



Post Producer[®]
Developer's Guide



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Preface

To obtain product information, technical support, or provide comments on this guide, contact us using our Web site, email, or phone number as listed below.

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Vantage Information, Assistance, FAQs, Forums, & Upgrades	Web Site: http://www.telestream.net/telestream-support/Vantage/support.htm Support Email: support@telestream.net

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Telestream Technical Writers	Email: techwriter@telestream.net If you have comments or suggestions about improving this document, or other Telestream documents—or if you've discovered an error or omission, please email us.

Post Producer Overview

The purpose of this guide is to help producers, editors, operators, and others involved in promotion production learn how to use Post Producer in Vantage to automate repetitive editing and encoding of assets.

Note: This guide is written for video professionals who are familiar with using Vantage. To use Post Producer effectively in Vantage, you should know how to create workflows and submit jobs. If you aren't familiar with Vantage, we suggest that you review the Vantage User Guide.

This guide includes examples in XML format. A basic understanding of XML is helpful, but alternate methods of Post Producer template creation are also noted.

Learning to use Post Producer to effectively design, develop, and implement compositions to produce media involves a variety of skills, depending on the preferred method for creating automation templates.

Familiarity with Vantage is essential. The language of Post Producer—Composition Markup Language (CML)—is a powerful and comprehensive media descriptor language. Telestream recommends that you read the first four chapters in sequence before you begin working with compositions. The remaining chapters are reference material you can turn to when you need information.

In this chapter, you'll learn what Post Producer is designed to do, and how it works.

- [Introduction](#)
- [How Post Producer Works](#)
- [Creating Post Producer Templates](#)
- [Related Guides](#)

Note: A companion guide, Post Producer Cookbook, illustrates typical applications for Post Producer, and includes CML examples.

Introduction

Post Producer™ is software for Telestream's Vantage transcoding and workflow management system that automates high-volume, repetitive media production processes. It accomplishes this by assembling often complex, multi-layered video from common/re-usable mezzanine media sources—based on a media design template.

Post Producer reduces promo production costs by eliminating operational editing in the edit bay, and by using automated workflows to perform repetitive tasks such as adding bumpers or pre-rolls, graphics, audio tracks, lower-third tag lines, etc.

Automated production of iterative content such as promos and regional ads, also increases efficiency—allowing you to scale up your distribution capacity. This is accomplished by employing Vantage's comprehensive workflow design and execution capabilities, job management, and encoding scalability, including accelerated encoding on GPU-accelerated Telestream Lightspeed servers.

Figure 1. Typical Post Producer Composition



Typical applications include:

- Broadcast, cable, and IPTV VOD and promo production and insertion
- Automated news and weather report assembly
- International localization
- Assembly and insertion of bumpers, branding graphics, legal notifications, etc.—often referred to as *bag & tag* operations.

Post Producer is implemented as an optional, licensed feature integrated directly in Vantage as actions—which enables you to build and execute Post Producer workflows.

Post Producer allows you to automatically generate multi-layered video, mixing different resolutions, formats, and frame rates. You can also simultaneously composite video, title text, images, audio, content advisories, and subtitles.

Post Producer renders output from the source media file identified in a CML file, including title text, images, audio, content advisories, and subtitles, into a single media file, producing unlimited variations of a promo in any Vantage-supported format/container and media format you require.

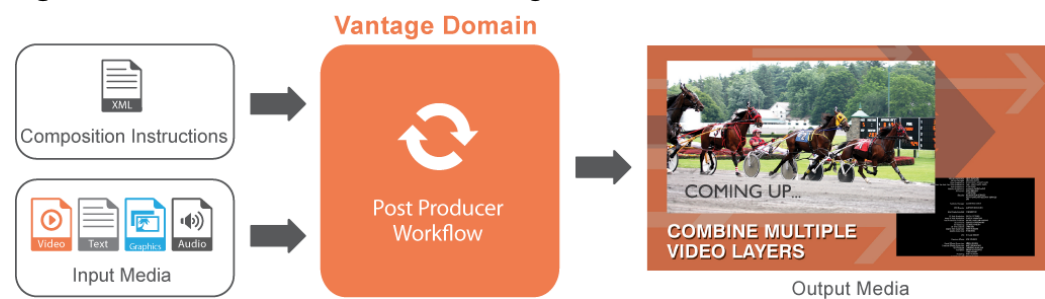
How Post Producer Works

Post Producer generates media based on a design template written in Composition Markup Language (CML)—a comprehensive set of media composition instructions (commonly called a *composition*) in XML format, created by you—using the media resources you specify, as input.

During the process, Post Producer applies display properties to the input media. It composes the video (including audio), with graphics and text overlays in exactly the proper arrangement (both spatially and temporally), as specified in the composition.

Finally, it renders a media file from your input media that conforms to the instructions.

Figure 2. Post Producer Media Conforming and Generation Process



Creating a media file using Post Producer involves these steps:

1. Creating a template to describe the media you want to create.
2. Updating the template with the file-based media resources to use for the specific media you want to generate.
3. Generating the media by processing the template in a Vantage workflow.

Creating Post Producer Templates

There are several ways to create templates for Post Producer.

- *Using Non-Linear Editors*—Use an NLE to create a project that includes the desired timing and sequences, add variables to elements that are to be replaced by automation, and export the project as an Apple Final Cut Pro file into a Post Producer watch folder for processing. For details on using non-linear editors to create compositions, see [Converting NLE Projects and Media Descriptor Files to Compositions](#).
- *Developing Applications Using the Post Producer API*—Develop custom applications that utilize the Post Producer API (Application Programming Interface) and automatically create variable templates from external media management and editing systems. For details, see [Sample Composition Program](#).

Telestream provides a Post-Producer developer's section on its Web site, which includes downloads of an SDK (Software Developer's Kit) that provide information, frameworks, and examples for software developers to create custom interfaces to work with Vantage and Post Producer.

For more information, browse the [Post Producer](#) page in the Customer Center on the Telestream Web site. (Viewing this page requires a valid Telestream username and password, which you can create online if you need one.)

- *Creating Templates Manually or Editing Existing Templates*—Create templates manually, implementing the Post Producer CML (Composition Markup Language) in an XML editor. You can also edit existing template files using a text editor to change media locations and timing events.

The power of Post Producer's CML automation language is that it can be created by developers who possess an understanding of the XML language, with virtually unlimited options for manipulating the production of rich compositions to drive powerful, automated workflows for content creation and distribution. For a full description of creating compositions, see [Creating and Working with Compositions](#).

- *Using Workflow Portal to Process Playlists of Clips*—Use Vantage's Workflow Portal with a CML configuration to select clips from a Vantage catalog, add or edit metadata, and submit the auto-generated CML to a Vantage workflow.

Workflow Portal—an easy-to-use operator's program—enables operator-intervention processing, where you can assemble (stitch) short form clips together to create longer form clips—highlight reels, news segments for VOD, long form shows, etc. While Post Producer CML templates can be created by other methods to perform this work, Workflow Portal makes it easy for both technical and non-technical users to assemble content from a quickly assembled playlist.

Note: Workflow Portal also provides an EDL configuration, with similar functionality. The difference between the two is that EDL configurations can only submit jobs to a Flip-action workflow. The CML configuration submits jobs to Conform-action workflows, which utilize the Telestream Media Framework transcoder, with more features, greater transcoding flexibility, and higher efficiency.

Related Guides

The following guides refer to a practical CML guide and other CML-based Vantage products, which you might find of value. These guides are all available in the Vantage section of the Telestream Web site.

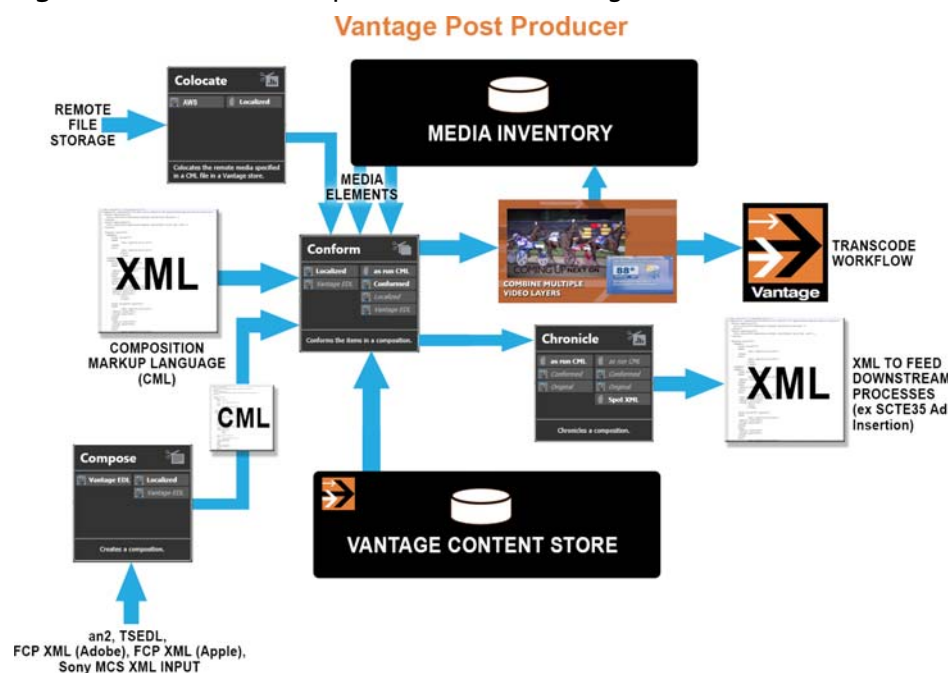
- *Post Produces Cookbook*—provides in-depth examples and explanations of how to use CML in a variety of applications.
- *Tempo User Guide*—provides an overview of what Tempo is, how to create Tempo workflows and compositions, and how to use the Tempo Portal to produce re-timed media assets.
- *Tempo Developer's Guide*—helps producers, editors, operators, and others involved in media re-timing learn how to use the Tempo CML—Composition Markup Language— in Vantage to automate re-timing of assets.
- *VOD Producer | DAI User Guide*—helps Vantage administrators, workflow designers, and operators set up and configure VOD Producer and create VOD ingest and publication workflows to generate CableLabs 1.1-compliant VOD assets and deliver them to multi-channel video programming distributors.

Using Post Producer in Vantage

This chapter describes how Post Producer is implemented in Vantage. In this chapter you'll learn about Post Producer actions, review a prototypical Post Producer workflow, and review how to submit Post Producer jobs in various ways to generate media. In addition, you'll learn how to use Post Producer workflows in operator-intervention applications such as assembling playlists, and creating DPP-compliant packages.

- [Post Producer Actions](#)
- [Typical Post Producer Conforming Workflow](#)
- [Submitting Compositions to Workflows](#)
- [Creating DPP Packages with Workflow Portal](#)

Figure 3. Functional Components and Processing in Post Producer

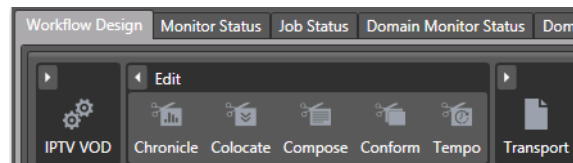


Post Producer Actions

Post Producer is implemented in Vantage via actions you can use to build Post Producer workflows. To produce promos and other media from source media with a composition, you process it in a Post Producer workflow that contains a Conform action. The Tempo action re-encodes media for shortening or lengthening the run time of media. For higher encoding performance, these two actions can be executed on a Lightspeed server.

All Post Producer actions are executed by the Vantage Edit Service, and are displayed as a group in Workflow Designer in the Edit category.

Figure 4. Post Producer Actions in Workflow Designer



Compose, Colocate, and Chronicle are Post Producer actions that provide utility features. They are described later in this chapter.

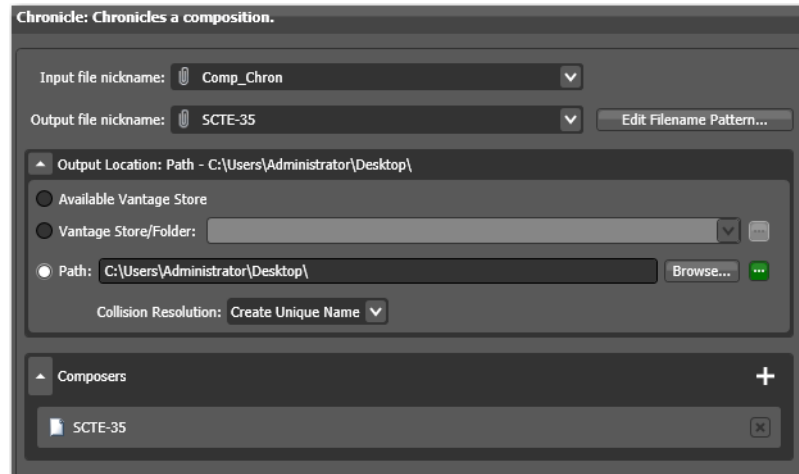
Note: Like all Vantage actions, you must configure them for use in a specific workflow before you can run jobs through them. For configuration details on each action, see the man page for the selected action in Workflow Designer.

- [Chronicle Action](#)
- [Colocate Action](#)
- [Compose Action](#)
- [Conform Action](#)
- [Tempo Action](#)

Chronicle Action

The *Chronicle* action transforms *As Run CML* files that have been produced from a Conform action to other formats for use with other processes.

Figure 5. Chronicle Action Inspector



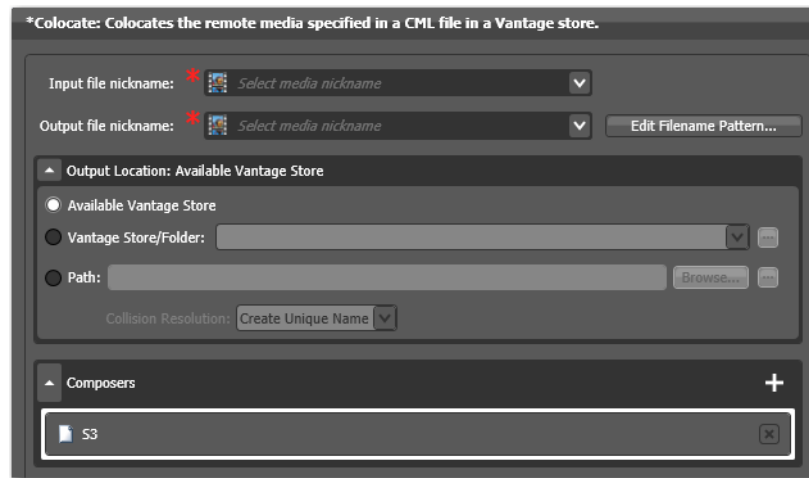
Note: An *As Run CML* file is one that has been produced by a Conform action after the file has been conformed (that is, the media file has been produced), and unresolved timecode values are replaced with actual start times for each segment marked as requiring a key frame. Variables have also been fully resolved. To generate an *As Run CML* file, check the Generate Composition Chronicle checkbox in the Conform action.

