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XAVC

XAVC Workflow Guide



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About this Guide

This XAVC Workflow Guide offers up-to-date information on how to work with XAVC, in its various forms, from recording on a camcorder, through review on a recording deck, clip management, editing and archive.

XAVC compliant products and applications will change over time, as Sony and partner providers improve their offerings. This Guide (**Version 1 : June 2014**) is therefore correct to the date of publication.

For the latest on XAVC products and solutions, and the most up-to-date version of this Workflow Guide check on the www.pro.sony.eu/xavc web site.

Guide limitations

This Guide offers some general advice on the use of XAVC related products and applications, and should be taken as a guide on how to get started using XAVC as a production format. However you should not feel limited to the advice given in this Guide.

If you find new, and more efficient methods of working with XAVC that save time and speed up the production process, you should feel free to use these methods.

Benefits of the XAVC format

XAVC is an open format that based on the best of current codec standards, and can be licensed to third party companies that want to make products in support of XAVC. This innovative format gives maximum flexibility and creative possibilities for videographers, programme and movie makers not only during the capture, recording and production phase, but also in post-production, editing, and archive.



XAVC technology is based on industry standard MPEG-4 AVC/H264 compression. Furthermore XAVC used the highest quality implementation of these standards, allowing broadcaster and movie makers to realise exceptional performance compression technology in a practical format.

XAVC offers a practical and real format for broadcasters and videographers wanting higher quality recordings with smaller file sizes and fast production cycles to on-air, through to high end movie makers wanting the best image quality and highest image resolutions possible with practical workable file sizes and reasonable post-production turn-around times.

XAVC image resolutions

The XAVC format has been designed to support all current popular AV media resolutions, including 4K, QFHD*, 2K, HD and SD as a proxy. This represents all the popular resolutions used by videographers and movie makers to produce high quality material in a variety of scenarios.

*QFHD otherwise known as Quad HD, Ultra HD, UltraHD or UHDTV. See Appendix.

XAVC colour depths and dynamic range

The XAVC format enables videographers to future proof their work. It supports 8, 10, and 12 bit colour depths, providing maximum dynamic range for colour correction and grading.

XAVC frame rates

HD and 2K XAVC material can be recorded up to 180 frames per second. QFHD and 4K XAVC material can be recorded up to 60 frames per second. This allows high-performance of monitoring and greater choice and creativity in post-production.

XAVC sample structures

The large choice of 4:4:4, 4:2:2, and 4:2:0 sample structures are available in XAVC. This enhances the colour grading process, increases creative control and flexibility, and reduces the post-production budget. The creation and application of special effects, credits or channel identity take less time with superior result with 4:4:4 or 4:2:2 colour sampling.

XAVC frame structures

XAVC is a rare example of a practical codec technology that supports both Intra-Frame and Long GOP recording. This provides the media community with a choice depending on the type of material being recorded, the expected market and the type of post-production used.

The practical nature of XAVC

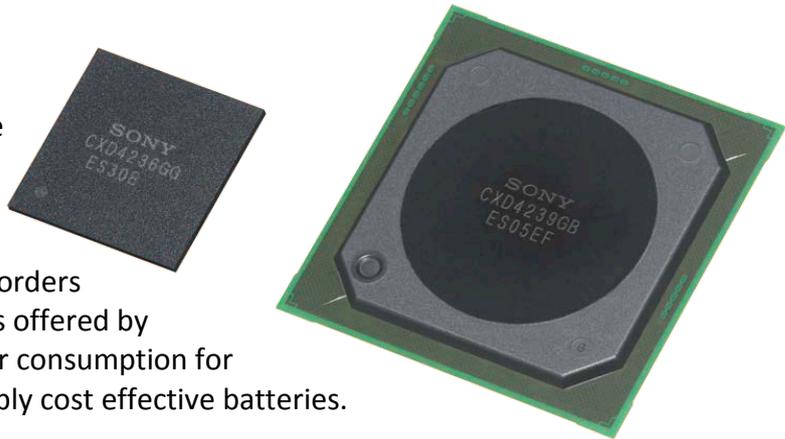
XAVC is a practical implementation of internationally accepted codec designs. It offers real solutions that can be used in real programme and movie making.

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This includes camcorders, media, media readers, recorders, file management applications, editors, colour correction and grading software, and archiving solutions.

XAVC chipset

One important aspect of XAVC is the design of a new chipset that could be used in a range of practical products. The real challenge is to produce small portable products such as camcorders and portable recorders that provide the exceptional qualities offered by XAVC, but still maintaining low power consumption for practical recording times on reasonably cost effective batteries.



XAVC offers the possibility of producing products that can record in XAVC while still maintaining reasonable recording times on both the media and with conventional batteries. The XAVC chipset offers the best combination of high quality video recordings beyond HD, and product designs with all the practical features videographers and cinematographers are seeking.

XAVC summary

This table summarises the scope of XAVC. Products may not have settings for all these modes so it is worth checking the specifications of each XAVC compliant product to see if it offers the version of XAVC your production requires.

Range	Resolution	Frame rates	Colour	Maximum bit rate	Compression type
4K	4096x2160	23.98p to 59.95p	4:2:0 8 bits to 4:4:4 12 bits	960Mbps	Intra-frame or Long GOP
QFHD	3840x2160	23.98p to 59.95p	4:2:0 8 bits to 4:4:4 12 bits	960Mbps	Intra-frame or Long GOP
2K	2048x1080	23.98p to 59.94p & 50i to 59.94i	4:2:0 8 bits to 4:4:4 12 bits	440Mbps	Intra-frame or Long GOP
HD	1920x1080 1440x1080 1280x720	23.98p to 59.94p & 50i to 59.94i	4:2:0 8 bits to 4:4:4 12 bits	440Mbps	Intra-frame or Long GOP
Proxy	1920x1080 1280x720 640x360 480x720	23.98p to 59.95p	4:2:0 8 bits	28Mbps	Long GOP

XAVC and XAVC-S

XAVC-S has been designed as a partner compression codec to XAVC with a more tightly compressed video signal. It is designed to support QFHF video signals only with a resolution of 3840x2160 pixels and an aspect ratio of 16:9. 4K televisions for home use will be restricted to this resolution. (XAVC also supports full 4K resolution of 4096x2160 and 17:9 aspect ratio.)

XAVC-S is restricted to 8 bit samples, a 4:2:0 sample structure and 150Mbps data rate. It will also have some limitations in non-linear editing.

