If you do not see any artefacts
- If you are simply looking at the SDI signal without color grading on set
- If you are using the “Look” SDI processing, which means that you are applying a look file in camera
- If you are viewing the SDI signal output from the ALEXA 35 via a direct BNC cable

How does WVO LogC4 work?

When the SDI processing of the ALEXA 35 is set to “WVO LogC4”, the LogC4 signal is further encoded in such a way as to optimally preserve its integrity even when transmitted wirelessly at a low data rate. This is done by applying a WVO encoding curve to the LogC4 signal, allocating more bits to the mid-tones where banding would be visible (see chart below). On the other end, the WVO LogC4 signal needs to be decoded with a WVO decoding LUT to reconstitute LogC4. The WVO decoding LUT is the inverse of the encoding.



A curve showing the WVO encoding that is applied to the LogC4 image.

Wireless versus cable

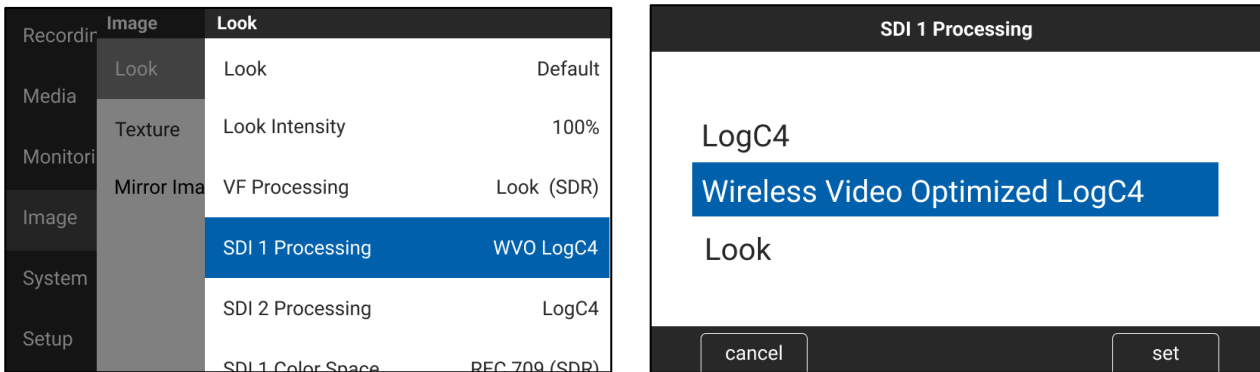
WVO LogC4 gives DITs and others wishing to transmit LogC4 wirelessly another option for maintaining image quality to the exacting standards associated with ARRI products. For the highest image fidelity and quality, it is recommended to view the SDI signal output from the ALEXA 35 via a direct BNC cable. When using a cable, WVO LogC4 is not necessary and the regular LogC4 encoding should be used.

How to use WVO LogC4

On-set WVO encoding (camera settings)

Menu > Image > Look > SDI 1 Processing > Wireless Video Optimized LogC4

We are using the SDI 1 output here as an example, but this works as well with SDI 2. In the camera menu, set SDI 1 Processing to “Wireless Video Optimized LogC4”. Connect the SDI 1 output of the camera to your wireless video transmitter.



When SDI 1 Processing is set to “Wireless Video Optimized LogC4”, the indication in the SDI status overlays will show “WVO”, where normally “LOG” (for LogC4) or “Look” (for look processing) are shown.



Notes

- When SDI 1/2 Processing is set to “LogC4” or “WVO LogC4”, the SDI Color Space menu options (Menu > Image > Look > SDI 1 Color Space) are irrelevant and are therefore greyed out. The WVO LogC4 encoding is only available for SDI 1 and 2 processing, not for the viewfinder or the recorded image.

On-Set WVO decoding

The WVO LogC4 signal needs to be decoded with a corresponding WVO decoding LUT before applying any additional color transforms like LUTs or CDLs. This decoding LUT must be loaded directly into your wireless receiver to function as intended. Once applied, the result of the decoding LUT is a LogC4 signal that can be treated in exactly the same way as having transmitted LogC4 to begin with, except without the banding artefacts.

[A package of "WVO Decoding LUTs" can be found on the ARRI website.](#) They are provided as 17x, 33x, and 65x 3D LUTs and as a 1D LUT. We recommend using the 1D LUT where possible as it is more efficient and robustly implemented in most wireless video systems.

Contact

In case you have questions or recommendations, please contact the Digital Workflow Solutions group within ARRI via email: digitalworkflow@arri.de