You can use the Chronicle action to generate Manzanita-specific SCTE35 files or a Canoe CSV file, for digital program insertion applications. The output file is provided a nickname, for further use in downstream actions.

Colocate Action

The purpose of the *Colocate action* is to ingest CML files with remote file references to source media, localize the files as necessary and then convert the file references into Windows file paths in a copy of the CML.

Figure 6. Colocate Action Inspector



Colocate operates on non-Windows local paths, S3 Amazon AWS paths, and HTTP server paths. For files on S3 and HTTP servers, you supply credentials in the Colocator component as appropriate, and the files are copied to the specified Vantage-accessible location. For local non-Windows files (those on a Mac OS X platform), the path is translated into a Windows-accessible (share or mapped driver-letter) path without relocating the file.

After the files have been localized and the CML has been converted, it can be submitted to the Conform or Tempo action to compose the media. You could create one workflow with both a Colocate and a Conform or Tempo action, or you could create two workflows—one to localize the media and convert the file (Colocate), and the second with a Conform or Tempo action, to conform and transcode it.

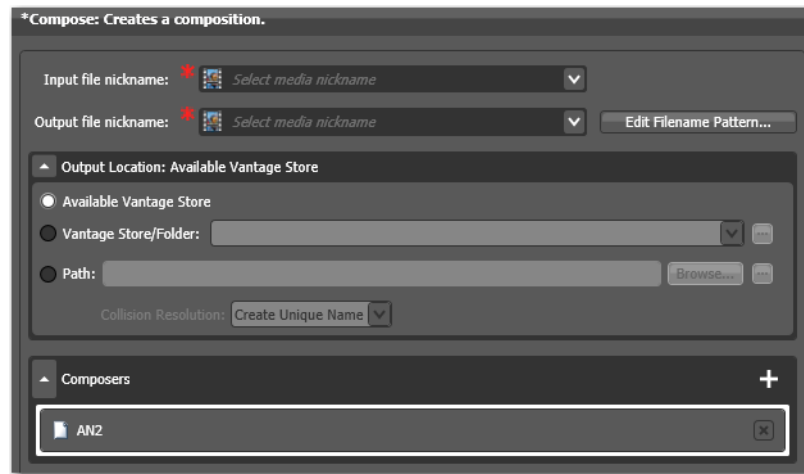
Note: HTTPS paths are not supported.

Add one or more components as required (for Local Path | S3 | HTTP files) and configure them with your server credentials.

Compose Action

The *Compose action* converts media descriptor files into a Composition file. To use the action, you specify an input file and output file by nickname, specify the output storage location, and select a composer to perform conversion, based on the input file type.

Figure 7. Compose Action Inspector



Formats that you can convert to compositions include:

- *Anystream (AN2)*—converts AN2 files from an Anystream Agility system
- *EDL*—converts specifically-formatted EDL files from a Harris Velocity system
- *Final Cut Pro 7 XML*—converts Final Cut Pro 7 XMEDL files from any system that generates or exports this file format.
- *QuickTime Reference*—converts QuickTime reference files, typically created by exporting a sequence from an Avid system
- *Simple AAF*—converts Simple AAF files, typically created by exporting a sequence from an Avid system
- *Trigger*—converts trigger files; enables you to add triggers (similar to the EDL Composer) in which secondary events can trigger events based on ancillary timecode, including pre-roll and post-roll clips, letterbox settings, closed captions and subtitles, and center cuts.
- *Telestream TSEDL files*—converts Telestream TSEDL files.

Once a file has been converted to a CML file (composition), it can optionally be further edited to add features before processing it. The resulting Composition can be submitted to the Conform action to compose media. You could create one workflow with both a Compose and a Conform action, or you could create two workflows—one to convert the file (Compose), and the second (with a Conform action) to conform it.

For details on converting media descriptor files to CML, see [Converting NLE Projects and Media Descriptor Files to Compositions](#).

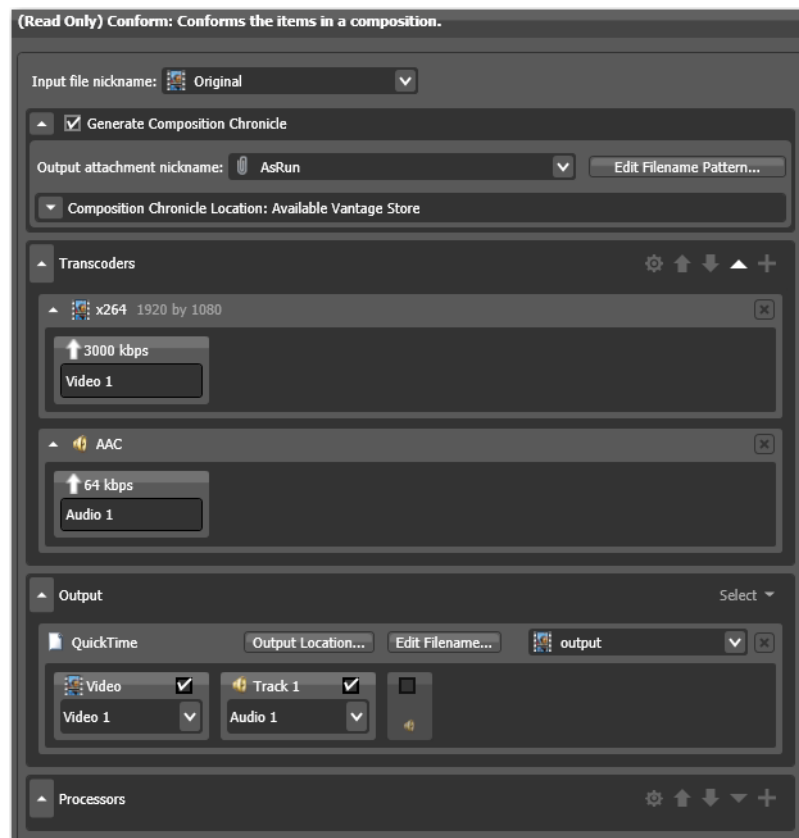
Conform Action

The *Conform action* is the primary Post Producer action. It assembles (*conforms*) and encodes source video, audio, titles, and still image (raster or bitmap) files, based on specifications contained in the CML file that started the job, and then transcodes (or direct-converts) into an output file, based on the configuration you have specified in the Conform action's inspector.

Note: Workflow Portal also supports EDL processing (using the Flip action), with similar functionality. However, the primary difference—and advantage—of using a CML workflow is that you can reference clips with mixed essences. The EDL configuration requires that all clips have the same frame rate, frame size and video codec; CML does not have this restriction. Composition processing also improves VANC and caption processing.

The process of creating media from a set of input media files using CML-based instructions is referred to as *conforming*. The input files and instructions for conforming the output file are all defined in the Composition XML file.

Figure 8. Conform Action Inspector



The Conform action can only process source video and audio in certain formats. If your input video and audio is not in a supported format, you can transcode it into one of the

supported formats prior to processing it in the Conform action. You can create a separate workflow to perform this task, or flip it right in the same workflow.

Note: For a list of supported formats, see [Input Media Formats](#), and [Graphic File Input Formats](#). For supported output formats, see [Output Video Formats](#).

The Conform action, which utilizes the Telestream Media Framework transcoder, with more features, greater transcoding flexibility and efficiency, can encode media in various essences, into these three formats: MP4, QuickTime MOV, and TIFO. The Conform action can also apply filters as specified by you, along with the media and container to generate during transcoding. If you require output media in formats other than those directly created by the Conform action, you can pass the media on to Flip, IPTV VOD, or other encoding actions in this or another workflow for processing.

You can not use the Conform action when it is configured to produce audio-only output. You must configure the Conform action with both a video and audio transcoder to produce both audio and video streams in your output.

Note: You can optionally add Video Processing Library (VPL) templates that can be applied to specific media files. VPL templates can be configured to process input media with specific decoding requirements, such as frame rate conversion, Telecine or inverse Telecine, or complex audio mapping. Templates are created by adding a Processor, configuring, and naming it. The template can then be referenced in the source configuration section of a composition, and used to perform decoding as specified when the composition is processed in a workflow with a Conform action.

Tempo Action

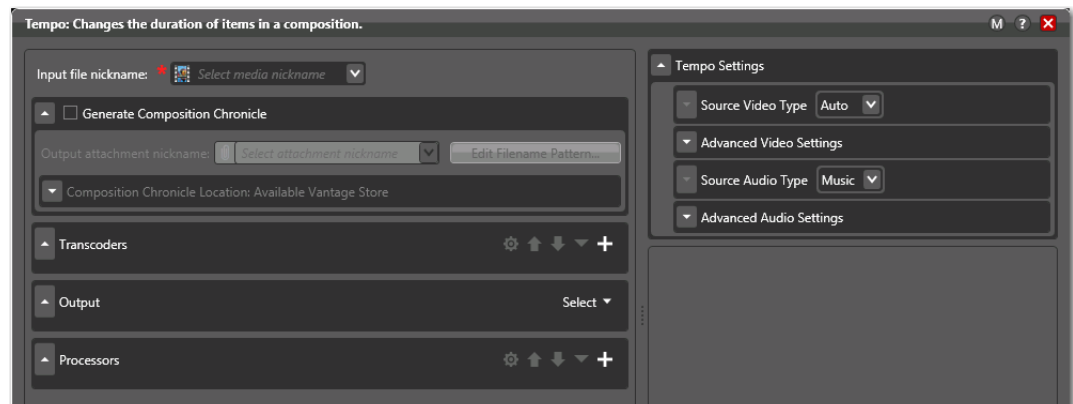
The Tempo action re-times file-based content and adjusts the running time of shows and segments while maintaining program quality. The Tempo action interpolates the desired time change over the duration of the content, adjusting total elapsed time without any perceived loss of video or audio quality, including video, audio, and captions.

Tempo-based workflows can only run on K80 Lightspeed servers, and utilize the Lightspeed Accelerated 16-bit YCbCr 4:4:4:4 (YUV) VPL.

The Tempo action produces newly-timed media (as defined in the incoming CML file) from the source media specified in the CML, applying option filters as appropriate, encoding the output video in the specified format.

Note: The audio and video input formats that are supported and output formats that Tempo can generate may be viewed on the Tempo data sheet, available on the Telestream web site. The output video may be ready for distribution, or you can process it with a Flip action, Multiscreen or IPTV VOD actions for further transcoding and packaging prior to distribution.

Figure 9. Tempo Action Inspector



Timecode propagation is supported in TIFO and QuickTime containers, but not in Program Stream or MP4 containers. Tempo supports closed captioning, content advisory, Active Format Description, and copy generation management (CGMS-A).

Note: For full details on setting up and using Tempo, see these guides, which are available in the Vantage section of the Telestream Web site. The Tempo User Guide provides an overview of what Tempo is, how to create Tempo workflows and compositions, and how to use the Tempo Portal to produce re-timed media assets. The Tempo CML Developer's Guide describes the requirements for producing Tempo compositions outside of Tempo Portal.

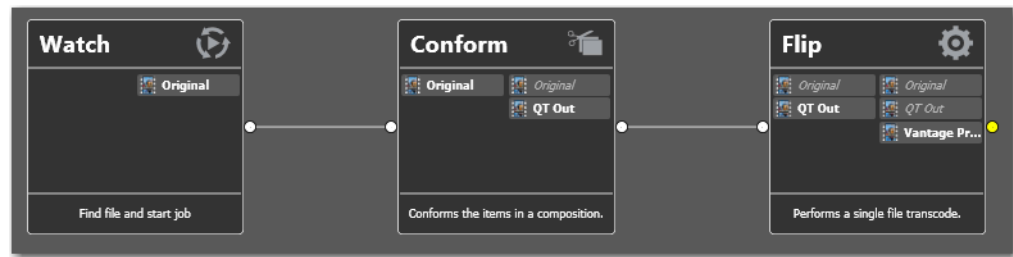
Typical Post Producer Conforming Workflow

The type of workflow you'll typically use repeatedly to produce your promos with Post Producer is a conforming workflow.

Conforming workflows can be very simple: the basic workflow involves a Watch, and a Conform—to composite the media as described in the CML, and encode it to one of the supported formats. (For a complete list, see [Post Producer and Related Formats](#)).

This example adds a Flip action, to create a proxy for easy review and approval.

Figure 10. Basic Post Producer Conforming Workflow



Of course, if these formats are not suitable for your production requirements, you can add Flip, Multi-screen or IPTV-VOD encoding to the workflow. In short—a Post Producer conforming workflow is no different than any other workflow in terms of flexibility or application—except that it uses a Conform action to produce your primary video—which you can use as the starting point for your video production.

Note: For a comprehensive review of typical Post Producer workflows for a variety of applications, see the separate Post Producer Cookbook.

Submitting Compositions to Workflows

You can submit a CML file to a Post Producer conforming workflow (a workflow with a Conform action) just like you submit media files to other workflows. Here are the ways that you can submit CML files for processing:

- Dropping the file into a folder monitored by a Watch action-based workflow.
- Dropping a workorder file (which contains jobs to submit) into a folder monitored by a Workorder action-based workflow. See [Batch Processing Jobs with Workorders](#).
- Manually submitting the file to a Receive action-based workflow in Workflow Designer or other Vantage client program.
- Programmatically generating and/or submitting the CML to a workflow using the Vantage SDK. See [Submitting Compositions to Workflows Using the SDK](#).
- Using Workflow Portal with a CML configuration to select media, automatically create a CML-based playlist and submit it. See [Assembling and Processing Playlists with Workflow Portal](#).

Batch Processing Jobs with Workorders

You can submit multiple jobs at one time, using a workorder. Workorders can only be processed by workflows that start with a Workorder action.

The purpose of the Workorder action is to enable automated submission of multiple jobs in batches. Workorder files are a simpler, automated submission alternative to job submission via the Vantage SDK.

A Workorder file is a comma-separated text file containing one or more work orders—job descriptions. Each Post Producer job is comprised of a fully-qualified reference to input files (CML files, media files, NLE project files and media descriptor files, etc.), optional attachments, and variables—all the input needed for the workflow performing the processing. At least one workorder scheme must be created (either directly in the Workorder action or in the Vantage Management Console) in order to parse the workorder schema and submit the jobs. Workorder files must conform to the schema specified in the selected workorder scheme.

You can create workorder files manually (in an Excel spreadsheet, or a text editor of some kind, for example). However, ideally a program or system component will dynamically and automatically create workorder files and deliver them to the target share for submission and processing.

For details on creating workorder schemes, refer to the Domain Management Guide.

Submitting Compositions to Workflows Using the SDK

You can submit compositions to a workflow for processing using methods in the SDK. For any SDK-based submission, the workflow must start with a Receive action.

Methods you can use include *SubmitFile*, where the CML is an XML file, located on a system that is accessible by the Vantage service that reads the file. You can also submit a composition using *SubmitItems*, where the composition is a object held in memory.

Note: When using *SubmitItems*, the maximum URL data size is 64K. If you exceed this size, the method fails. To keep your URL under the size limit, consider eliminating default values and comments, if any. Alternatively, write the composition to a file, and use *SubmitFile* (or other file-based submit method) to submit the composition to the workflow.