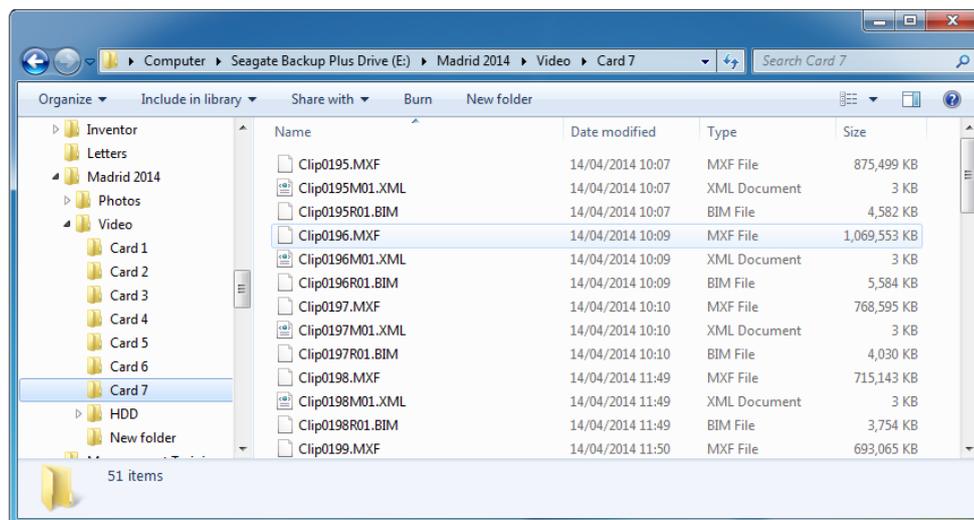
XAVC is therefore intended as a professional codec for the highest quality video compression, and professional post-production workflows. XAVC-S is intended as a more economic and simpler consumer codec, that is more appropriate to simpler editing and internet streaming applications.

XAVC and XAVC-S file wrappers and folder structure

The XAVC codec uses the .MXF (Material eXchange Format) file wrapper in both 4K and HD files, and the .MP4 file wrapper for its proxy files. These are the preferred file wrappers for professional digital video and audio material.

The XAVC-S codec uses the .MP4 file wrapper defined by MPEG-4 Part 14 for its 4K, HD and proxy files. This wrapper allows direct streaming over the internet.

XAVC and XAVC S is recorded to media with a conventional file structure that is easy to navigate through from any conventional computer. The recording device can be connected directly to the computer where it appears as an external drive, or the media can be removed and either inserted into the computer directly or connected via a media reader or media adaptor where is also appears as an external drive.



XAVC products

Sony offer a number of products in support of XAVC and XAVC S. This list is correct at the time of publication 07 April 2014.

PMW-F55 & PMW-F5 camcorders

These two camcorders were the first camcorders produced in support of XAVC. Their modular construction is designed to be adapted and modified for a number of different shooting scenarios. Both of these camcorders are primarily intended for high-end digital cinematographic production. The PMW-F55 has slightly higher specifications compared to the PMW-F5 camcorder.

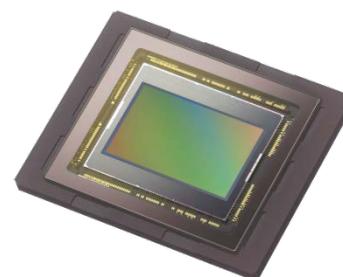


Figure 1

PMW-F5 & PMW-F55 camcorders

Both camcorders have a full resolution 4K Super 35mm CMOS sensor capable of Full 4K (4096x2160) resolution. This sensor is capable of 14 stops of dynamic range. The PMW-F55 includes a frame capture image sensor that eliminates rolling shutter and jello effects characteristic of most CMOS image sensors, even with a fully open shutter. (The PMW-F5 does not include this sensor.)

Both camcorders include dual SxS Express card slots that can be used to insert any compatible SxS media card including SxS PRO+, SxS PRO, and SxS1 cards. Some modes of operation require the highest grade SxS PRO+ cards to record successfully.



These camcorders incorporate a multi-codec design capable of operating in XAVC, SStP and MPEG2 modes, providing the ultimate choice for programme and movie makers. Both camcorders will record in XAVC mode in 2K (2048x2160) and HD (1920x1080) at a number of popular frame rates, recording to the SxS media.

The PMW-F55 will also record Full 4K and QFHD versions of XAVC to SxS PRO+ media. 4K and QFHD recording on the PMW-F5 is only possible with the AXS-R5 (see below).

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The camcorders modular design includes a Sony proprietary FZ lens mount that can be used for a new range of powered zoom lenses. Every PMW-F5 and PMW-F55 camcorder also includes an FZ to PL lens mount adaptor, to allows any compatible PL lens to be fitted, The adaptor also supports Arri LDS and Cooke i electrical connections.

Both camcorders include a high bandwidth multi-pin connector that can be used to fit a number of accessories. For the ultimate recording quality the Sony AXS-R5 dockable recorder can be fitted to the back of a PMW-F55 or PMW-F5 camcorder to provide 16 bit linear RAW 2K or 4K recording to AXS media cards. This retains the full 14 bit dynamic range from the sensor, offering more tonal resolution than XAVC.

The modular nature of the PMW-F55 allow it to be configured as a live 4K camera, by fitting an FZ to B4 lens adaptor to the front, and a CA-4000 fibre adaptor to the back. This converts the camcorder into a Full 4K or QFHD live broadcast camera.



PMW-400 camcorder

The PMW-400 is a fully specified shoulder mounted broadcast camcorders, primarily intended for news crews and other broadcast acquisitions. It is available in two versions, the PMW-400K with a supplied x16 zoom lens, and the PMW-400L without a lens.



Figure 2

PMW-400

This camcorder has a standard B4 lens mount and is able to accept any B4 broadcast powered zoom lens. It also includes triple Full HD 2/3" Exmor CMOS sensors.

The PMW-400 includes dual SxS Express card slots that can be used to insert any SxS media, or SxS adaptor for SD and Memory Stick media. Some media is not recommended in some of the higher specified video recording modes.

The PMW-400 is the first camcorder to include a special port for the CBK-WA101 wireless adaptor, which provides the camcorder with Wi-Fi, 3G, 4G and LTE connectivity through dongles. This allows the camcorder to be set up remotely. It also allows logging data to be

added to shots recorded on the camcorder, live viewing of material from the camcorder and recorded file management. Finally the adaptor allows hi-res and/or XAVC S low-res material to be transferred wirelessly to a remote server or storage device.

With firmware version 1.30, the PMW-400 will support XAVC Intra 10 bit HD 4:2:2 MXF recordings as a free firmware upgrade from June 2014 and XAVC Long GOP recording from October 2014.



PMW-300 camcorder

The PMW-300 is a compact hand-held camcorder with an interchangeable lens. It is available in two versions, the PMW-300K1 with a x14 (5.8-81.2mm) zoom lens and the PMW-300K2 with a x16 (5.8-93mm) zoom lens.



Figure 3

PMW-300

This camcorder includes triple 1/2" Full HD Exmor CMOS sensors, and is able to record in a wide range of HD (MPEG2) and standard definition (MPEG2 & DVCAM) modes and frame rates.

The PMW-300 includes dual SxS Express card slots that can be used to insert any SxS media, or SxS adaptor for SD and Memory Stick media. Some media is not recommended in some of the higher specified video recording modes.

The PMW-300 can use the CBK-WA100 wireless option. This is similar to the CBK-WA101 for the PMW-400 but without the dedicated connector. This unit offers similar wireless operation as the PMW-400 with logging data, live viewing, file management and material transfer.

With firmware version 1.20, the PMW-300 will support XAVC Intra 10 bit HD 4:2:2 MXS recordings as a free firmware upgrade from June 2014 and XAVC Long GOP recording from October 2014.

PXW-Z100 camcorder

The PXW-Z100 is the first of a new range of high performance compact camcorders capable of recording 4K material. It includes dual XQD card slots, a new compact high performance media capable of recording XAVC Intra-Frame 4K (4096x2160) 4:2:2 10 bit Intra-Frame material at 50fps or 60fps.



Figure 4

PXW-Z100

The camcorder will also record XAVC QFHD (3840x2160) and XAVC HD (1920x1080) material in a number of popular frame rates.

