

Pipeline Preservation of VBI and VANC data

Pipeline v2.6 or later

Introduction

A Pipeline system can preserve data contained in baseband HD/SD-SDI signals (standard definition VBI and HD VANC) and pass it into a variety of output file formats. This document explains how during capture Pipeline preserve s this data either within individual video frames or into the file container's data tracks, and during playout Pipeline reads VANC data for output via SDI.

Pipeline data Storage

VBI and VANC data is stored in media files in different ways. Generally speaking, the data can be stored with each video frame as data or as a separate data track within a file container. Listed below are Pipeline's frame based and track based methods for storing VBI /VANC data into video frames or file container formats respectively.

	Preservation of VBI and VANC			
	Frame Based	Track Based		
	Preserves VBI data (such a Time Code and Closed Captions) and VANC data in video essence	All VBI and VANC data is passed through in the TIFO file's data track for use with FlipFactory or Vantage	QuickTime CC track created (608 or 708)	Preserves VBI and VANC data in MXF OP1a or OPAtom (SMPTE 436M)
Codecs				
DV / DVCPRO	No	Yes	Yes	Yes
IMX / MPEG-2 I-frame	Yes, in VBI lines	Yes	Yes	Yes
ProRes / ProRes HQ	Yes, proprietary Apple spec	Yes	Yes	-
DNxHD	Yes, proprietary Avid spec	Yes	Yes	Yes
DVCPRO HD	Yes	Yes	Yes	Yes

There are two ways to playout VANC data from a Pipeline system.

Track based VANC data

The first (default setting) is to obtain this data from the data tracks of the respective file formats. For QuickTime files this includes the time code and closed captions tracks. For MXF OP1a this includes all data stored the SMPTE 436M track data.

Frame based Video Essence VANC data

The second method will playout VANC data that has been embedded into DVCPProHD, ProRes and DNxHD video essence frames. This method requires you to enable this option from the Pipeline Administration page. This option overrides Pipeline's track based playout.

VANC playout from essence metadata

Frame-based Methods

Frame based data carriage methods are associated with the specific video codec. Some use standard methods while others are proprietary.

IMX/MPEG-2 I frame

Pipeline captured IMX/MPEG-2 I-frame video will preserve the original VBI data by preserving all incoming VBI lines.

FlipFactory/Vantage/Episode/Agility can decode VBI data contained in Pipeline IMX/MPEG-2 I-frame files.

When Pipeline plays IMX files out any VBI data contained in the file will be played out of SDI.

Apple Pro Res HD

Apple Pro Res created by Pipeline preserves VANC data into each video frame using an Apple proprietary format. Pipeline software can wrap Pro Res into a QuickTime container or into Telestream TIFO container files. TIFO files are created by Telestream Pipeline software and when containing Pro Res video, it will also carry VANC data separate from the video frames (see Track Based methods above).

Pipeline preserves VANC data within ProRes HD frames using Apple proprietary methods.

To play out VANC data contained in ProRes HD video essence frames the file must be wrapped in QuickTime and the firmware option “**VANC payout from essence metadata**” must be enabled.

FlipFactory/Vantage/Agility can decode Pipeline’s QuickTime files containing VANC in ProRes frames.

Avid DNxHD (SMPTE 2019m VC3)

Avid DNxHD carries VANC data in each video frame using an Avid proprietary format. DNxHD is carried in QuickTime or MXF containers, or in Telestream TIFO files. TIFO files are created by Telestream Pipeline software and when containing DNxHD video, it can also carry VANC data separate from the video frames (see Track Based methods above).

Pipeline preserves VANC data within DNxHD frames using Avid proprietary methods.

To play out VANC data contained in DNxHD video essence frames the file must be wrapped in QuickTime or MXF OP1a, and the firmware option “**VANC payout from essence metadata**” must be enabled.

FlipFactory/Vantage/Agility can decode Pipeline’s QuickTime files containing VANC in DNxHD frames.

DVCProHD

The SMPTE 375m standard specifies the mapping of VANC data packets into the payload area of the DV based 100 Mbps digital interface format (DIF) structure VAUX DIF blocks. This is defined in SMPTE 370M.

Pipeline preserves VANC data within DVCProHD frames using SMPTE 375m.

To play out VANC data contained in DVCProHD video essence frames the file must be wrapped in QuickTime or MXF OP1a, and the firmware option “**VANC payout from essence metadata**” must be enabled.

FlipFactory/Vantage can decode Pipeline’s QuickTime DVCProHD files with SMPTE 375m VANC data.

QuickTime

QuickTime is Apple's file container format for a vast variety of video and audio codecs. Some Pipeline video formats carried in QuickTime containers can include VANC data in each video frame (see above).

HD Formats:

- DVCProHD (VANC is preserved video frames using SMPTE 375m)
- Apple Pro Res (VANC is preserved video frames using Apple proprietary methods)
- Avid DNxHD (VANC is preserved video frames using Avid proprietary methods)

SD Formats:

- D10/IMX – Data contained in VBI is preserved.
- DV/DVCPro – No data is preserved in Pipeline's DV video frames.

QuickTime also supports a closed caption track, which Pipeline software applications will create for both HD and SD formats. (See Track-based Methods)

FlipFactory/Vantage/Agility can decode Pipeline's QuickTime files containing VANC in specific video frames (see above) and from standard VBI when present.

Track-based Methods**QuickTime**

All QuickTime files created by Pipeline will contain a Closed Caption track which is populated with data from VBI or VANC.

When the firmware option "**VANC payout from essence metadata**" is disabled Pipeline will recreate VANC output based on the QuickTime files Time Code and Closed Caption data tracks.

FlipFactory/Vantage/Agility can decode QuickTime Closed Caption tracks for repurposing within their respective workflows.

MXF (SMPTE 436)*

MXF format is covered by a variety of SMPTE standards. SMPTE 436m describes the embedding of VANC data or standard definition uncompressed VBI data within an MXF file. The standard specifies a variety of formats for this data.

Pipeline Control for Windows v2.5 or later can create a SMPTE 436m data track in MXF OP1a output files.

When the firmware option "**VANC payout from essence metadata**" is disabled Pipeline will recreate VANC output based on the SMPTE 436M packets contained in the MXF OP1a files.

FlipFactory/Vantage/Agility can decode Pipeline MXF OP1a files with SMPTE 436m VANC data.

Telestream Intermediate Format (TIFO)

Telestream Intermediate Format (TIFO) is a proprietary intermediate file format wrapper. This format is used primarily for integration between Telestream Pipeline and Telestream transcoding products. Any data contained in VBI or VANC within the incoming HD/SD-SDI input can be preserved as a Data/Control track within the TIFO output file produced by the Pipeline software applications. This data can then be processed by FlipFactory or Vantage into appropriate output files.

Pipeline does not support payout of TIFO files.

FlipFactory/Vantage can decode Pipeline TIFO files with track based VBI/VANC data.

Processing Pipeline files with VBI/VANC data through FlipFactory/Vantage/Agility

Pipeline files containing data in video frames or file container tracks can be processed through FlipFactory/Vantage/Agility by creating a factory/workflow/profile with an output that supports VBI/VANC data preservation. FlipFactory/Vantage/Agility decoder updates may be required to support particular VBI/VANC data preservation methods. See the appropriate FlipFactory/Vantage/Agility documentation or contact Telestream Technical Support for details on processing Pipeline files containing track or frame based VBI/VANC data.

**Available in Pipeline Control for Windows v2.5 or later only*