For information on using the Vantage SDK, see [Developer Resources](#).

Assembling and Processing Playlists with Workflow Portal

In addition to submitting compositions you've created directly to a Flip action workflow, you can also use Workflow Portal to create a playlist formatted as a CML file and submit it to a Post Producer conforming workflow (a workflow with a Conform action).

In this situation, the Conform action (instead of the Flip action) processes the compositions you submit, and renders a single media file as output.

Note: Create CML (Composition Markup Language) configurations can only be used in the Windows client.

Workflow Portal also supports EDL processing (using the Flip action), with similar functionality. However, the primary difference—and advantage—of using a CML workflow is that you can reference clips with mixed essences. The EDL configuration requires that all clips have the same frame rate, frame size and video codec; CML does not have this restriction. Composition processing also improves VANC and caption processing.

Workflow Portal configurations are created in the Management Console. For details, see the *Configuring Vantage Workflow Portal Operation* chapter in the *Domain Management Guide*. For details on using Workflow Portal to process CML-based playlists, see the *Vantage User Guide, Using Workflow Portal* chapter.

Creating DPP Packages with Workflow Portal

You can use Vantage to create a media processing system which produces Digital Production Partnership (DPP), Version 4.1-compliant television programme packages, ready for broadcast or distribution.

DPP package production in Vantage provides the following features:

- *DPP Workflow Portal*—which enables operators to create DPP package processing jobs, marking parts in a proxy to generate a DPP timeline including slate, bars, and black (as a CML file), enter DPP metadata, and submit the job to DPP package publishing workflows. (Workflow Portal has also been implemented as a Web application, but it does not support DPP configurations.)
- *Post Producer*—renders the CML with the programme's video and metadata to create video with a DPP-compliant timeline, including slate, bars, and tone.
- *Transcode Pro*—encodes DPP programme files, automatically inserting DPP metadata, creating a DPP package in AS-11 MXF format with appropriate audio and video encoding.
- *Vantage Analysis tools*—validates the metadata in the DPP metadata XML files, ensuring valid formatting and compliance.
- *Delivery Connectors*—enables automatic delivery or deployment to archiving, delivery, and publishing systems, including Aspera and Signiant delivery protocol options (HTTP, S3, and FTP are standard capabilities).

Note: For full details on setting up and using DPP processing systems in Vantage, please refer to the *Creating DPP Packages in Vantage* app note, which is published on the [Telestream Web site](#) in the Vantage Options section. Also refer to Creating DPP Configurations in the Using Workflow Portal chapter of the Vantage User Guide.

Composition Overview

The purpose of this chapter is to introduce you to the concept of a Post Producer composition. This chapter describes (conceptually) how to create and use compositions, and the major components of a composition, and their relationship with each other. Of course, at this introductory stage some details are left out, and there is little mention of Composition Markup Language (CML)—the XML schema used to implement a composition. The CML language is covered in detail in succeeding chapters.

To understand how to describe the behavior and the look and feel of your intended media in a composition, it is important to understand it's building blocks. Creating templates with an NLE does not require a deep understanding of compositions, but if you plan to write a program to auto-generate compositions or manually create a composition in a text editor, this conceptual understanding is vital to your success.

- [Creating a Composition](#)
- [Composition Object Hierarchy](#)
- [Sequences](#)
- [Segments](#)
- [Material](#)
- [Visual and Auditory Effects](#)

Creating a Composition

Compositions (the design template) must be written in a specific schema—Composition Markup Language (*CML* for short). CML is designed to make describing media (and thus providing the composition instructions) as easy, flexible, and comprehensive as possible. Compositions are written as XML files.

Because Post Producer is intended for repetitively producing media files from different sets of input media (hourly weather updates, for example), the composition must be specific enough to comprehensively describe the output media characteristics, but general enough to generate the media from any given set of input media provided.

When designing the composition, you won't typically know in advance the file names of the input media resources. All you'll know is that you need a baseline video, and you want a logo, plus lower-thirds text, for example. So you have to leave these elements undefined—or, just identify a sample set of test input media for development.

You typically create CML files using a computer program that you have developed, or you can create them manually in an XML or text editor.

Note: Before you can create CML files (or write programs that create CML files), you must have a solid understanding of its elements and topology. For details, see [Creating and Working with Compositions](#).

You can create CML files in the following ways:

- Develop a program using the Post Producer Class Library in the Vantage SDK
- Using an XML or text editor
- In Vantage, use a Compose action workflow to convert a media descriptor file in another format to CML format.

Each of these methods are described in detail later in the guide.

Note: While creating Composition files manually is feasible, it is not usually the preferred practice. The best practice is to generate compositions programmatically.

Specifying the Input Media in the Composition

Each time you submit a job (for testing or for production), you modify the composition file to identify the path to each input media file you require—creating a ready-to-run composition—and then you can submit it to a Vantage workflow to process the job and generate the output.

Before you submit a composition file to generate a new output file, update it with the correct input files. While you can update it manually, you can also automate this process in various ways in production. For example, you could use a nickname that is replaced with a run-time path and file name. Or, you could implement your

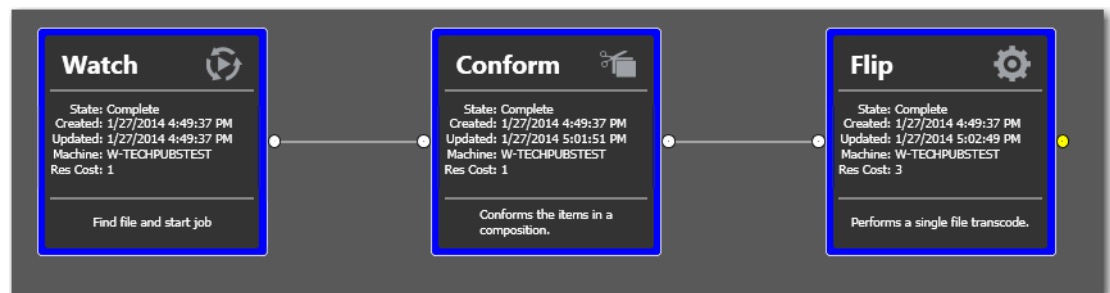
composition generator application to supply the correct file name just prior to submission.

Alternatively, you could design a composition with generic or functional filenames: *baseline_video.mov*, *network_logo.png*, *backtimed_credits.mov*, etc. Then, you would design your system to rename the input files for each job to these generic names.

Generating Media from a Composition

In Vantage you can create media from a composition by processing it with a Post Producer workflow. You first create a Post Producer workflow—one which contains a Conform action (or other Post Producer transcoding action, such as Tempo). This workflow assembles and encodes the input media files—the video, audio, text, and still images you’ve identified in the ready-to-run composition—into an output file.

Figure 11. Typical Post Producer Workflow

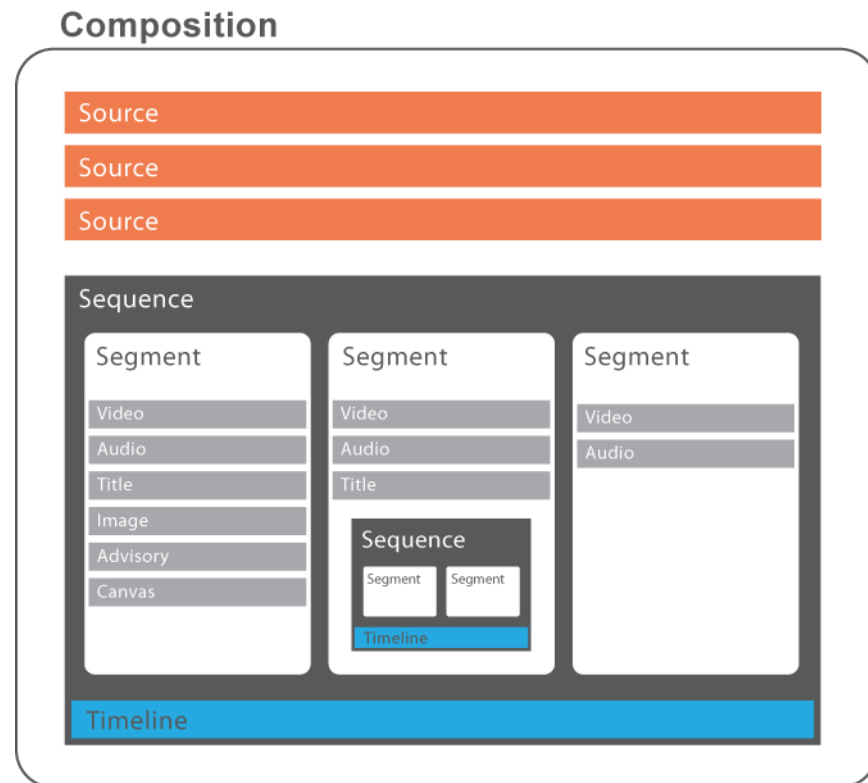


To generate your media, you submit your ready-to-run composition file to the workflow. Details are described in the next section. When the job is done, Post Producer has automatically created your promo—based on the composition’s design template—from the source media you identified.

Composition Object Hierarchy

As illustrated below, a composition is a collection of multi-level objects, working together to create a hierarchical, temporal, and spatial arrangement of media.

Figure 12. Composition Hierarchy, Simplified



Referring to the illustration above, note that each composition as a minimum, has these components:

Sources—These are simply pointers to input media files—nothing more than fully-qualified paths to the media files.

Sequences—An independent timeline; a collection of one or more segments, played out sequentially.

Segments—A layered collection of material (and optionally, other sequences) that is played simultaneously.

Material—The media—video, audio, titles, content advisories, canvases, and images—each with unique properties and effects, and spatial and temporal arrangements.

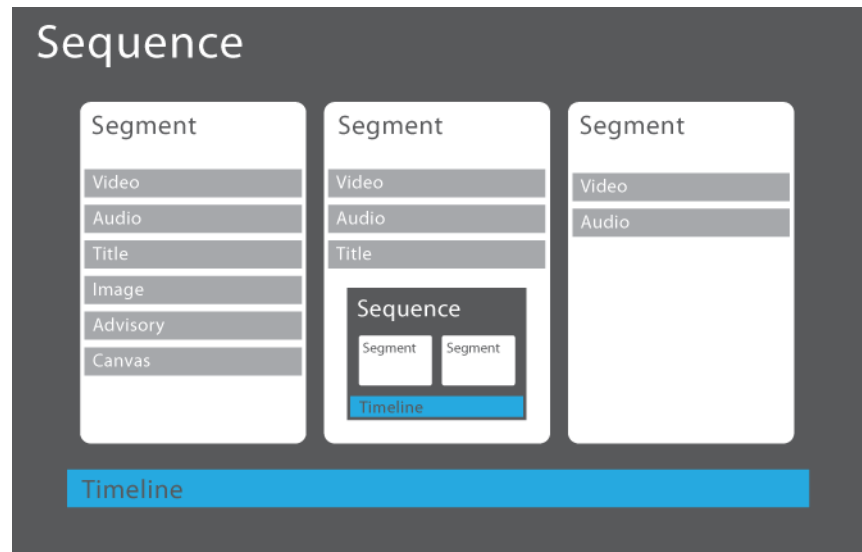
A composition also contains media sources, which identify the media files of the media that are utilized in the composition.

Sequences, segments, and material (and their effects) are described in detail in the following topics.

Sequences

A sequence defines a set of segments, which play sequentially, one after the other, to completion. At least one sequence is required, in order to hold segments. The total length of a sequence is the sum of the length of its segments. Sequences can be placed in the composition, or inside segments.

Figure 13. Sequences are Composed of Segments



The temporal position (start time) of each segment in the sequence is determined by the accumulated duration of the preceding segments in that sequence.

All sequences in a composition begin playing concurrently. Likewise, sequences in a segment begin at the same moment—when that segment begins.

You change the moment when a sequence plays by offsetting it with a time value. You use the layer property of a sequence to control visual layering (compositing): which sequence can obscure the visual material in other sequences. Thus, visual material in a sequence with a lower layer value may be obscured by visual material in sequences with a higher layer value.

The material in a given sequence is played back independently of material in all other sequences. Thus, you should add an additional sequence when you want an additional, independent timeline upon which to present material.

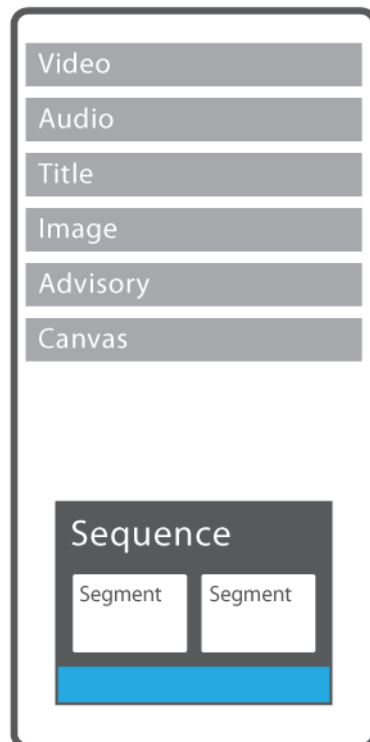
The duration of a sequence is equal to the accumulated duration of all the segments it contains. The longest sequence in the composition determines the duration of the composition.

Segments

Segments define a set of material that is played back concurrently. At least one segment is required in each sequence. Multiple segments play consecutively. Segments are dynamic, bounded time periods—the ordinal (ordered) building blocks of a sequence. Each segment has a duration—and the duration of each segment in the sequence determines the total duration of the sequence.

Figure 14. Segments are Composed of Material and other Sequences

Segment



Segments create time boundaries on the enclosing sequence's timeline; the material within a segment can not cross the segment's boundary. You add additional segments to a sequence when you want to increase the timeline of the sequence.

The start time of a given segment is determined by the accumulated duration of the preceding segments. Like a sequence, you can change the moment when material begins playing by offsetting the item with a time value.

Each segment also includes a reference to the source media file, and may include mark-in and mark-out -point to specify the portion of the media to play back.

Material

Material items are the building blocks of your media. You can provide the following types of material in segments:

- *Video*—instances of the video or video clips referenced by sources
- *Audio*—instances of audio in a file, ignoring video (if present)
- *Images*—instances of raster images, or image sequences
- *Content Advisories*—instances of advisory graphics and metadata
- *Titles*—instances of text, burned in on the frame
- *Canvases*—instances of black rectangles, used for fades

While all material has common characteristics, each type also has a unique set of properties. Just like sequences, all material items in a segment play concurrently—at a specific temporal position in the timeline of the sequence—beginning at the segment time. To alter the moment when a specific instance of material is presented, you provide a time-based offset.

Also like sequences, all material items within a segment are layered from back to front visually. Thus, visual items in a lower layer within the segment may be obscured by visual items in a higher layer.

Visual and Auditory Effects

Visual effects can be applied to material. You can also apply these effects over time, creating animations and audio fades. Effects can also be combined. (Volume adjustment is also an effect, which can be applied to audio material.)

You can apply the following effects to material:

- *Opacity*—controls the transparency of visual material, by layer
- *Scaling*—controls the size of the visual material in the frame
- *Translation*—controls the location of the visual material in the frame
- *Rotation*—controls the X, Y, and Z axis of the visual material
- *Volume*—controls the loudness of audio material.