This camcorder includes a fixed x20 (4.1-82mm) zoom lens and a single 1/2.3" Exmor R CMOS sensor.

PXW-X180 camcorder

The PXW-X180 camcorder is a compact hand-held due for release during Autumn of 2014 (at publication date 07 April 2014).



Figure 5
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PXW-X180

This camcorder is equipped with a fixed x25 zoom lens with full auto/manual control.

The camcorder includes dual SxS Express card slots that can be used to insert any SxS media, or SxS adaptor for SD and Memory Stick media. Some media is not recommended in some of the higher specified video recording modes.

The camcorder also includes a built-in wireless adaptor, enabling XAVC S proxy material to be recorded on an SDHC card and pushed to the cloud or ftp server.

The camcorder includes triple Full HD (1920x1080) 1/3" Exmor CMOS sensors and is able to record XAVC Intra-Frame HD (1920x1080) and XAVC Long GOP HD (1920x1080) recording for superior image quality over previous HD recordings. The camcorder will also record in MPEG-2 HD422 at 50Mbps to comply with many established editing systems.

FDR-AX1 camcorder

The FDR-AX1 is a compact hand-held camcorder with a fixed x20 (4.1-82mm) zoom lens capable of recording QFHD (3840x2160) material. It includes a single 1/2.3" ExmorR CMOS sensor, and dual XQD media slots.



Figure 6

FDR-AX1

This camcorder can record XAVC S QFHD (3840x2160) material at a variety of frame rates. It can also record XAVC S HD (1920x1080) material at a variety of popular frame rates.

FDR-AX100 camcorder

The FDR-AX100 is a compact Handycam camcorder with a fixed x12 optical zoom lens, with x24 Clear Image zoom. It is equipped with a 1" Exmore R CMOS sensor capable of taking 20Mpixel still images and shooting in QFHD (3840x2160) at 30fps maximum.



Figure 7

FDR-AX1000

The FDR-AX1000 records XAVC S QFHD (3840x2160) video at 24, 25 and 30fps (29.97) and XAVC S HD (1920x1080), AVCHD (1920x1080) video at 24, 50 and 60fps, AVCHD (1440x1080) video at 50i and 60i, and MP4 (1280x720) at 25 and 30fps. Recording are made to SDXC media.

Alpha A7S digital still camera

The Alpha A7S is the latest in the A7 series of E mount digital still cameras, due for release during Summer 2014. It is equipped with a 12.2Mpixel Full Frame Exmor CMOS sensor. This is a drop in resolution compared to the previous A7 series of cameras, like the A7 and A7R, with 24.3Mpixels and 36.4Mpixels respectively. However the A7S has a very impressive 4096002 maximum ISO sensitivity setting. This means it can shoot with almost no light at all.



Figure 8

Alpha A7S

The Alpha A7 is equipped with an E mount for its lenses. This compact lens mount has a very short flange back distance of 18mm, allowing for compact camera and lens designs. The new LA-EA4 lens adaptor allows Alpha lenses to be mounted onto the A7S camera, taking advantage of the full frame sensor of the A7S.

The Alpha A7 will shoot XAVC S QFHD (3840x2160) and XAVC S HD (1920x1080) at a variety of frame rates.

HDR-AS100V Action Cam

This latest version of the Action Cam range records Full HD to XAVC S at 50Mbps on Micro SDXC. It will also record MP4 HD and other lower resolutions up to 240 frames per second to Micro Memory Stick and SD cards depending on the mode of operation. The slim design allows it to be worn during sport events without annoying protuberances. The camera has a fixed Zeiss Tessar lens with a clear 170 angle of view, a 13.5Mpixel Exmor CMOS sensor, Advanced SteadyShot and a BIONZ X image processor.



Figure 9

HDR-AS100V

PDW-HD1550 recorder/player

The PDW-HD1550 is an improvement over the previous PDW-HD1500 recording/playback deck. The PDW-HD1550 is a ½ 19” rack deck that will record and playback XDCAM MPEG2 HD 4:2:2 material at 50Mbps and HD 4:2:0 material at 35Mbps and 25Mbps. I will also record MPEG2 SD 4:2:2 SD material at 30, 40 and 50Mbps and DVCAM SD material at 25Mbps.



Figure 10

PDW-HD1550

The PDW-HD1550 adds the ability to record XAVC Intra-Frame 10 bit 4:2:2 HD (1920x1080) recording at a variety of popular video frame rates.

The deck support all current versions of Professional Disc, including the single layer (blue) 23GB disk, the dual layer (red) 50GB disc, the triple layer (yellow) 100GB disk and the write-once 128GB (white) quad layer disc.



Figure 11

PDV-1550 connections

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This deck provides a cost effective and secure archive system for high definition XAVC material onto reliable Professional Disc media. It also provides a convenient bridge between traditional VTR-like controls with a professional Jog/Shuttle dial and transport controls and server-like connectivity with RJ-45 Ethernet network connection and a front panel mounted high speed USB3 connector.

The PDW-HD1550 includes all the features and connectivity of a fully specified professional video recording deck.

PMW-1000

The PMW-1000 is a ½ 19” rack deck that includes dual SxS media slots. It will record and playback XAVC Intra-Frame 10 bit 4:2:2 HD (1920x1080) at a variety of popular video frame rates.



Figure 13

PMW-1000

The deck will also record and playback XDCAM MPEG2 HD 4:2:2 material at 50Mbps and HD 4:2:0 material at 35Mbps and 25Mbps. It will also record MPEG2 SD 4:2:2 SD material at 30, 40 and 50Mbps and DVCAM SD material at 25Mbps.



Figure 12

PMW-1000 connections

The deck includes VTR-like controls with a professional Jog/Shuttle dial and transport controls and server-like connectivity with RJ-45 Ethernet network connection and a front panel mounted high speed USB3 connector.

SxS media

SxS media is a form of Express Type 34 media. It is available in a variety of different versions. The original version was SxS PRO. This provides 1.2Gbps read and write speeds, fast enough for all forms of XAVC HD and 2K, and MPEG2 HD recordings. SxS PRO will not guarantee to properly record XAVC 4K and QFHD material.



Figure 14

SxS media

SxS 1 cards offer similar characteristics to SxS PRO but in a more cost effective design. This media is not as reliable as SxS PRO, and is only guaranteed to record MPEG2 HD recordings.

SxS PRO+ is the latest SxS media capable of recording at 1.5Gbps and playing back at 1.6Gbps. It is recommended for all forms of XAVC including 4K and QFHD.

The SBAC-US10 SxS card reader is designed to provide a USB2 connection to a computer for SxS media cards. It will operate with SxS PRO and SxS 1 cards.

The newer SBAC-US20 SxS card reader is an improved version of the SBAC-US10 reader with higher speed USB3 connection to the host computer. All forms of SxS media, including SxS PRO+ can be used in the SBAC-US20.



Figure 15

SBAC-US20 SxS reader

XQD media

XQD is a new compact media specifically designed for a new generation of compact hand-held 4K camcorders, and high frame rate digital stills cameras. There are three series of XQD cards, H series runs at 125MBps (1Gbps), N series also runs at 125MBps, and the S series which runs at two speeds, 168 MBps (1.34Gbps) and 180MBps (1.44Gbps). The H series XQD cards have been discontinued, and the N series are a direct replacement.