Using these effects effectively requires a solid understanding of each effect, as well as how to identify various temporal portions of the media.

Note: The application of material and application of effects in your composition is really where the rubber hits the road. The ability to implement the material in the manner you desire is the key to creating functional compositions. For a comprehensive, detailed discussion of working with material, see Chapter 5, [Working with Material](#).

Creating and Working with Compositions

The previous chapters introduce you to the purpose and features of Post Producer, how it is implemented in Vantage, and a conceptual model of a composition.

This chapter provides referential information—practical, detailed guidelines for various aspects of creating and working with composition files.

Note: You may be a programmer; you may not be. As a programmer, you may be writing a program to generate (or otherwise utilize) a composition. Regardless of your background, skills, or method of generating a composition, these topics should be of general value to you in your composition development endeavors.

- [Approaches to Composition Development](#)
- [Developer Resources](#)
- [Media Characteristics Affect Composition Design](#)
- [Composition File Requirements](#)
- [Specifying Unit Designators in Attributes](#)
- [The Basic Format of a Composition](#)
- [Validating a Composition XML File](#)
- [Resolving Errors in CML Processing Jobs](#)
- [Using Nicknames, Expressions, Variables, and Constants in Compositions](#)
- [Commenting CML Files](#)
- [As Run CML Files](#)

Note: If you have comments or suggestions about improving this guide—or if you've discovered an error or omission, please email us at techwriter@telestream.net.

Approaches to Composition Development

Composition Markup Language (CML) is an XML schema that provides the vocabulary to describe media elements and their temporal and spatial relationships on a video timeline, in a manner suitable for conforming the specified input files into an output media file that adheres to the general description.

Aside from using an NLE to generate CML, there are two different approaches to creating or developing compositions. Telestream recommends generally, that you use the Playlist .Net Class Library and develop your compositions in supported .Net languages. The benefit of this approach is that you're relieved of the requirement to hand-craft valid, complex XML and CML. With a properly designed program, you're assured of producing a valid composition.

However, you can also create a composition manually, using an XML editor or text editor. The benefit with this approach is that you don't have to be a programmer or learn how to use the Playlist Class Library.

Note: Neither approach relieves you of the burden of understanding CML. In both cases, there is a common requirement: you need to know how to properly construct a composition to meet your media generation requirements. If you don't understand Composition Markup Language, you'll have a difficult time creating the composition you intend without a lot of trial and error.

The approach you take depends on several factors:

- Technical skills—that you have, or are available to you
- Scale of effort—do you need a few compositions, or lots of them
- Intended use—whether this a testing/learning experience or a production task.

Skills and Tools Required for the Programming Approach

If you are planning to write a program to generate a composition, you'll need the following skills and tools:

- Composition Markup Language
- C# or other .Net CLI language
- Playlist Class Library
- Microsoft Visual Studio (or other .Net development tool).

Skills and Tools Required for the Manual Approach

If you are planning to write a composition manually, you'll need these skills and tools:

- Composition Markup Language
- XML
- XML or text editor.

Developer Resources

In order to learn about CML and apply it to your video processing requirements, refer to the following products and documents.

Vantage SDK—The Vantage SDK is an indispensable part of CML development. It contains the .Net class libraries, C# code examples, and documents that you need to develop programs to create and generate Post Producer compositions, and to submit files (such as compositions and media descriptor files) to Vantage workflows.

Registered users can download the Vantage SDK by logging into the [Registered Vantage Customer](#) section on the Telestream Web site and following the steps.

Composition Class Library Help—A CHM file in the SDK for programmers who are creating a composition or utilizing compositions for other purposes. This reference describes the Vantage Composition class library (referred to as the Playlist library), which implements the Composition Markup Language.

Post Producer Developer's Guide—The guide you're reading now.

Post Producer Example Files—This collection of files on the Telestream Web site forms the basis for all cookbook examples. They make excellent tutorials, and templates for starting your own projects, or improving them. For details, see [Post Producer Composition Examples](#), below.

Post Producer Composition Examples

A library of compositions examples and videos generated by the composition are provided to illustrate various features of Post Producer. To access these examples, go to the www.telestream.net Web site and log in as an authorized user.

Click on the Post Producer link and select the CML examples tab to view each CML example, which includes the CML file, the exported workflow it can be processed with, source media, and a sample proxy video clip that was produced from it.

Many of these examples are also described in detail in the Post Producer Cookbook.

Media Characteristics Affect Composition Design

Compositions can't be created in a vacuum. For any composition to be practical and useful, some assumptions must be made.

For any composition you want to create, you should at a minimum, know:

- The intended length of output (60 seconds, 3 minutes, etc.)
- Input and output video formats (SD / HD 720, 1080, etc.)
- Any raster image sizes
- Input and output audio track layout: 5.1, stereo, Dolby E, track count and layout

The specifications of your media directly affect the media modifications you plan to perform in the CML to generate the required output. Telestream recommends that you document your media specifications as comments directly in the CML, so that you and others are cognizant of them as the composition is studied, used, or modified.

For example:

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
<!-- Up Next Promo DUR=1 min 1920x1080 DolbyE 5.1+2 -->
<!-- All PNG files: 600 x 420 -->
<!-- Input: 1080i -->
<!-- Output: 1080i x264 -->
<!-- Conforming Workflow: 1080 VOD -->
...
```

Optionally, provide other design or runtime (Conform action configuration requirements) details including the author, and a change history.

Composition File Requirements

Each composition must be written in XML, and saved as a text file. It is common to name XML files with the .xml suffix. By convention, Telestream often names composition files with the .cml file suffix, to identify it as a Composition Markup Language file. The fact is, you can name a composition file with any suffix you want, and submit it to a Post Producer workflow. The suffix is immaterial in this context.

If you are rendering text in the CML (by the use of the Title element), you have to concern yourself with the file's character encoding format. For Roman character sets, you can use ANSI or UTF-8 encoding; for 2-byte non-Roman fonts (Cyrillic or Chinese, for example), you must save the file as UCS-2 or UTF-16 little-endian.

The font family being rendered must be present in the operating system of the Vantage server where the Vantage Edit service executing the Conform action is hosted.

Note: XML is case-sensitive. Elements must be entered in upper case in a CML file to be recognized by Post Producer. If you don't enter the element in upper case it will be ignored—an no error will be displayed. Although attributes are also by convention in upper case, most attributes in CML are all lower case. Be sure to use the case indicated in the element's definition, in [Composition Markup Language Reference](#).

For details on text rendering and the use of font families, see the [Title](#) element.

Specifying Unit Designators in Attributes

Whenever you specify a dimensional, volumetric, or other value-oriented number in an attribute (for example, `<Crop top="30px" left="0" bottom="-2px" right="100%" />`), you can identify the logical unit designator that applies to it.

Note: Per XML syntax rules, all attribute values must be enclosed in straight (not smart) double quotes (" and "). Use of smart quotes will cause the workflow to fail. This applies to all value types: strings, integers and other numbers, and keywords. All values must be straight quotes, not smart (left and right) quotes. For example, `<Crop top="30px"... />`.

If you specify a value without a unit designator, it is *always* treated as a ratio.

The table below describes each unit designator permitted in CML.

Table 2. Unit Designators You Can Use with Numeric Values

Unit	Designator	Description
Percent	%	Use percent (%) to define the ratio of the attribute value compared to the whole it is referencing (for example, right edge). You can use percent to describe most value types—for example, an increase in volume, or the width of an output frame. Integers and decimals are permitted. In some attributes, the value may be negative. For others, it must be in the range 0-100%. Or, the value may be over 100%, as in the case of Rotation: 200% is equal to 720 degrees, or two complete rotations.
Decibels	dB	Use Decibels (dB) to define audio volume values.
Degrees	°	Use degrees (°) to specify the amount of rotation. In some attributes, it may be in the range 0 to 360; in others (such as Rotate), you may specify an unlimited amount of rotations—for example, 720 for 2 turns, or 3600 (for 10 turns). You might also be able to specify a negative degree: <code>phase="-90°"</code> , for example.
Pixels	px	Use pixels to define values relating to dimensions or points in raster images, input and output frames. In some cases, you may use negative pixels. Pixels are always expressed as integer values.

Table 2. Unit Designators You Can Use with Numeric Values

Unit	Designator	Description
Points	pt	Use points (approx. 1/72 of an inch) to define values relating to the size of text, as in a Title element. Integers and decimals are permitted.
Fraction	{ }	There is no designator for a fraction. Use fractions when it is more accurate, easier (or better understood by other readers) to express the proper value. Because a fraction is a mathematic expression, it must be enclosed in braces. For more details, see Using Nicknames, Expressions, Variables, and Constants in Compositions .
Ratio		Like fractions, there is also no designator for a ratio. Use ratio in the same manner as percent: to define the ratio of the attribute value to the whole being referenced—for example, right edge. A ratio may be expressed as an integer, a decimal number, or a rational number {5/10} which must be presented as an expression, in braces. Ratio is effectively a percentage value, with the decimal moved 2 places left. For example, 100% = 1.00. In some attributes, the range is 0 to 1. In other cases, the value may be greater than 1.

The unit designator you use should immediately follow the value, with no intervening space. For example, *top="30px"*.

The Basic Format of a Composition

Now that you conceptually understand the major elements of a composition and their relationship to each other, let's turn to the task of implementing them in Composition Markup Language—by creating a CML file.

A composition is comprised of two types of elements:

- Optionally, one or more Source elements
- One or more Sequence elements

In the example below, a very simple composition is presented. Note that all attribute values are in straight double quotes—an XML requirement. Also, note the UNC path in the File element—the most effective way to access files in a multi-server environment hosting a typical Vantage domain.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share\path\my_promo.mov" />
  </Source>
  <Sequence layer="1">
    <Segment>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0" />
    </Segment>
  </Sequence>
</Composition>
```

This example illustrates the proper format and organization of the basic composition elements.

A composition always starts with an XML element, as required per XML standards, and has one Composition element. This composition has the following elements:

- Inside the Composition element is a Source element (shown in bold), to identify the source file for the Video. You may or may not need Source elements—you can optionally add one or more as necessary. Though not required, by convention they are placed before any Sequence elements to improve readability.
- A single Sequence element (in bold). (One or more sequences are permitted).
- A single Segment element (in bold) in the sequence, where the video is utilized. As with sequences, multiple segments are permitted.

This example composition will produce an output clip in the format specified in the Conform action. This is the foundation you'll build on to create complex, high-quality highlights, promos, and other types of clips.

We suggest you copy and paste this into a file, save it as XML, and change the location attribute on the File element to point to a suitable file that your Vantage server has access to. Then, submit the XML file to a Conform workflow and view the output.

Validating a Composition XML File

To validate the XML formatting of a composition, you can use a variety of tools (Notepad++, Microsoft Visual Studio, Oxygen, etc.) You can also validate your composition using tools provided by the Worldwide Web Consortium at: http://www.w3schools.com/xml/xml_validator.asp.

It is a good habit to validate your composition frequently as you develop it—regardless of how create it. If you submit a composition to a Post Producer workflow with XML or CML errors, it will fail.

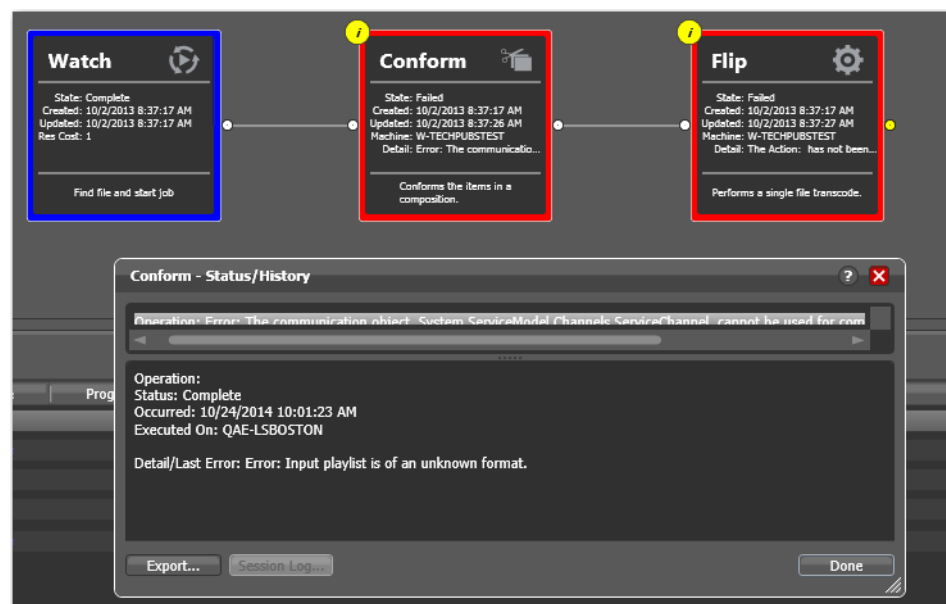
Resolving Errors in CML Processing Jobs

When you submit a CML file to a Post Producer conforming workflow, it may fail due to the following reasons:

- *Invalid XML*—you may have created an invalid XML file.
- *Invalid CML*—you may have created an XML file that does not conform to Composition Markup Language.
- *Errors in values*—you may have a value in an attribute that is not correct.
- *Unsupported source material*—You may need to transcode source media using a Flip action prior to using it in Post Producer (see [Post Producer and Related Formats](#)).
- Invalid path or filenames—you may have incorrect paths or filenames in the CML.

When a composition file can not be processed by the Conform action, you typically see the following error in Workflow Designer's Job Status tab:

Figure 15. Viewing Error on Workflow Which has Failed



To resolve the issue, you should validate your composition (see [Validating a Composition XML File](#)). If the composition is valid, verify that the values you supply for each element are correct for the media being processed.

Note: If you provide an attribute that is not a valid attribute (for example, you add *duration*, but it's in the wrong element, or you misspell *align* as *allign*), the attribute is ignored. If you provide a value that is of the wrong type (for example, providing a string where an int is required), the action will fail. Or, if you provide a keyword that is not permitted or incorrectly capitalized, the action will fail.

Using Nicknames, Expressions, Variables, and Constants in Compositions

In any attribute value in CML (text surrounded by double quotes), you can utilize nicknames, expressions, constants, and variables, which you place in braces { }.

The use of nicknames and variables allows you to design general-purpose compositions, and dynamically supply appropriate values at run-time—on a job-by-job basis.

By applying nicknames, expressions, and variables in your compositions, you can make them more broadly applicable and thus, more practical—you'll usually end up creating fewer, more flexible compositions.

For example, you could create a filename as: `{{filename}}.{$#Original}.37*24}.mov`, where the first expression is a variable, the second is a media item identified by its nickname, and the third is an expression that will be evaluated.

Evaluation is performed by the Conform action during execution to resolve nicknames, expressions, constants, and variables to the final string value (literal) before the composition is processed. All values are ultimately presented as strings, of course.

Table 3. Nickname, Expression, Variable, and Constant Formats

Type	Format
Nickname	<code>{\$#Nickname}</code> (preferred) <code>{#Nickname}</code> for compatibility
Expression	<code>{expression}</code> —see Expression Examples
Variable	<code>{{VariableName}}</code>
Constant	<code>{%%Constant}</code>

- [Nicknames](#)
- [Nickname Examples](#)
- [Expressions](#)
- [Expression Examples](#)
- [Variables](#)
- [Variable Examples](#)
- [Constants](#)

Nicknames

Workflow actions often reference files with a *nickname* to make it easier to design and implement workflows. A nickname is a logical reference; a variable for the file name, which usually differs in each job. For example, you can use *Original* as the nickname for a file ingested by a Watch action, or *Vantage Proxy* for a QuickTime file produced by a Flip action. A nickname in a composition takes the form `{${#Nickname}}`.

Note: To maintain backward compatibility, a single # is permitted unless its value has space characters in it, or any characters (-) that could be interpreted as operators.

A nickname can also be used in place of the actual file path and name in a composition. During processing, the runtime value of the nickname is substituted. In order to use nicknames, an upstream action must have either ingested or produced the file, and assigned it the associated nickname.

The use of nicknames creates more flexibility in the design of compositions. For example, you could have one composition that works in three different workflows, each processing video for a different output size, or a different language. In each workflow, you could use an Associate action to identify the correct file for the workflow.

Nickname Examples

In this example, the File element references a fully-qualified path by nickname: `{${#Promo}}` instead of hard-coding the path as a string.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="{${#Promo}}" />
  </Source>
  <Sequence layer="1">
    <Segment>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0" />
    </Segment>
  </Sequence>
</Composition>
```

In this example, the composition is configured to process a file nicknamed *Promo*. This CML file—which we will name *Promo_CML.xml* for this example—is stored permanently in a workflow’s watch folder, and as you drop media in, a job is submitted.

[ednote graphic of Variable test workflow](#)

The Watch action ingests new media as it is added to the watch folder, and starts a job to process the media by the *Promo_CML.xml* shown above. It assigns the incoming file the nickname *Promo*. The Associate action then ingests the *Promo_CML.xml* file for this job. The Associate action’s file match pattern should be configured to pick up the specific CML you want to be processed by the Conform action.

ednote FROM Roland: A simple case to expound on this is to use the associate action to tag the path and filename a new file arriving in a watch folder to be used as a source in CML file, or a file created by an upstream action that is created in the Vantage store.

Note: You could also create a media file upstream, and pass it in as Promo, instead of using the Watch action to ingest a pre-existing media file.

Expressions

You can use arithmetic expressions to calculate the value of an attribute or element string value. Expressions can—and often do—contain variables. (Using expressions alone—without variables—may not be very practical—though it does accurately present the expression’s logic.)

Expressions are always surrounded by braces {}.

The use of expressions enables you to create more flexible and powerful compositions. For example, you can use expressions to dynamically calculate curtains or pillars, or frame sizes at run time.

Supported operations are:

- Addition (+)
- Subtraction (-)
- Division (/)
- Multiplication (*).

Expressions can include parentheses to support precedence.

Expressions that use only integers return an integer presented as a string. Expressions that involve real numbers return a real number presented as a string, even if the decimal portion is zero.

Expression Examples

Here are some expression examples shown in the context of XML tags:

`<... "{4 * (1+3)}" />` is evaluated as `<... "16" />`

`<... "{4 * 4.0}" />` is evaluated as `<... "16.0" />`

`<... "{4 / 3}" />` is evaluated as `<... "1.33333333" />`

`<Translation x="{40+40}%" />` is evaluated as `<Translation x="80%" />`.

You can also populate variables in upstream actions and pass them downstream. For example, an Analysis action can obtain timecode information to set the tail of a clip:

```
<Tail>
  <Edit mode="duration" time="{ $TC_duration - $TC_offset }" />
</Tail>
```

Variables

You can use variables in attributes and elements to provide a run-time value during processing, rather than a constant value, specified at design time. Variables may be of any type: integers, strings, timecodes, etc. You can also use variables in expressions.

Variables in a composition are strings preceded by the reserved characters \$\$, and surrounded by braces {}. For example, `$$FrameWidth`.

Note: To maintain backward compatibility, a single \$ character is also permitted unless the variable's value has space characters in it, or any characters that could be handled as operators. For example: a string such as `16/9` that is intended to be a literal string value and not the numeric representation of `1.77778`.

If the value of a variable will be computed or derived from analysis, the variable must be specified in a previous action in the workflow. If a static value will be used, then the variable simply needs to be declared with a default value at design time, either in the Conform action (right-click on the action and select Add Variable) or by declaring the variable and the default value directly in the Vantage Management Console.

Variables can also be used in supported non-linear editors by renaming clips on the timeline with a variable that will ultimately be used to replace those media elements with alternative content.

Note: You can also use variables in Workorder-based workflows, where you supply runtime values for each job in your workorder. These values are assigned to variables in the Workorder action when the job starts. This feature is not specific to Post Producer; it is explained in detail in various topics in the User Guide, Domain Management Guide, and Workorder inspector man pages.

Variable Examples

Here are some examples of using various types of variables in compositions.

[ednote Scott: Add Example of a math equation/expression in CML - Time Code?](#)

Numeric Variables

In this example, you are supplying an SD source file which contains NTSC IMX video (720 pixels by 512 lines), and you want to display it in HD aspect ratio. You use the Crop element to remove vertical blanking, and the Mask element to convert the source to the 16:9 aspect ratio by adding a 2:9 (0.222) curtain to each side of the image.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/path/Source_video.mxf" />
```

```
<Crop top="{ $$VBI_Top }px" left="0" bottom="-{ $$VBI_Bottom }px"
right="100%" />
<Mask top="0" left="{ $$2_9_Curtain}" bottom="100%" right="-
{ $$2_9_Curtain}" />
</Source>
<Sequence layer="1">
  <Segment>
    <Video align="head" adjust="edge" fill="none" source="1"
layer="0" />
  </Segment>
</Sequence>
</Composition>
```

In an action upstream of the Conform action in your workflow, you'll add three variables: *VBI_Top* and *VBI_Bottom*, and *2_9_Curtain*, and then assign the values: 30, 2, and 0.222222, respectively. By using variables, these values can be determined at runtime—not design time—on a job-by-job basis.

Channel Numbers as Variables

In this example, the audio channel numbers in the Mix elements (in bold, below) are identified only by variables, whose values are set at runtime in the workflow. The audio channels are specified with hard-coded target channel maps and mix levels.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="{ $Original }" />
    <Mix source="{ $$AudioChannelLeft}" target="1" level=".9"/>
    <Mix source="{ $$AudioChannelRight}" target="2" level=".9"/>
  </Source>
  <Sequence layer="0">
    <Segment>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0" />
    </Segment>
  </Sequence>
</Composition>
```

String Variables

You can also provide text string variables, and optionally, concatenate strings. For example:

```
<Title align="head" adjust="edge"... >Watch { $$Show_Name} tonight
at { $$Show_Time}</Title>
```

In your workflow, in an appropriate action upstream of the Conform action, you'll add two variables: *Show_Name* and *Show_Time*, and assign the string values "What's Up, Doc?" and "7:00 PM Eastern", respectively.

Note: If the action does not explicitly provide the variable you require, you can always right-click the action and select Add Variables to provide any variable you want.

DPP Variables

In DPP applications, these variables may be used in text fields to dynamically insert metadata and part information:

Table 4. DPP Variables

Variable	Description
DPP_Total_Parts	Part total
DPP_Programme_Duration	Total programme duration
DPP_Part	Part number (for the first slate, 1)
DPP_Part_Duration	Part duration
DPP_Series	Series title
DPP_Programme	Programme title
DPP_Episode	Episode title / number
DPP_Production_Number	Production number
DPP_Originator	Originator
DPP_Copyright_Year	Copyright year
DPP_Other_ID	Other identifier
DPP_Distributor	Distributor

Constants

Constants are reserved strings pre-pended by two percent characters—%%—and surrounded by braces: {}. In DPP processing, Vantage uses a constant for accessing system-level slate generation resources: {%LOCAL_MEDIA_FILES}.

LOCAL_MEDIA_FILES is a constant which identifies a Vantage-supplied set of PNG files stored in a specific location during Vantage domain installation. You can not change the value of this constant.

Commenting CML Files

XML permits comment lines. Telestream encourages you to comment your compositions as appropriate.

Here's an example code snippet, with comments in green.