Figure 16

XQD media & MRW-E80 reader

The MRW-E80 reader provides a USB3 connection into a host computer for moving recorded material from XQD media into a server or non-linear editor.

SD & SD Micro media

SD media is specified to work with some XAVC S products. However the fastest SD cards should always be used. At the date of publication (30 June 2014) SDXC cards should be used. SDXC Micro cards are used with the HDR-AS100V Action Cam and can also be used with other SD compliant products through the Sony SRAC-A1 SD Micro to SD adaptor



Figure 17

SD & SD Micro media & adaptor

Memory Stick

Memory Stick has similar characteristic and performance specifications to SD media and will work with some XAVC products in some modes of operation. However the fastest Memory Stick should always be used. At the date of publication (30 June 2014) Memory Stick PRO-HG Duo HXA Series cards or better should be used through a Memory Stick to SxS adaptor.



Figure 18

Memory Stick media

SxS media adaptors

There are three SxS media adaptors available for Memory Stick, SD cards, and XQD media. The MEAD-MS01 adaptor allows Memory Stick to be used in any equipment with an SxS slot, the MEAD-SD02 adaptor for SD cards, and the QDA-EX1 adaptor for XQD media.



File management & editing with XAVC

All the major non-linear editing software application vendors support XAVC to varying levels. It is important to ensure that the selected NLE supports the chosen XAVC mode. This guide will help you select applications to suit the camera or camcorder you are using, and the XAVC mode you are recording in your project.

File management with Sony Content Browser

Sony Content Browser is an all-in-one clip management application that can be used with the latest portfolio of Sony camcorders and decks, including those using NXCAM, XDCAM, XDCAM-EX and XAVC formats.



The latest version of Content Browser at publication date (June 2014) is version 2.2. This requires an XAVC licence available from Sony Creative Software. (One licence is provided with each XAVC product.) This version supports clip View, Copy, Move and Delete functions. Metadata can be browsed and edited. Content Browser also supports SxS formatting.

Note 1 : If you have a Content Browser Advanced Pack licence, no XAVC licence is required.

Note 2 : RAW Viewer is also able to read and decode XAVC files.

Note 3 : Content Browser V1.1 is still available as a free version, compatible with MPEG2, DVCAM and IMX codecs only.

Content Browser can be obtained from the Sony Creative Software web site at this address <http://www.sonycreativesoftware.com/contentbrowser>

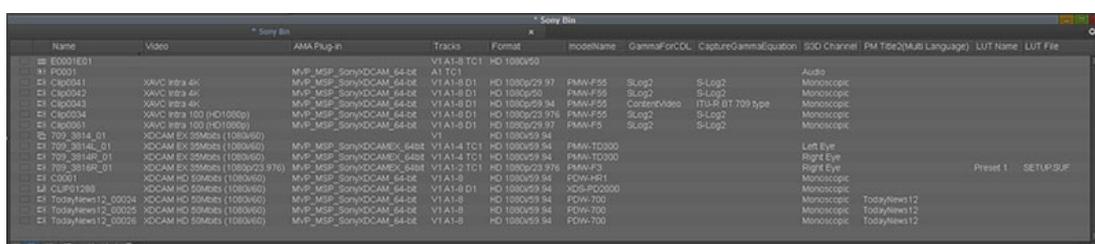
XAVC 4K/HD and XAVC-S with AVID

Avid Media Composer is the one of the most widely used NLE for professional film and video editing. With Media Composer 7, videographers gain accelerated workflows, automated media management, and extending real-time production.



Avid uses DNxHD as a codec technology, engineered to create mastering-quality media at reduced file sizes, shattering the barriers to real-time productivity, whether using local storage or in real-time collaborative workflows.

For faster and fluid workflow, Sony have created a special AMA plug-in for AVID (PDZK-MA2). This free of charge software for Microsoft Windows and MAC OS X operating systems provides support for XAVC and XDCAM / XDCAM HD files in Avid Media Composer, Symphony and NewsCutter products, allowing viewing and editing capability.



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You can find out more about this plugin, and download the plugin specifically for the version of Avid used, at this address <http://www.sonycreativesoftware.com/pdzk-ma2>

Supported XAVC modes

With this plug-in, the new version Avid Media Composer 7.0.3 supports:-

- Decode XAVC Intra 4K and HD
- Encode XAVC Intra HD
- XAVC Intra QFHD support
- XAVC Intra 2K support

Notes:

Avid Media Composer version 7.0.3 onwards can decode XAVC Intra in 4K and HD native. “Native editing” processes the original files from the camcorder directly to the NLE system.

At the time of publication (April 2014) Avid does not support XAVC Long GOP. Support for this mode is expected soon.

XAVC-S is not currently supported natively by Avid Media Composer. To import XAVC-S files into Avid for smooth editing, third-party software is required to convert XAVC-S to DNxHD. This process is called “Transcoded editing”. The original files are converted to another format to be compatible with editing system. This process may lower bitrates and quality of the original files.

Installation procedure and use

The process installing the AM plug-in and ingesting XAVC into Avid is as follow:-

- Ensure that the Avid system is compatible with the chosen XAVC mode (see note below).
- Install the XAVC/XDCAM Plug-in for Avid (PDZK-MA2).
- Choose **Setting** and click on **AMA**.
- Open **AMA** and enable **AMA Volume Management**.
- Select the **File** menu and choose **Link to AMA Volume**.
- Locate the footage from card (SxS, XQD or SD) in **Finder** window.
- Create and name the new Bin with the imported clips.

Note:

Specific plug-in versions are designed to support specific Avid products.

PDZK-MA2 Version 3.2 : Media Composer 7, NewsCutter 11

PDZK-MA2 Version 2.33 : Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x

PDZK-MA2 also supports the XDCAM EX format.

Avid Symphony has become an option of Media Composer from version 7.



XAVC 4K/HD and XAVC-S with ADOBE

At the date of publication (8 April 2014), Premiere Pro Creative Cloud is the latest version of Adobe's timeline-based video editing software application. It is part of the Adobe Creative Cloud suite of graphic design, publishing, video editing and web development programs. Premiere Pro CC is the redesigned successor to Adobe Premiere. The latest version includes expanded native format support and multicam operations with XAVC.

With Creative Cloud, it's easy for videographers working with 4K or HD in XAVC or XAVC-S to download the latest features and synchronize the settings and shortcuts to any editing workstation in the world. Adobe Premiere Pro CC leads the industry with native media support on both Mac OS and Windows systems.

For Mac users the previous version of Premiere Pro (V.6) requires the installation of additional third-party software like "Final Cup Pro" or "Compressor" from Apple to be compatible with XAVC HD.

For Microsoft Windows users the videographer needs to install the Main Concept/Rovi Total Code plugin which will enable XAVC in both HD and 4K . You can find out more information about Total Code at this address <http://www.sony.co.uk/pro/article/broadcast-products-get-xavc-support-in-adobe-premiere-with>

Supported XAVC modes

The new version 7.2 of Adobe Premiere Pro CC natively supports:

- XAVC Intra (4:2:2 10 bit) encode/export both for HD, 2K, QFHD and 4K
- XAVC S Long GOP (4:2:0 8 bit) decode in QFHD and HD
- Implicates XDCAM Proxy workflow (re-linking proxy to hi-res file)

Notes:

Import and edit XAVC content is direct, without rewrapping or transcoding. The flexible structure of XAVC allows you to browse clips using the Media Browser and organize them using camera metadata. The videographer can edit directly from the SxS card via the camcorder or a card reader or use the Media Browser to transfer the content to hard disk for better performance. Adobe Premiere Pro 7.2 the editor can export to XAVC 4K format, however the MXF file format is not XAVC compliant. The next version will be compliant.

Installation procedure and use

The process of ingesting XAVC material into Adobe Premier Pro CC is as follows:-

- Ensure that the Premier Pro version is compatible with the chosen XAVC mode.
- Choose **Media Browser**.
- Locate the footage from the media card (SxS, XQD or SD).
- Either right-click on the clip and select **Import**, or select the clip or clips and go to **File Menu** and select **Import**.

XAVC 4K/HD and XAVC-S with Vegas Pro

Vegas Pro 12 is an integrated, affordable and forward-thinking production environment designed for a new generation of creative professionals.

Vegas Pro 12 is the world's first HD, 2K and 4K XAVC native editor. The latest version features built-in support for XAVC files, with the same drag and drop, no transcode simplicity that videographers have enjoyed with other popular formats. No expensive add-ons or plug-ins are required. For optimal performance with 2K and 4K XAVC content, use the new smart proxy HD workflow for full frame rate playback on a wide variety of hardware configurations, from compact laptops to advanced multi core workstations.



You can find out more about the Sony range of creative software application at this address <http://www.sonycreativesoftware.com/>, and more about Sony Vegas family of software applications at this address <http://www.sonycreativesoftware.com/vegassoftware>.

Supported XAVC modes

The new version 12 Vegas Pro Edit natively supports:

- XAVC Intra (4:2:2 10 bit) encode/export both for HD, 2K, QFHD and 4K
- XAVC S Long GOP (4:2:0 8 bit) decode in QFHD and HD
- Implicates XDCAM Proxy workflow (re-linking proxy to hi-res file)

Notes:

Live feeds can also be captured as XDCAM MXF files for editing in Vegas Pro 12, or archived for future use. The Sony MXF file format is roughly one-fourth the bit rate of other HD compression technologies such as Avid DNxHD or Apple ProRes, making it more efficient for hard drive storage.

Installation procedure and use

The process of ingesting XAVC and XAVC S material in Vegas Pro 12 is as follows:-

- Ensure that the version of Vegas is compatible with the chosen XAVC mode
- Choose **Device Explorer** or locate the material on the media card (SxS, XQD or SD)
- Click **Import All New Clips** button, or if you want to import just a one specific clip, click the thumbnail to select it and then click the **Import Selected Clips** button. (Hold the **Ctrl** key while you click thumbnails to select multiple clips and import them in one operation.)
- The clips will appear in the **Project Media** window.
- Add (drag) the clips to the timeline.

Notes on fast editing with Vegas Pro

If editing native 4K clips is taking too long on your computer, you can use the new proxy feature in Vegas Pro 12. The lower-resolution files allow the fast editing without breaking your creative process, and then swap back to the original 4K file to render the final project when you have finished editing.

To create a proxy of a XAVC 4K clip:

- Right-click the clip in the **Project Media** window.
- Choose **Create Video Proxy** from the menu.

During the editing process, you can preview the project as proxies in either **Draft** or **Preview** modes, or as 4K in either **Good** or **Best** modes.

To render the project out to the XAVC or XAVC S format:

- Click the **Render As** button on clip
- Click the **Sony XAVC / XAVC S** Expand arrow
- Select the template from the list (XAVC or XAVC S at 4K, XAVC at 2K, or XAVC and XAVC S in HD quality).
- Click on **OK**.

XAVC 4K/HD and XAVC-S with Final Cut Pro

Final Cut Pro is a non-linear video editing software application developed by Apple. The most recent version, Final Cut Pro X 10.1 (FCP), runs on Intel-based Mac computers powered by OS X version 10.9 or later.



FCP has been updated for the next-generation architecture in the new Mac Pro, providing the high performance when editing and monitoring 4K video and working with complex graphics and effects. The latest FCP version smoothly edits multiple streams of 4K at full resolution. An enhanced playback architecture paired with the power of the new Mac Pro lets edit multicam video with up to 16 simultaneous streams of 4K ProRes. And if the videographer prefers to work directly with 4K camera formats, FCP natively supports XAVC.

FCP works with a proper codec technology ProRes . ProRes is a line of intermediate codecs, which means they are intended for use during video editing, and not for practical end-user viewing.

The previous version of FCP, version 7, is not compatible with XAVC or XAVC S. Only the latest version – Final Cut Pro 10.1 (Final Cut Pro X) adds general QuickTime support for XAVC.

For faster and fluid workflow, Sony has created a special plug-in (PDZK-LT2 V.1.10). This free of charge software for Mac provides support for XAVC and XDCAM / XDCAM HD files in FCP allowing viewing and editing capability. You can download the plug-in at this address

<http://www.sonycreativesoftware.com/pdzk-lt2>

Supported XAVC modes

The new version Final Cut Pro X supports:

- Decode XAVC Intra 4K and HD
- Decode XAVC S Long GOP QFHD and HD.

Notes:

FCP can decode XAVC Intra in 4K and HD in native with the PDZK-LT2 plug-in. “Native editing” processes the original files from camcorder, through the plug-in, to the NLE system. PDZK-LT2 plug-in also supports the XDCAM EX format.

Installation procedure and use

The process of installing the plug-in and ingesting XAVC material into FCP is as follows:-

- Insure that the version of FCP supports the chosen XAVC mode.
- Install the XAVC/XDCAM plug-in for FCP (PDZK-LT2 V.1.10).
- Click the **Import** button on the left-hand side of **Project**.
- Locate the footage from card (SxS, XQD or SD) in **Devices**.
- Click on any of the clips and choose **Import Selected**.
 - Confirm in the new window to:
 - Copy files in **Final Cut Events** folder (to work with native XAVC files)
 - ... or create **Optimized Media**, which will convert the files into ProRes
 - ... and/or **Create Proxy Media**.

XAVC 4K/HD and XAVC-S with EDIUS

EDIUS is a video editing software package currently developed by Grass Valley. EDIUS Pro 7 is a versatile real time editing software application for 4K, 3D, HD and SD. This is the finishing tool often used for broadcast news, news magazine content, and studio programs, as well as corporate, documentary, and 4K theatrical productions.

Low-resolution proxy editing mode enables EDIUS Pro 7 to work with older desktop and laptop systems. That means videographers do not need the latest and greatest system to edit with EDIUS Pro 7 and XAVC.

Supported XAVC modes

The latest version of EDIUS, version 7.21 64 bits, supports:

- Decode XAVC Intra 4K and HD
- Decode XAVC S Long GOP QFHD and HD

Note:

EDIUS works with HQX codec technology. HQX is a line of intermediate codecs, which are intended for use during video editing, and not for practical end-user viewing.

Installation procedure and use

The process of ingesting XAVC into EDIUS 7 is as follows:-

- Insure that the EDIUS version supports the chosen XAVC mode.
- Select the **File** menu, then **Add Clip**.
- Check the setting of **Transfer to Project** folder.
- Register whole folders into EDIUS. Right-click in the bin and select **Open Folder**.
- Locate the material from the card (SxS, XQD or SD)
- Transcode the logged clips into **HQX**, or work with **Native XAVC** files.