```
...
</Source>
<!-- Stereo audio in video source and 10 VO's map source mono -->
<!-- track to a track in the output file. Channel map must be -->
<!-- set in the Compose action in the Vantage workflow. -->
  <Sequence layer="1">
    <Segment>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0">
    ...
```

Using comments can make understanding, modifying, and maintaining your compositions much easier.

As Run CML Files

As Run CML files are generated from Conform actions, when configured to do so.

An As Run CML file is a replica of the input CML file, with many attributes updated to indicate how options were processed (for example, images), and actual values determined at runtime.

One application of As Run files is to review the file to determine how elements were actually processed—images, for example.

Another application is to use a Conform action to generate an MPEG4 file from MPEG video with AAC audio and create an As Run CML file (with actual values in timecode attributes, for example), for use in Black Arrow SCTE-35 ad insertion systems.

Converting NLE Projects and Media Descriptor Files to Compositions

The purpose of this chapter is to describe how to export projects in supported non-linear editors and convert them into CML templates for use in Post Producer workflows. In this chapter, you'll also learn about converting other media descriptor files into CML templates.

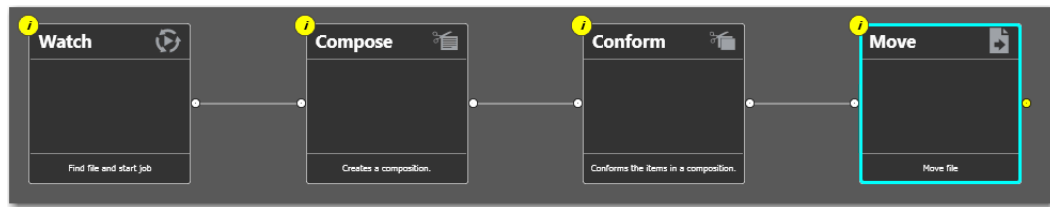
- [Converting NLE Projects into Compositions](#)
- [Submitting NLE Projects and Media Descriptor Files to Workflows](#)
- [Creating Compositions from Avid Sequences](#)
- [Creating Compositions from Final Cut Pro 7 XML](#)
- [Creating Compositions from Agility AN2 Files](#)
- [Creating Compositions from EDL Files](#)
- [Creating Compositions from QuickTime Reference Files](#)
- [Creating Compositions from Trigger Files](#)
- [Creating Compositions from Telestream EDL \(TSEDL\) Files](#)

Converting NLE Projects into Compositions

One of the easiest methods for creating Post Producer templates is by integrating variables into NLE timeline elements in your project, and then exporting the project in an XML format that can be processed by a Post Producer workflow utilizing a Compose action to automatically create a Composition, which you can submit to a Conform workflow to generate your media. Using this method requires only expertise in the NLE, and requires little or no understanding of XML or Composition Markup Language.

The typical Vantage NLE project conversion workflow starts with a Watch or Receive action to ingest the project/media descriptor file and start the job, as shown below.

Figure 16. Typical NLE Project Conversion Workflow



Use a Watch action when you want to submit media manually or by adding the file to a target folder. Use a Receive action when you want to submit the file programmatically, using the Vantage SDK.

The Compose action (configured with a specific *composer* for the type of file you're converting) parses the file and generates a Post Producer composition (CML) file. It passes the CML file to a Conform action for media encoding, and then to optional file-operations actions for delivery of the output media file to its intended destination. (You could also implement the Conform action and other actions in a second, separate workflow.)

Post Producer can convert basic transitions such as cuts and fades from an NLE. However, dissolves, page turns, and similar kinds of transitions need to be rendered out to a media file, and the file added to the CML for stitching in the Conform action workflow.

NLE Feature Support

The following table provides information about which editors and versions are supported, plus details about supported features in each editor.

Table 5. Supported Features by Non-Linear Editor

Editor & Version	Export Format	Variable Support	Transition Support	Max Layers	Mixed Format Content Support
Adobe Premiere for Mac OS Premiere Pro CC Premiere Pro CC 2014	FCP7-XML (XMEML)	Yes, via Rename Clip	Cuts, Fades, Cross Fades	10	All formats supported by Post Producer
Adobe Premiere for Windows Premiere Pro CC Premiere Pro CC 2014	FCP7-XML (XMEML)	Yes, via Rename Clip	Cuts, Fades, Cross Fades	10	All formats supported by Post Producer
Apple Final Cut Pro 7	FCP7-XML (XMEML)	Yes, via Rename Clip	Cuts, Fades, Cross Fades	10	All formats supported by Post Producer
Avid Media Composer for Mac OS Version 7 & 8	Simple AAF	No	Cuts	1	No
Avid Media Composer for Windows Version 7 & 8	Simple AAF	No	Cuts	1	No

Post Producer Titler Engine is an optional replacement for the built-in Premiere title tool.

A practical example of using an NLE involves creating a template for show promo spots. The clips in the CML can be tagged with tokens for variable substitution in Post Producer.

For, example, you can add a *DayofWeek* variable to create specific spots, each for play at different times. Each spot uses a preset bed created in an NLE with graphic overlays and audio overlays for a show announced as playing on “Tuesday” or “Tomorrow”, or “Tonight”. The workflow populates the variables pulled from the sequence XML, such that three files are created from one job: “Tuesday” (with a graphic overlay and audio dub for Tuesday,) Tomorrow (with matching graphic overlay and audio) and Tonight (also with matching graphic overlay and audio.)

The Final Cut Pro 7 XML Interchange Format was designed by Apple to describe every element in an NLE project in a human-readable, XML-based format. Final Cut Pro and Adobe Premiere Pro CC can export this format to Post Producer (through a watch folder or direct import) which converts this file to a CML file which includes the elements that are required for automating production.

Note: Post Producer only supports Final Cut Pro 7 XML files as source, which is used by Apple Final Cut Pro v7 and current versions of Adobe Premiere Pro CC. Final Cut Pro X uses a different schema that is not supported by Post Producer. See [Creating Compositions from Final Cut Pro 7 XML](#).

Since the Vantage server and services are running as a user in a Windows domain, when you are using files from Mac OS X, the system should be set up to log in as a user on the Windows domain as well. If media is shared directly from the OS X volume, that folder must be set up as a Samba share, allowing the Vantage domain services full access to this share. Leaving the OS X system set up as a workstation will result in permissions issues when Vantage tries to access the files.

Note: If you are creating files on a Mac OS volume and the paths in the composition are not UNC paths, you must pre-process the composition using the Colocate action to convert the paths to the share that identifies the file directory before you can process the composition in Conform. See [Colocate Action](#) and [File](#) for details.

Submitting NLE Projects and Media Descriptor Files to Workflows

You can submit files from NLE projects and certain media descriptor files to a Post Producer workflow with a Compose action just like you submit media files to other workflows. Media descriptor files that you can convert include QuickTime Reference, EDL, TSDDL, and Trigger files.

Here are the ways that you can submit NLE projects and media descriptor files for conversion to CML:

- Dropping the file into a folder monitored by a Watch action-based workflow.
- Dropping a workorder file (which contains jobs to submit) into a folder monitored by a Workorder action-based workflow. See [Batch Processing Jobs with Workorders](#).
- Manually submitting the file to a workflow in Workflow Designer.
- Using Workflow Portal to modify metadata and supply variable values on a job-by-job basis, submitting the file to target workflows starting with a Receive action.
- Programmatically generating and/or submitting the file to a Receive action-based workflow via a program using the Vantage SDK. See [Submitting Compositions to Workflows Using the SDK](#).

Creating Compositions from Avid Sequences

The Simple AAF Composer enables you to convert a Simple AAF file (typically exported from Avid Media Composer or Newscutter) into a CML file. The Avid AAF file format defines how collections of media files and ancillary data are referenced an Avid system.

Avid Simplified AAF files are handled as media source types in Vantage. AAF files can be exported from Media Composer and dropped into Vantage watch folders or submitted by Vantage SDK-based programs to a Receive-based workflow for processing.

The Post Producer Compose action configured with a Simple AAF composer parses the Avid Simplified AAF file into CML, and the Conform action transcodes the video as directed by the CML, processing audio and data track (D-Track) MXF Op-Atom media referenced in the file ingested from ISIS storage.

During processing, you can specify if all media should be tagged for direct-covert as appropriate. You can also supply a source folder string (usually, a UNC path to a share) to replace all local file path strings up to the file name, resulting in network-accessible file paths to your source media.

Note: If the source media files aren't accessible to the Vantage domain server executing the workflow, the Conform action will fail. Typically, the media folder is set up as a Windows share, with read privileges for the Vantage services using the files.

Exporting Simplified AAF Files

This topic describes how to export an AAF file and submit it to a Vantage Compose-based workflow for conversion to a Composition.

The Link To Effects Mixdown export setting allows you to mix down both audio and video effects so that the exported AAF references only master clips. This is useful for workflows in Vantage that can ingest the exported AAF media for further encoding.

When the video is mixed down, if a segment of the video is an existing master clip or filler, a reference to that segment is added to the new sequence. If the segment is a transition or effect, a video mix-down occurs which creates a new master clip. The new mixed-down master clip is added to the project bin and a reference is added to the new sequence.

For the audio mix-down, the editing application can limit the number of tracks included in the exported sequence to the first 2, 4, 8, or 16 tracks. If an audio track contains at least one effect or gain change, the entire track is mixed down to a new master clip. The new mixed-down master clip is added to the project bin and a reference is added to the new sequence.

To perform a simplified AAF Export:

1. In the Project Window, click the Settings tab and select the Export Link to Effects Mixdown setting. If the setting does not appear, click the User Profile Selection menu and select Update User Profiles. The new setting appears in the settings list.

2. Select the sequence you want to export as a simplified AAF.
3. Select File > Export.
4. Click Options to display the Export Settings dialog.
5. Select AAF from the Export As menu.
6. Leave these options enabled:
 - Video/Data Details: Mixdown Video/Effects to V1.
 - Audio Details: Flatten Audio Tracks that Contain Effects.
7. Select the number of audio tracks to include in the sequence.
8. Select the Media Destination Drive where you want to save any newly created media. (This should be a drive that Vantage has access to.)
9. Click Save.
10. Select a location for the AAF file, name the file and click Save. The AAF file is saved to the selected server and folder that is being monitored by the Vantage workflow.

Creating Compositions from Final Cut Pro 7 XML

The Compose action's Final Cut Pro 7 Composer supports the XMEML standard, used by Final Cut 7 and the current version of Premiere Pro (but not Final Cut X).

- Vantage only supports media essences that Post Producer can decode. Thus, not all essences that can be used within Final Cut 7 or Premiere Pro can be used in Post Producer workflows.
- Post Producer workflows must have access to referenced media. Typically, the media should be stored on Windows shares that are accessible to Vantage. The folder location can be set globally in the Compose action in a Vantage workflow. You can use this method when all media is in a single folder. The file:// references in the XML export are not used, as they generally reference the localhost volume.
- The Colocate action Local Path component can also be configured to process a CML file using pattern search and replace from, so that multiple media locations can be used. For example, the Mac OS path can be set up for access via SMB and `\\local-host_drive\\this_share\\` can be replaced by `\\network_server\\this_share\\` or by a letter-drive it has been mapped to.
- Closed Caption propagation can be set globally in the FCP XML Composer in the Compose action for a given XML source.

- [Limits on Final Cut Pro 7 XML Features](#)
- [Exporting Projects from Final Cut Pro](#)
- [Exporting Projects from Adobe Premiere Pro](#)
- [Final Cut Pro 7 XML File Workflows](#)

Limits on Final Cut Pro 7 XML Features

The Final Cut Pro 7 Composer converts Final Cut Pro 7 XML files to Post Producer compositions, with certain limits:

- One bumper and one trailer can be specified in the Final Cut Pro 7 Composer.
- There is limited support for transitions. For example, all dissolve transitions are transformed to overlapping fades in CML.
- Internally-generated video elements (blacks/whites/bars) are not supported. You have to generate media files for these in the resolution/scan type, audio channel configuration, and frame rate you need, and use them as if they were regular media files on a file system.
- Most audio cross fades are supported.
- Dip to color transitions are supported. A canvas with the color specified in the source XML as RGBA will be inserted in the CML, and fades will be set in the overlaying video.
- There is limited support for image manipulation. Static opacity, scaling and positioning is supported, but cropping, rotation, or any kind of animated control is not.
- Support for static clip volume (keyframes are ignored).

- Support for audio gain filter.
- Overlays can be transparent PNG files. Vantage 6.3 also includes PSD file support. Single layer files with a straight matte should be used for transparency support.
- To enable media file substitution, a clip in the FCP sequence can be renamed as a variable—`{{<clip name>}}`—and a value can be set for the variable within the Vantage workflow, or via a job in a Workorder file. For details, see [Final Cut Pro 7 XML File Workflows](#).
- Vantage does not support CML translation of text/titles.

Exporting Projects from Final Cut Pro

This topic describes how to create a Post Producer composition from a sequence exported from Final Cut Pro as a Final Cut Pro (XMEML) file.

Note: Final Cut Pro Version 7 is required to export sequences compatible for conversion to Post Producer compositions.

In Final Cut Pro:

1. Create the project as you normally would, with video, audio, and graphical elements and transitions.
2. Identify the elements that you want to replace with a different video or audio clip, or graphic file each iteration of this production and rename the element, on the timeline, using a variable pattern, as described immediately following.
3. Export the project as a Final Cut Pro 7 XML file. Save this file to a watch folder that is monitored by your Vantage workflow.

In [Final Cut Pro 7 XML File Workflows](#), two prototype workflows are examined. Each is designed to ingest a sequence created in Final Cut Pro 7 or Premiere and exported as Final Cut Pro 7 XML. The sequence simply overlays a graphic over a media file with video and audio.

Exporting Projects from Adobe Premiere Pro

This topic describes how to create a Post Producer composition from a sequence exported from Adobe Premiere.

Note: Adobe Premiere Pro CC for Mac OS X or Windows is required to export sequences compatible for conversion to Post Producer compositions.

In Premiere:

1. Create the project as you normally would, with video, audio, and graphical elements and transitions.

2. Identify the elements that you want to replace with a different video or audio clip, or graphic file each iteration of this production and rename the element, on the timeline, using a variable pattern, as described immediately following.
3. Export the project as a Final Cut Pro 7 XML file (File > Export > Final Cut Pro 7 XML). Save this file to a watch folder that is monitored by your workflow or to a folder that can be accessed from Vantage, for manual submission in Workflow Designer.

In [Final Cut Pro 7 XML File Workflows](#), two prototype workflows are examined. Each is designed to ingest a sequence created in Final Cut Pro 7 or Premiere and exported as Final Cut Pro 7 XML. The sequence simply overlays a graphic over a media file with video and audio.

Final Cut Pro 7 XML File Workflows

Two prototype workflows are examined. Each is designed to ingest a sequence created in Final Cut Pro 7 or Adobe Premiere and exported as Final Cut Pro 7 XML. The sequence simply overlays a graphic over a media file with video and audio.

The first workflow uses variables in the Composition; in the second, they are submitted externally.

- [Converting FCP7 XML Files to a Composition with Variables](#)
- [Converting FCP7 XML Files to a Composition and Processing Them with a Workflow Designer](#)

Converting FCP7 XML Files to a Composition with Variables

This example workflow (*XMEML_compose_to_HD_with_var_sub*—see [Post Producer Composition Examples](#)) converts an exported Final Cut Pro 7 XML file to CML, populating a schedule variable directly in the Compose action to specify the name of the schedule graphic file to use at run time. The Colocate action can be configured with the Local Path options to convert Mac OS local paths to media files into share paths, so that the Conform action can access all of the required input media to generate the output media file.

Figure 17. Post Producer Media Conforming and Generation Process



- *Watch action*—enables an operator to submit media files to an ingest folder: the CML file that specifies the clips in the program, and the associated metadata file.
 - *Media Files Nickname*—Original

- *Compose action*—converts the exported Final Cut Pro 7 XML file into a CML file for processing in the Conform action.

To specify the overlay file name at run time so it can be changed on every job, do two things:

- In Final Cut or Premiere, use the Post Producer tokenization scheme—`{{<Variable Name>}.ext}`—where a graphic that is intended to be replaced on each job is renamed with a variable name in brackets. The extension is required for images to be properly handled in the transformation to CML. For example, `{{schedulegraphic}.png}`:

Figure 18. Final Cut—Supplying a File Name for Variable Substitution

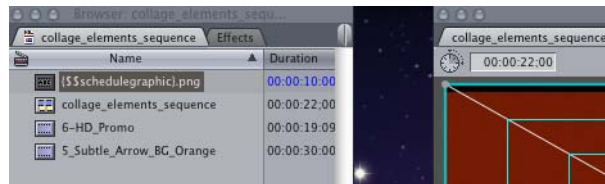
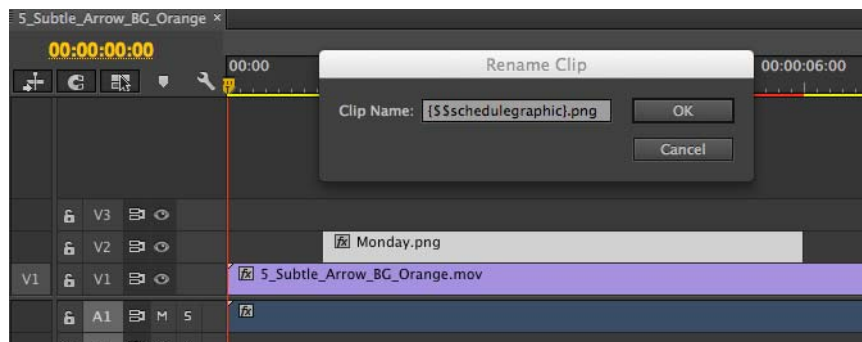


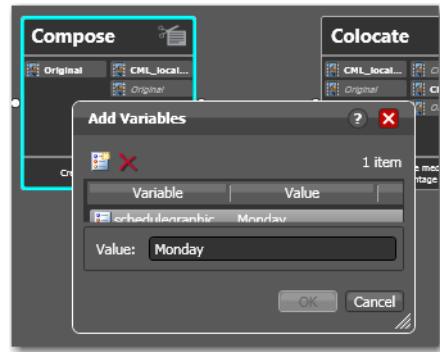
Figure 19. Premiere—Supplying a File Name for Variable Substitution



- In the Compose action, add a text variable with the same name (in this case, *schedulegraphic*), and set its value to the base name of the file you want to use (Monday—to identify the file as *Monday.png*). To rename a clip in the Premiere timeline, control click the clip and select Rename from the context menu.

Note: Note that for each tokenized value for media specified in the sequence, the workflow must assign a correct value to this variable, or the job will fail.

Figure 20. Adding a Variable to the Compose Action



Colocate action—with the Local Path option, used as required to make Mac OS-located media files accessible to Vantage. You supply Mac OS source path string and target UNC share path strings. Colocate finds and replaces the source path strings with the corresponding share path strings in the CML file before passing it downstream.

This is required because the Final Cut Pro 7 XML file refers to local paths to media, even though the media in the sequence is located on a share (which it must be). The path replacement string (Target path) uses a share that is accessible to Vantage. The Prepend Target Path to locations without a Source Path option is also enabled, to create a fully-qualified path for the tokenized media, which does not have any path specified in the CML created by the Compose action.

Note: Instead of using a Colocate action in these examples, a single source folder can be specified in the Compose action for use by both Final Cut XML Composer and Vantage. The advantage of the Colocate action is that multiple local path colocators can be set up for multiple file locations.

- *Conform action*—renders the media files (clips) referred to in the converted CML file into an output media file, as specified by you.

The use of this workflow requires that you manually change the value of any tokenized media variables each time you run it. While it is not typically convenient to do so, it provides a clear example of the use of tokens to use specified files at run time. For a more efficient method of using tokens, see the next workflow.

Note: You can also create an operator-driven workflow to implement job-by-job file names or other metadata. The target workflow must start with a Receive action. You should set up a Browse Windows configuration for Workflow Portal and specify the variable to update for each job you submit.

Converting FCP7 XML Files to a Composition and Processing Them with a Workorder

When using tokenized media, the more common scenario is to use a workorder so that multiple variable substitutions can be used automatically. The XMEML_compose_to_HD_from_workorder workflow provides this example.

Figure 21. Post Producer Media Conforming and Generation Process



The Workorder action uses a specific workorder configuration to process workorder files. (Workorder configurations specify the record layout, and are created in the Management Console.)

The Workorder action ingests a CSV file with a path to media and variables, instead of a typical source file. In this case, CSV file has a path to the Final Cut Pro 7 XML file, which is the source file for the Compose action, and a text variable which is used to provide a value for the tokenized graphic file from the XML source.

Here are two example jobs specified in the workorder:

\\Media\Source\collage_elements_sequence.xml, Monday

\\Media\Source\collage_elements_sequence.xml, Tuesday

The workorder populates the Media Nickname *XMEML* used in the workflow with the path to the source file (the first value), and the variable from XML/CML `{{schedulegraphic}}` with the value of the second value of the workorder (Monday, Tuesday.)

The workorder action processes the workorder file and submits two jobs, one for each row, with an graphic overlay for the day of the week.

Note: For full details on the use of workorders, see topics in the User Guide, Domain Management Guide, and context help topics in the Workorder action inspector.

Creating Compositions from Agility AN2 Files

The Agility AN2 Composer in the Compose action converts an AN2 file saved from an Agility system, into a CML file.

When converting an AN2 file for use in Post Producer, the following attributes are assigned in CML:

- Crop dimensions per source
- Captions propagation enabled per source
- Mix settings per source
- Timecode in and out per segment
- Graphic overlays per segment

Propagating Closed Captions

In order to specify that you want to propagate closed captions in the CML, each clip block in the AN2 file that need caption propagation should have a cc element within the parameters element, as shown below in bold (you can enable this for all segments if easier):