Workflow summary

	Camera or camcorder	Editing	Archive
XAVC 4K Intra-Frame	PMW-F55 PMW-F5 PXW-Z100	Avid Media Composer 7 & NewsCutter 11 with PDZK-MA2 v3.2 plug-in (decode only). Avid Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x with PDZK-MA2 v2.33 plug-in (decode only). Adobe Premiere Pro Creative Cloud. Sony Vegas Pro 12. Apple Final Cut Pro X 10.1. Grass Valley EDIUS Pro 7.	ODS-D55U ODS-D77U
XAVC QFHD Intra-Frame	PMW-F55 PMW-F5 PXW-Z100	Avid Media Composer 7 & NewsCutter 11 with PDZK-MA2 v3.2 plug-in. Avid Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x with PDZK-MA2 v2.33 plug-in. Adobe Premiere Pro Creative Cloud. Sony Vegas Pro 12.	ODS-D55U ODS-D77U
XAVC 2K Intra-Frame	PMW-F55 PMW-F5	Avid Media Composer 7 & NewsCutter 11 with PDZK-MA2 v3.2 plug-in. Avid Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x with PDZK-MA2 v2.33 plug-in. Adobe Premiere Pro Creative Cloud. Sony Vegas Pro 12.	ODS-D55U ODS-D77U
XAVC HD Intra-Frame	PMW-F55 PMW-F5 PXW-Z100 PXW-X180* PMW-400* PMW-300*	Avid Media Composer 7 & NewsCutter 11 with PDZK-MA2 v3.2 plug-in. Avid Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x with PDZK-MA2 v2.33 plug-in. Adobe Premiere Pro Creative Cloud. Sony Vegas Pro 12.	ODS-D55U ODS-D77U PDW-1550 native record & playback
XAVC HD Long GOP	PXW-X180* PMW-400* PMW-300*	Avid Media Composer 7 & NewsCutter 11 with PDZK-MA2 v3.2 plug-in. Avid Media Composer 6.5.x/6.0.x, Symphony 6.5.x/6.0.x, and NewsCutter 10.5.x/10.0.x with PDZK-MA2 v2.33 plug-in. Sony Vegas Pro 12. Apple Final Cut Pro X 10.1. Grass Valley EDIUS Pro 7.	ODS-D55U ODS-D77U
XAVCS QFHD	FDR-AX1 FDR-AX100 Alpha A7S*	Not supported at present. Support expected during 2014 with release of new product or upgrade of existing product.	ODS-D55U ODS-D77U
XAVCS HD	FDR-AX1 FDR-AX100 Alpha A7S HDR-AS100V	Adobe Premiere Pro Creative Cloud. Sony Vegas Pro 12 (decode only). Apple Final Cut Pro X 10.1. Grass Valley EDIUS Pro 7.	ODS-D55U ODS-D77U

*Not yet released, new or upgraded product.

Notes on media & ingest paths

Adopting a safe backup and archive strategy

Recording media can always be removed from the XAVC camera or camcorder and connected to a computer via a media adaptor or media reader. However it is strongly advised never to perform edits on the original recorded material on the original recording media. Editing performance is likely to be severely affected, there is a risk that editing files may fill the media and cause the editor to stop or crash. There is also a strong likelihood that you will corrupt or alter the original recorded clips, which you may need to refer to in their original form later.

Most media used in XAVC products include a read-only switch. Switch the media to read-only mode before inserting it into the computer, media reader, or media adaptor. This will ensure the computer does not alter the original recording in any way.

Always copy the complete folder and file structure from the media to a new folder on the computer. Then copy this to at least one archive or backup device external from the editing computer.

Remove the media from the computer without deleting anything or reformatting the media.

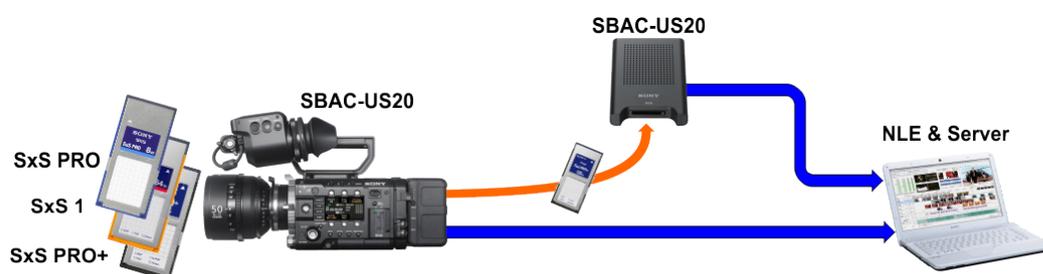
Check that the recorded material is visible from the editor and all the recorded clips can be used on the editor's timeline.

When you are sure that the copied material is complete, you can switch the read-only switch on the media off, and reformat the media ready for the next shoot. Always reformat the media in the camera or camcorder, not in the computer. This will ensure that the media's format is entirely compliant with the camera or camcorder.

Finally never edit directly from any backups or archived material. If the working copy becomes corrupted or you need to start a project again, take another copy from the archive or backup and work from the copy.

PMW-F55, and PMW-F5

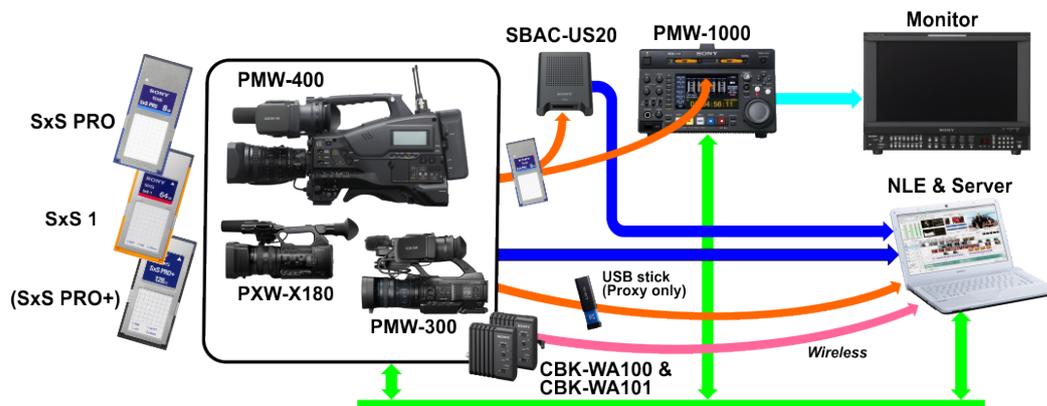
These camcorders use SxS media. XAVC 4K Intra-Frame and XAVC QFHD Intra-Frame recordings require SxS PRO+ media. XAVC 2K Intra-Frame and XAVC HD Intra-Frame recording can use SxS PRO+ or SxS PRO media up to 25p frame rate.



Material may be transferred to a server or NLE directly through the USB connector on the camcorders. Alternatively the SBAC-US20 SxS drive provides a USB connection to an NLE or server.

PMW-400, PMW-300 & PXW-X180

These camcorders use SxS media and record the high definition mode of XAVC Intra-Frame only. SxS PRO or SxS 1 media can be used in these camcorders. SxS PRO+ will work, but is considered over-specified.



Material may be transferred to a server or NLE directly through the USB connector on the camcorders. Alternatively the SBAC-US20 SxS drive provides a USB connection to an NLE or server.