```
<clip>
<video>\\sierra.prod\\HD\\Billy_Da_Kid\\Billy_Da_Kidd_5_HD.mxf</
video>
<audio>\\sierra.prod\\HD\\Billy_Da_Kid\\Billy_Da_Kidd_5_HD.mxf</
audio>
<parameters>
<cc>
<embedded-type>auto</embedded-type>
<source>embedded</source>
</cc>
</parameters>
</clip>
```

When you submit this file to the Compose action, the generated CML has the following attribute added to each source:

```
<Subtitle preserve708="false" />
```

For details on the use of the Subtitle element, and using preserve 708 with true or false, see [Translation](#).

Creating Compositions from EDL Files

The EDL Composer in the Compose action converts an EDL file from a Harris Velocity broadcast server system into a CML file.

When converting the EDL file for use in Post Producer, you can specify the frame rate for the media (if you do not, the Conform action by default uses the frame rate in the source media).

During conversion, you can manually add bumpers and trailers, perform centercuts and letterbox formatting during SD/HD conversion, and specify how to handle closed captioning and subtitles.

Creating Compositions from QuickTime Reference Files

The QuickTime Reference File Composer in the Compose action allows you to convert a QuickTime Reference file (typically created by exporting a sequence from an Avid system) into a CML file.

Note: This conversion should not be performed if closed captions are required, since the QuickTime reference file itself will not contain captions.

Creating Compositions from Trigger Files

The Trigger Composer in the Compose action allows you to use SCTE-104 triggers in the 436M track of an MXF file to create stream-conditioned VOD output with a Chronicle action that logs ad insertion points.

The Trigger Composer is designed to add triggers (similar to the EDL Composer) in which secondary events can trigger events based on ancillary timecode.

During conversion, you can enable insertion of keyframe segments, manually add bumpers and trailers, perform centercuts and letterbox formatting during SD/HD conversion, and specify how to handle closed captioning and subtitles.

Creating Compositions from Telestream EDL (TSEDL) Files

The Telestream TSEDL Composer in the Compose action allows you to convert a Telestream TSEDL file into a CML file.

This composer should be used when you are creating TSEDL files manually or programmatically, with EDL content that conforms to the Telestream TSEDL specification.

When converting a TSEDL file for use in Post Producer, you can specify whether the in and out points are mark elements (and specify a frame rate) or they are represented as timecode elements.

Sample Composition Program

This chapter illustrates the use of the Vantage SDK to write a program that produces a CML file, highlighting the basic process.

Note: The Post-Producer developer's section on the Telestream site includes downloads of an SDK (Software Developer's Kit) that provide information, frameworks, and examples for software developers to create custom interfaces to work with Vantage and Post Producer.

Sample C# Composition Creation Program

This sample program illustrates the basics of using the Playlist class to produce a composition and save it as a file. This C# console program was developed in Microsoft Visual Studio 2012 using .NET 4.5.

Note the Composition methods which are used to create a new composition and populate it with CML elements and attributes.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using Telestream.Soa.Facility.Playlist;
namespace CompositionExample
{
    class Program
    {
        static void Main(string[] args)
        {
            // create new composition and add version and date
            Composition composition = new Composition ();
            composition.Version = new Version (1, 0);
            composition.Created = DateTimeOffset.MinValue;
            // create and add a source
            Source source1 = new Source ();
            source1.Identifier = 1;
            source1.Files.Add
                (new File(@"\\share\\path\\Segment_01.mov"));
            composition.Sources.Add (source1);
            // Create and add a new sequence
            Sequence sequence1 = new Sequence();
            sequence1.Layer = 1;
            composition.Sequences.Add (sequence1);
            // Create and add a new segment
            Segment segment1 = new Segment();
            sequence1.Segments.Add(segment1);
            // create and add a new video element
            Video video1 = new Video();
            video1.Source = 1;
            video1.Layer = 0;
            video1.Align = EdgeAlign.Head;
            video1.Fill = FillMethod.None;
            video1.Adjust = PartAdjust.Edge;
            segment1.Material.Add(video1);
            // create a title
            Title title1 = new Title();
            title1.Value = ("Title Element Text");
            title1.Duration = new Time(0, 0, 0, 5, true);
            segment1.Material.Add(title1);
            // write the composition to a file for processing
            composition.Serialize
                (@@"\\share\\path\\Sample_Composition.cml");
        }
    }
}
```


Working with Material

The purpose of this chapter is to help you learn the best approach to working with material in the context of a composition: accessing source files, creating clips, composing media, applying visual effect, and aligning it on the timeline, for example.

- [Introduction to Material](#)
- [Adding Material to a Composition](#)
- [Extracting Clips from Master Media](#)
- [Cropping and Masking](#)
- [Applying Effects to Material](#)
- [Controlling Material on the Timeline](#)

Note: All of the examples in this chapter are complete compositions. To use them, copy and paste the example into a text editor. Change the references to the media files you are supplying (note the design specs as comments at the top of each composition), and save the file as a text file.

Then, submit it to a Post Producer conforming workflow, using Workflow Designer.

Introduction to Material

Post Producer supports six types of material that you can use in a composition; each defined by a specific element:

- *Video*—instances of temporal, frame-based video
- *Audio*—instances of audio, ignoring the video stream (if present)
- *Image*—instances of raster images, or image sequences
- *Advisory*—instances of advisory graphics and metadata
- *Title*—instances of text, rendered on the frame
- *Canvas*—instances of black rectangles, used for fades.

Material is arranged in sequences and segments within the timeline, along with formatting instructions: montage ordering, composition layering, audio mixing and mapping, etc.

Material Attributes

Each element of material includes attributes that describe it in relation to the other material, and also describe its properties. There are fundamentally two types of attributes in CML:

Spatial Attributes—these are attributes that describe characteristics of the material and its relationship to other material.

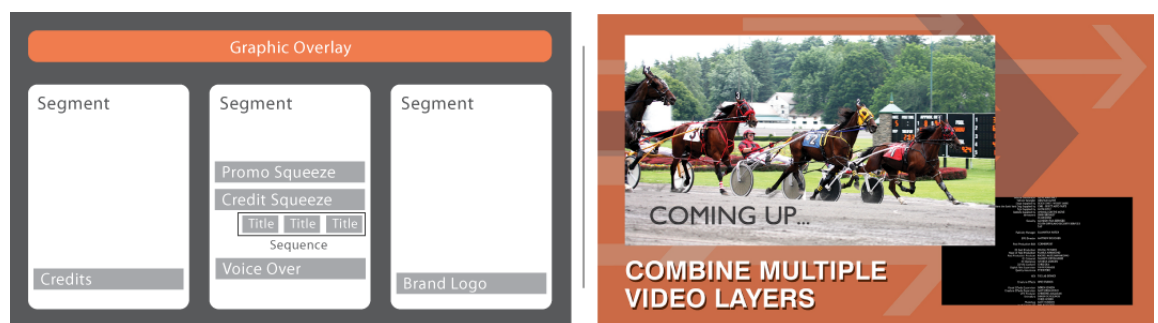
Transformational Attributes—attributes that describe the behavior and timing of the material: size, location, opacity, rotation. and audio volume.

The application of material elements is illustrated in the following graphic.

Story Boarding

It's often helpful to draw out your composition graphically (in an NLE or a graphics program, or on paper), to help you visually organize the material and determine specifically what you are trying to achieve in the CML.

Figure 22. Typical Composition Story Board and Sample Frame



On the left, is a designer's story board of each element in the composition, arranged temporally, with three individual segments. Each segment is implemented when you want to divide the composition into distinct temporal segments, in which you can independently present media. On the right is a sample frame of the resulting video. Notice that this story board does not illustrate spatial arrangement; only temporal arrangement of material.

Story boarding helps you identify each segment and sequence, and each instance of material in every segment. Once you know these details, you can create your composition and begin adding attributes to control how each item of material should be presented.

Sample CML

The story board (or other form of design) must be implemented in CML (converted to a composition), and processed in a Conform workflow to generate the output. Here is a very simple composition, with one instance of video, in one segment, within one sequence.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Basic CML Sample DUR=NA, AR=16x9, res. 1920x1080 -->
  <!-- Input: 1080i Apple ProRes 25 FPS 16b 48k stereo -->
  <!-- Output: 1080i x264 -->
  <!-- Conform Workflow: Basic Conform 1920x1080 x264 AAC + Flip
  Proxy -->
    <Source identifier="1">
      <File location="//share/path/source_video.mov" />
    </Source>
    <Sequence layer="1">
      <Segment>
        <Video adjust="edge" fill="none" source="1" layer="0" />
      </Segment>
    </Sequence>
  </Composition>
```

This is about as basic as it gets, and it illustrates how all these elements fit together.

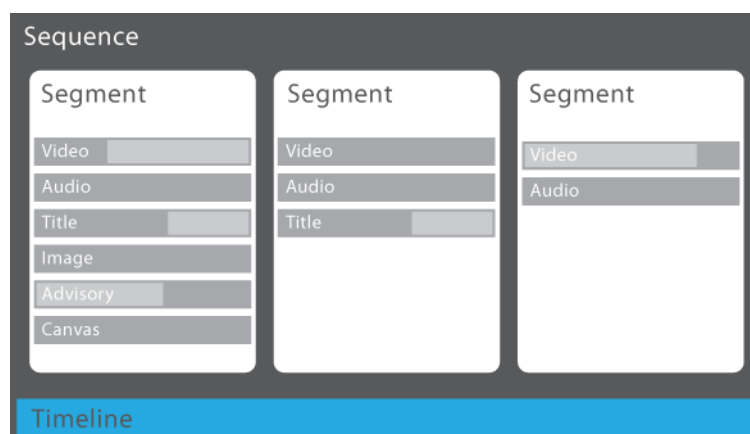
Adding Material to a Composition

To add material (or a portion of it) to your composition, you add its element to the [Segment](#) where you want it to play, as you saw in the CML example above.

Note: For specifications of each element and its attributes, click on the link to view its reference topic in the [Composition Markup Language Reference](#) chapter.

Recall that each segment identifies a specific portion of the composition's timeline, based on its ordinal position in the sequence:

Figure 23. Segments Play Sequentially in their Order in the Composition



Also recall that each sequence creates an independently-functioning timeline within a composition—the point of a sequence is to provide you a new, independent timeline upon which you can place segments of material and play them independently of any other material in the composition.

Certain material is stored in files: Video, audio, and images. Post Producer also supplies Advisories with USTV images. For other rating systems, you must supply your own.

Canvas and Title material (which creates formatted titles from text) does not use files.

- [Specifying Files for Video and Audio Material](#)
- [Specifying Files for Image Material](#)

Specifying Files for Video and Audio Material

For each instance of video and audio that you use in a composition, you need to add a [Video](#) or [Audio](#) element to the segment. You can add as many video and/or audio elements as you need, and any number of them can create new instances of media from the same file. You can also create clip instances, by setting in and out points.

You also need a corresponding [Source](#) (a child of *Composition*), to identify the source file. By default, if a video source contains audio, it also plays when the video is played.

For convenient access, place *Source* elements as the first elements in the composition.

Post Producer allows you to combine source files with differing frame rates and Telecine cadences, plus SD, HD, television and 23.98 sources and re-encode them as specified in your output media specifications.

All video and audio files must be in a supported format that the Conform action can process. A file may contain the media essence, or it may reference additional files containing media essences (for example, a QuickTime reference movie). For a list of supported input formats, see [Post Producer and Related Formats](#). If your video and audio files can't be decoded by the Conform action, you can add a Flip action to the workflow upstream of the Conform action (or create a separate workflow) to transcode the source file into a supported format.

Note: The Vantage Edit service (there may be more than one running in your domain) that executes the Conform action in the job must have access to each file. Because files are typically not stored on the same server as the Vantage service that processes them, Telestream recommends using shares to reference files. For details on dealing with file access by Vantage services, see the Domain Management Guide. You can use the [Tempo Action](#) to copy non-local source material to a location where all actions in your workflow can access it.

Here are the steps:

1. Add a [Video](#) or [Audio](#) to a [Segment](#).
2. Add a [Source](#) to the [Fade](#) (usually at the top, where it's easy to access).
3. Add an identifier attribute to the video or audio element with a unique integer value in the composition.
4. Add a [Image](#) to the Source element, supplying a location attribute with a fully-qualified file path and the file name.
5. Finally, add a source attribute to the video or audio element, using the same integer value as the Source element's identifier attribute.

Video Example

In this example, one source file is specified, and one instance of it is used in a segment.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Basic CML Sample DUR=NA, AR=16x9, res. 1920x1080 -->
  <!-- Input: 1080i Apple ProRes 25 FPS 16b 48k stereo -->
  <!-- Output: 1080i x264 -->
  <!-- Conform Workflow: Basic Conform 1920x1080 x264 AAC + Flip
Proxy -->
  <Source identifier="1">
    <File location="//share/path/source_video.mov" />
  </Source>
  <Sequence layer="1">
    <Segment>
      <Video adjust="edge" fill="none" source="1" layer="0" />
    </Segment>
```

```
</Sequence>
</Composition>
```

Why not just reference the file directly in the Video or Audio element? Because it is common to use multiple segments of material from a given source (for example, a master file). Also, in a source, you can perform basic modifications in one place: cropping and masking, audio mixing and routing, etc.

Audio Example

In this example, four source files are specified; one for video and three for audio. The CML creates a video file, inserting various language tracks on channels 3, 4, and 5.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Audio DUR=NA, AR=16x9, res. 1920x1080, DolbyE 5.1+2 -->
  <!-- Input: 1080i -->
  <!-- Output: 1080i x264 -->
  <!-- Conform Workflow: Basic Conform 1920x1080 x264 AAC + Flip Proxy -->
  <Source identifier="1">
    <File location="//share/path/Amsterdam_promotion.mp4"/>
  </Source>
  <Source identifier="2">
    <File location="//share/path/english.m4a" />
    <Mix source="1" target="3" level=".9"/>
  </Source>
  <Source identifier="3">
    <File location="//share/path/French.wav"/>
    <Mix source="1" target="4" level=".9"/>
  </Source>
  <Source identifier="4">
    <File location="//share/path/italian.wav" />
    <Mix source="1" target="5" level=".9"/>
  </Source>
  <Sequence layer="1">
    <Segment>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0">
        ...
      </Video>
      <Audio align="head" source="2" offset="00:00:00.50" />
      <Audio align="head" source="3" offset="00:00:00.50" />
      <Audio align="head" source="4" offset="00:00:00.50" />
    </Segment>
  </Sequence>
</Composition>
```

This audio will be mixed or routed, as appropriate, so that viewers of different languages can hear the audio channel of their native language.

Specifying Files for Image Material

When you add an *Image* element (either a single image, or an image sequence) to a segment, the element directly references its file or files via the *location* attribute, as illustrated below (in bold).

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Image Example DUR=NA, AR=16x9, res. 1920x1080 -->
  <!-- All PNG files: 1920 x 1080 -->
  <!-- Input: NA -->
  <!-- Output: 1080i x264 -->
  <!-- Conform Workflow: Basic Conform 1920x1080 x264 AAC + Flip
  Proxy -->
    <Sequence layer="1">
      <Segment>
        <Image align="tail" adjust="body" fill="none" layer="2"
location="\\share\path\1C_Arrow_Title-PNGs\frame-000508.png"
frames="72" layout="none">
          <Head>
            <Fade duration="00:00:01.000" />
          </Head>
          <Tail>
            <Fade duration="00:00:01.000" />
          </Tail>
        </Image>
      </Segment>
    </Sequence>
  </Composition>
```

When you add a single image, you need to adjust its properties to play in a certain manner for a given duration. Likewise, you can supply an image sequence by referencing to the first file of a given pattern in a folder of sequential images. For full details, see *Image*.