The PMW-1000 recorder/player deck will play back XAVC HD Intra-Frame recordings from the PMW-400 and PMW-300 camcorders. This deck can also be used to record and edit XAVC HD material in a linear editing suite, and can also bridge between SxS media from these camcorders into a server or NLE.

The PDW-1550 will also record XAVC HD Intra-Frame to Professional Disc, and can be used as a bridge from SxS media to cost effective Professional Disc as an ultra-reliable archive.

PXW-Z100 & FDR-AX1

These camcorders use XQD media. This is a compact but high performance media designed for a new generation of compact 4K camcorders.

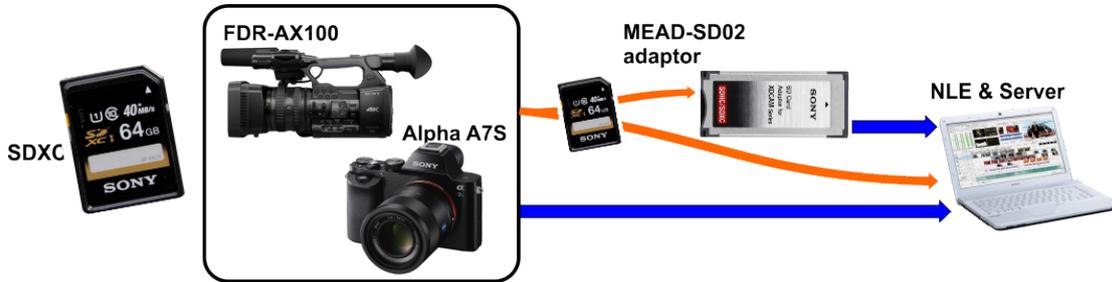


It is unlikely that a standard PC, Mac or laptop will include an XQD slot. Therefore either an MRWE-80 reader can be used to connect the XQD card to the computer via the USB port, or a QDA-EX1 adaptor can be used to connect the XQD card to the computer via an Express card slot.

SONY.

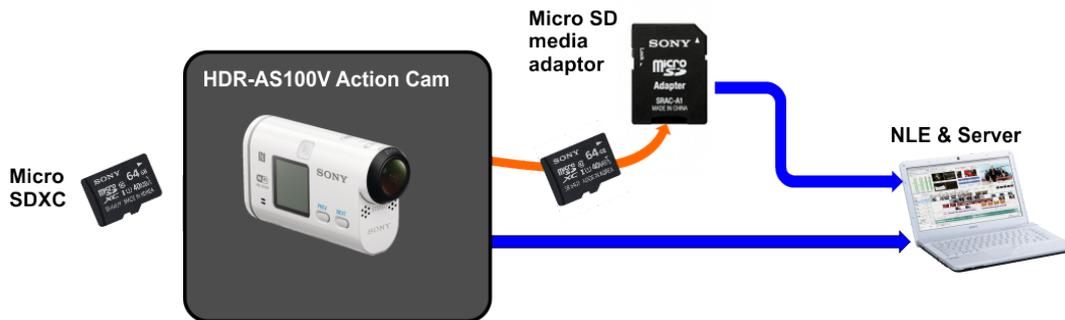
FDR-AX100 & Alpha A7S

Both the FDR-AX100 and Alpha A7S accept SDXC media. The camera/camcorder can be connected directly to the computer via a USB cable. The SD media can also be removed from the camera/camcorder and either plugged into the computer directly, or fitted to the computer via the SD media adaptor.



HDR-AS100V Action Cam

The HDR-AS100V Action Cam can accept both Micro Memory Stick or Micro SD media. However XAVC S recording requires specific Micro SDXC media. The SRAC-A1 Micro SD adaptor can be used to fit a Micro SD card to the SD media slot in a computer.



Appendix : How the technology works

Introduction to 4K

Several 4K resolutions exist in the fields of digital television and digital cinematography, all based on resolutions of about 4000 horizontal pixels.

The DCI (Digital Cinema Initiatives) 4K standard, sometimes referred to as True 4K or Full 4K, has a resolution 4096x2160 and 17:9 aspect ratio, and is utilised by all Sony hi-end digital cinematography products. This standard is exactly four times the resolution of the 2K (2048x1080, 17:9). Pixels are almost, but not exactly, square, i.e. $4096 \div 17 \times 9 \neq 2160$.

The QFHD standard, sometimes referred to as Quad HD, Ultra HD, UltraHD or UHDTV has been proposed by the Consumer Electronics Association. It has a resolution of 3840x2160, and a 16:9 aspect ratio. This is exactly four times the 1920x1080 high definition standard. QFHD has exactly square pixels, i.e. $3840 \div 16 \times 9 = 2160$. QFHD is intended for consumer televisions, and live broadcast television, live sports coverage etc.

Both 4K and QFHD have the same pixel size (disregarding the 0.39% difference because 4K pixels are not square). Therefore the resolution (quality) per unit area of 4K and QFHD is the same. However QFHD has a 16:9 aspect ratio and 4K has a 17:9 aspect ratio. Thus 4K has 6.67% more pixels.

Both 4K and QFHD offer exceptional reproduction of fine detail. Even if the final material is down-converted from 4K or QFHD to 2K or HD, after post-production and editing, fine quality is maintained and the final image has more detail compared to the same scene shot and produced entirely in 2K or HD.

4K workflows are considered the future, certainly for the digital cinematography and also for the professional market. QFHD is considered the next step for professional live television and for consumer use. The XAVC and XAVC S codecs offer real practical solutions for 4K productions in both True 4K and QFHD productions.

Intra and Long GOP compression

The XAVC format is able to compress video with either Intra or Long GOP compression.

Intra compression, sometimes referred to as Intra Frame compression or I Frame Only compression, compresses each frame on its own without any reference to other video frames. Compression is performed using a toolbox of techniques including Discrete Cosine Transform, Scanning, Entropy Coding and Data Buffering, and can normally reduce the amount of data in each frame to a half (2:1) of its original without any noticeable difference in quality.

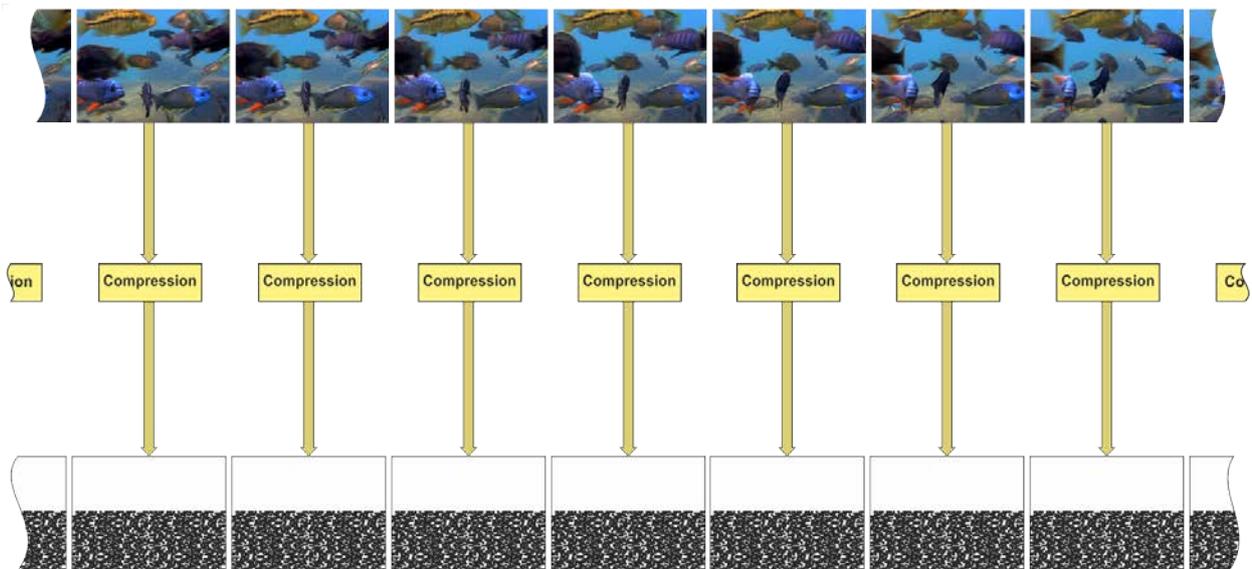


Figure 20

Intra compression

Long GOP compression, sometimes referred to as Inter-Frame compression, compares frame with frames before or afterwards before compression. In most video scenes each video frame is very similar to the frame before and the frame after. Therefore the comparison frames will contain the same amount of data, but far less useful information compared to the original video frames. It will therefore compress very easily to about a sixth of the original video frame for about the same quality as Intra compression.

Figure 20 shows a simple example of basic Intra Frame compression. The process starts with a single frame compressed on its own just as it would be in Intra compression. This is sometimes referred to as an I frame, and is used as a reference for the next five frames.

In this example the next five frames are compared with the previous frame to give comparison frames that are the same size as the original video frame but contain very little useful data, showing only what moved between the two frames.

These comparison frames are then compressed using the same compression as the I frame, but gives far less data than the I frame for the same overall compression quality. These final data frames are referred to as P (predicted) frames.

After five P frames the system resets with another I frame. The complete structure from the I frame to the last P frame is called a GOP (Group of Pictures).

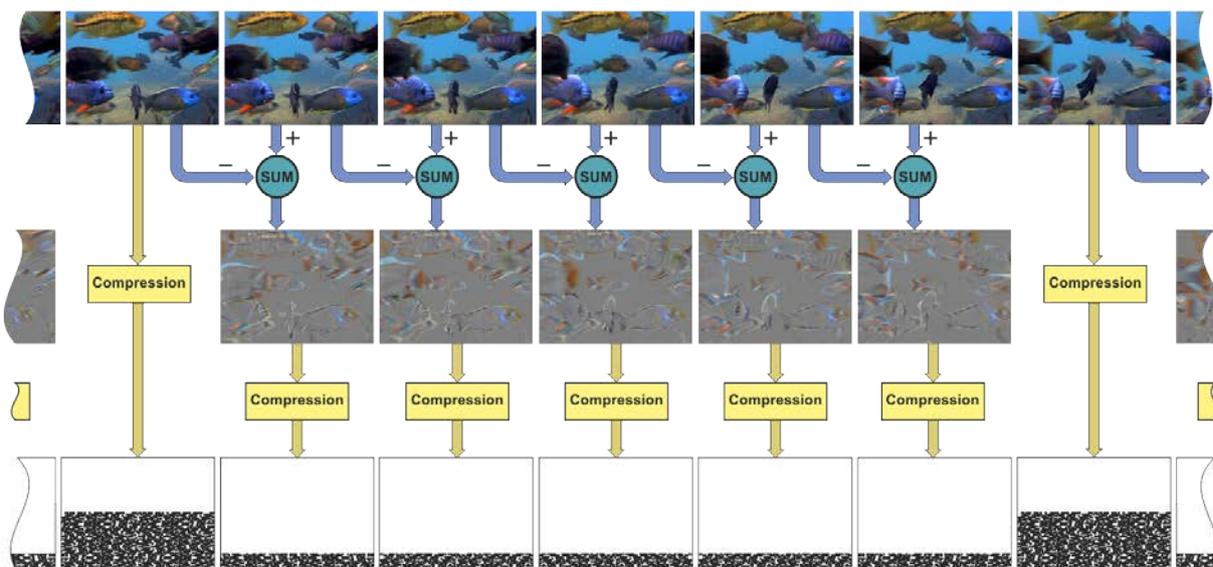


Figure 21 **Inter Frame compression**

Real compression systems like Long GOP XAVC use a GOP structure of about half a second with a 12 frame GOP. Some comparison frames compare with the frame before and the frame after. This gives higher levels of compression with less data for the same quality as P frames. These frames are called B (bi-directional frames).

Figure 22 shows the GOP structure of Long GOP XAVC with a 12 frame GOP. This significantly reduces the amount of data compared to Intra compression for similar overall compression quality.

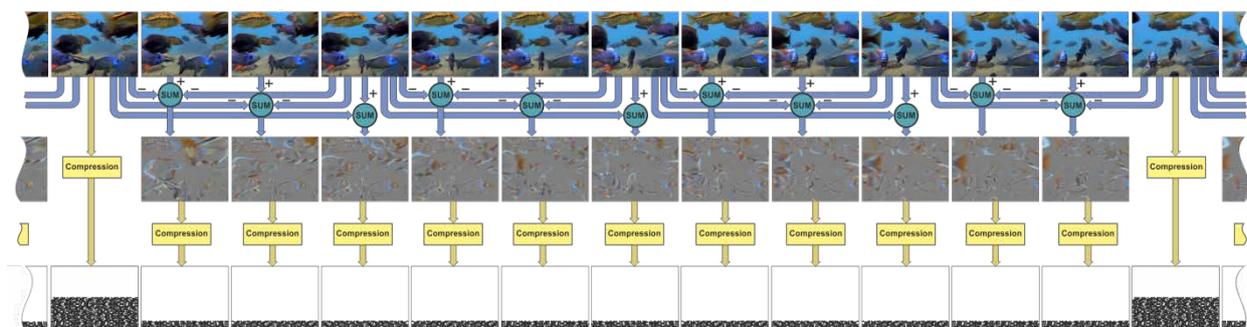


Figure 22 **Long GOP compression**

Good quality compression can be achieved quite easily with Intra compression at higher levels of compression, but at very high levels Intra compression will start to show compression artefacts.

Intra compression is simpler than Long GOP compression, and preferred by many broadcasters for its simplicity in editing. At higher bit rates, Intra compression can sometimes show higher levels of overall quality compared to Long GOP compression

Long GOP compression provides smaller file sizes for faster file transfer, material searching and browsing. Editing is more complex, but most of this complexity is handled by the non-linear editor, and is completely invisible from the operator.

References

LINK XAVC

<http://www.xavc-info.org/>

XAVC Sony :

<http://www.sony.fr/pro/article/broadcast-products-sonys-new-xavc-recording-format-accelerates>

<http://www.sony.co.uk/pro/article/broadcast-xavc-white-paper-1211>

<http://www.sony.co.uk/pro/article/broadcast-products-xavc-fags>

<http://community.sony.com/t5/F5-F55/XAVC-Sonys-implementation-of-Advanced-Video-Coding/td-p/36571>

<http://www.sony.co.uk/pro/press/pr-sony-ibc-autodesk>

4K workflow

http://community.sony.com/sony/attachments/sony/large-sensor-camera-F5-F55/7907/1/4K_Workflow_Guide_Version2.0.pdf

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