1. Add an *Image* to a *Segment*.
2. Add a location attribute to the Image element, which references the image (or first image in the sequence).

Specifying Files for Advisory Material

For each instance of an advisory that you plan to use in a composition, you insert an *Advisory* in the correct segment.

If you are using the USTV rating system, default images (the larger ones) are supplied for each combination of ratings and reasons, so you don't need to reference a file. For other rating systems, you need to supply your own image, and reference it in the element, as shown below:

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Advisory Example DUR=10s., AR=16x9, res. 1920x1080 -->
  <!-- All PNG files: large USTV Ratings Bugs -->
  <!-- Input: 1080i -->
  <!-- Output: 1080i x264 -->
  <!-- Conform Workflow: Basic Conform 1920x1080 x264 AAC + Flip
  Proxy -->
    <Source identifier="1">
      <File location="//share/path/source_video.mov" />
    </Source>
    <Sequence layer="1">
      <Segment>
        <Video adjust="edge" fill="none" source="1" layer="0" />
        <Advisory align="head" adjust="body" fill="none" layer="1"
duration="00:00:05.000" type="USTV" rating="PG-13" />
      </Segment>
    </Sequence>
  </Composition>
```

Extracting Clips from Master Media

The purpose of this topic is to explain how to perform frame-accurate editing—extracting clips from master files at run-time—directly in your compositions.

Much of the video that you use as source material in Post Producer applications is longer than you require for a given promo. For example, you may want a 30-second clip of a movie that's about to air. Or, you may want to create a squeeze-back video and run the credits of the last movie that aired, in an Up Next promo. Thus, you need a way to create clips.

There are two practical ways to create video and audio clips for use in a composition:

- *Create clips externally, then reference each clip for use in a composition*
- *Create clips dynamically from master media directly in a composition*

To use clips that have been created externally, you simply add a Source element, and then reference the media as appropriate ([Adding Material to a Composition](#)).

However, you may have a master file—a full-length movie, for example—from which you want to identify and extract several smaller clips for your highlights composition.

As an alternative, Composition Markup Language also enables you to dynamically create clips from master media—producing the clips at run time by extracting the segment with mark-in and mark-out points—using [Head](#) and [Tail](#) elements.

Overview

To extract a clip (create an instance of media) from a master file, you need to:

- Identify the source (using a Source element) that you want to extract clips from.
- Set mark in and mark out points by adding [Head](#) and [Tail](#) elements with a [Fade](#) to the [Audio](#) or [Video](#) element on the media that define the portion you want to use.

Here are the CML elements that you'll use when defining a clip:

- Heads and Tails—the point in the media which defines the mark-in ([Head](#)) and mark-out ([Tail](#)) point.
- Edit—when used in a Head, the mark-in point of the clip. When used in a Tail, the mark-out point of the clip.

Together, the Head and Tail elements with an Edit thus define the clip of material to be extracted from the source file.

Note: It is important to note that Head Edits are inclusive; Tail Edits are exclusive. That is, the first frame after the specified time in the Head Edit is *included* in the clip. However, the first frame after the specified time in the Tail Edit is *excluded*.

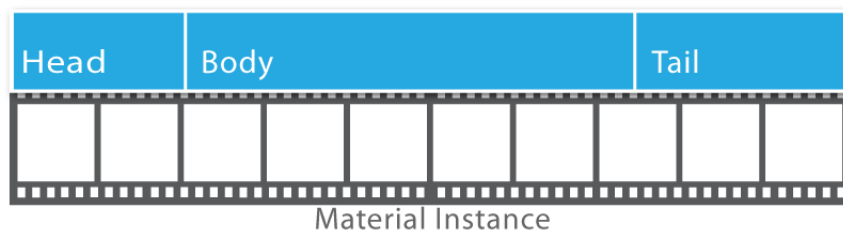
Heads, Tails, and Bodies

To crop media from a master file to create a clip, or to apply effects to your material, you need to understand how to use and implement heads, tails, and bodies. (If you don't

have effects and you don't need to clip the instance, there's no point in having a Head, Tail, or Body.)

First, let's examine a graphic illustration of these components of an instance of media (a Video or Audio element).

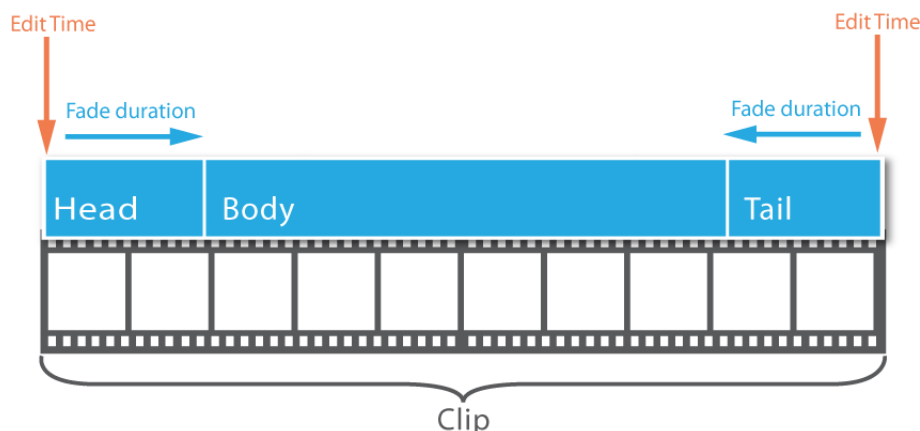
Figure 24. Heads, Body, and Tail are Points on Material



The Head, Body, and Tail are temporal locations (mark-in and mark-out points) on the timeline of the material instance—but they're not depicted that way here. Instead, they are depicted as having a duration, which is usually the easiest way to think of using them, because in most cases, Edits are implemented with Fades, which are fundamental to applying effects over a period of time.

The mark-in point of the Head is the left edge—by default the beginning time or timecode of the material. By adding an Edit element to a Head, you can set a mark-in point to trim the beginning of the clip. Likewise, you can set a mark-out point in the Tail, to trim it from the end of the clip. (The mark-out point of the tail is of course the right edge—the mirror opposite of the Head.) Without an Edit, the mark-out point of the tail is the end of the clip. Edit elements can only be added to a Head and a Tail.

Figure 25. Heads and Tails can have Edits—Head, Bodies, and Tails can have Fades



By definition, a Head can not begin (have a time) before the beginning of the instance. It can be later (with an Edit), and it can have an effect duration (Fade), extending to the right (forward) along the instance. Similarly, a Tail can not be later than the end of the instance, but it can be earlier with an Edit, and it can also have a Fade, extending in this instance backward along the instance.

The Body's point (and duration) is not explicit—it's implicit—controlled entirely by how you set up the Head and Tail with Edit and Fade elements.

Note: You can also add a Fade element, to control each effect's duration. The Fade element is what gives a Head, Body, and Tail its length, so to speak. Using a Fade is describe in detail in [Applying Effects to Material](#).

Example

Here is a simple example, with bold text identifying the operative elements:

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Up Next Promo DUR=1 min, 16x9, 1920x1080, DolbyE 5.1+2 -->
  <!-- All PNG files: 600 x 420 -->
  <!-- Input: 1080i -->
  <!-- Output: 1080i x264 -->
  <!-- Conforming Workflow: 1080 VOD -->
    <Source identifier="1">
      <File location="//share/path/clip1.mov" />
    </Source>
    <Source identifier="2">
      <File location="//share/path/master.mov" />
    </Source>
    <Sequence layer="0">
      <Segment>
        <Video source="1" layer="0" />
        <Video source="2" layer="1" align="head" adjust="edge"
fill="none" >
          <Head>
            <Edit time="00:00:04.000" />
          </Head>
          <Tail>
            <Edit time="00:00:22.200" />
          </Tail>
        </Video>
      </Segment>
    </Sequence>
  </Composition>
```

The Source elements in this composition define the media files to be used in the composition. The *identifier* value in each source is what you use in the Video element's *source* attribute to reference the correct file.

The first Source points to *clip1.mov*, a clip which has been clipped and saved as a file outside of Post Producer, for use in this composition as-is. The second Source points to *master.mov*, a master file from which we want to extract a clip dynamically.

Here's how the second Video element is modified to create a clip dynamically:

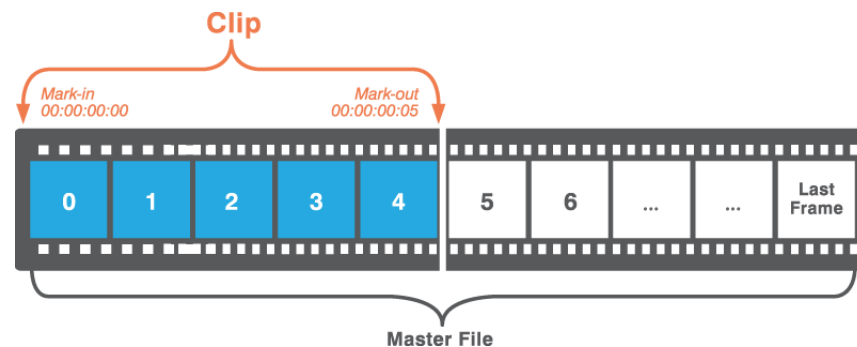
1. Add a Head element to define the mark-in point on your master media file.
2. Add an Edit to the Head and specify the mark-in time.
3. Add a Tail element to define the mark-out point on your master media file.
4. Add an Edit to the Tail and specify the mark-out time.

Specifying Mark Times

In both the Head and the Tail, you specify the time by adding an Edit element and configuring it. The Edit element has two attributes—*time* and *mode*. Together, these two attributes allow you to comprehensively describe the mark-in and mark-out point in various situations.

Note: The time of the mark-in point on the master file is *inclusive*; the mark-out point is *exclusive*—it references the point in time immediately following the last frame to be included—the first frame to be excluded. For example, you specify mark-in 00:00:00:00 (the first frame in the clip) and mark-out 00:00:00:05 (the 6th frame in the clip), to create a clip with 5 frames (0, 1, 2, 3, and 4), as illustrated in the figure below.

Figure 26. Using Edit on a Master File to Create a Shorter Clip Instance



Using the Mode Attribute

The Mode attribute has 3 keyword values:

- *absolute* (default)—used when a timecode is present in the source; identifies the edit point relative to the timecode. If you supply a timecode but the source lacks a timecode, it is converted to a time value and utilized.
- *relative*—specifies an edit point measured from the beginning (in a Head) or ending (in a Tail) of the source, irrespective of the timecode (if present).
- *duration*— specifies an edit point measured as a length of time, from the end (in a Head) or the beginning (in a Tail) of the source. (You can't use duration in both Head and Tail on the same instance of media.)

Using the Time Attribute

You can specify the *time* value using time or timecode, as appropriate:

- *Time Notation*—always specified with seconds as a decimal number, in the pattern HH:MM:SS.sss, with microseconds (fractional second in 3 digits).
- *Timecode Notation*— specified in the patterns (HH:MM:SS:FF | HH:MM:SS:FF), optionally using a drop timecode indicator (;) for US timecodes.

Note: You should always use non-drop-frame timecode, unless the timecode in the source is drop-frame timecode. Then you should specify your timecode as drop-frame timecode (using a semicolon between the second and frame value) as well.

A time is not valid, when mode is set to *absolute*. A timecode is not valid when mode is set to *duration*.

When you specify a time, Post Producer ignores the timecode in the source media, even if it exists. The time always represents the temporal distance from the beginning of the media, whether there is timecode in the source media or not.

When you specify a timecode, Post Producer uses the timecode in the source material, if it exists—the time represented by your timecode is relative to the timecode in the file. Thus, it must be consistent with the timecode in the source. For example, if your media has a timecode of 01:00:00:00, your timecode must be specified relative to that timecode.

Time and Timecode Examples

The following example illustrates how to use time and mode attributes in Edit elements.

Head Edit in Absolute Mode

```
<Head>
  <Edit mode="absolute" time="01:00:02:12"/>
</Head>
```

This material must have a timecode, or this will fail. Assuming that the timecode begins at 01:00:00, the mark-in for this video is set to 2 seconds, 12 frames.

```
<Head>
  <Edit mode="absolute" time="00:00:02.500"/>
</Head>
```

This material must also have a timecode. The mark-in is set to the point in the source at 2.5 seconds, regardless of the start time on the timecode.

Head Edit in Relative Mode

```
<Head>
  <Edit mode="relative" time="00:00:02:12"/>
</Head>
```

This material may or may not have a timecode; it is ignored if present. The mark-in for this video is set to 2 seconds, 12 frames from the beginning of the source.

```
<Head>
  <Edit mode="relative" time="00:00:02.500"/>
</Head>
```

This material may or may not have a timecode; it is ignored if present. The mark-in for this video is set to 2.5 seconds from the beginning of the source.

Head Edit in Duration Mode

```
<Head>
```

```
<Edit mode="duration" time="00:00:54.200"/>
</Head>
```

In *duration* mode, you must specify time only—you can't use a timecode value. The Head's mark-in point is set at 54.200 seconds back from the end of the source.

Tail Edit in Absolute Mode

```
<Tail>
  <Edit mode="absolute" time="01:00:30"/>
</Tail>
```

This material must have a timecode, or this will fail. Assuming that the timecode begins at 01:00:00, the mark-out for this video is set to 30 seconds from the beginning.

```
<Tail>
  <Edit mode="absolute" time="00:00:30.00"/>
</Tail>
```

This material must also have a timecode. The mark-out is set to the point in the source at 30 seconds, regardless of the start time on the timecode.

Tail Edit with Relative Mode

```
<Tail>
  <Edit mode="relative" time="00:00:02:12"/>
</Tail>
```

In a Tail element, when specifying a timecode, Edit sets the mark out point at 2 sec, 12 frames from the end of the source.

```
<Tail>
  <Edit mode="relative" time="00:00:02.50"/>
</Tail>
```

In a Tail element, when specifying a time, Edit sets the mark out point at 2.5 seconds from the end of the source.

Tail Edit with Duration Mode

```
<Tail>
  <Edit mode="duration" time="00:00:30.000"/>
</Tail>
```

In *duration* mode, you must specify time only—you can't use a timecode value. The point is specified from the opposite end. For example, the mark-out point in this example is set at 30 seconds from the beginning of the source or the Head element, if specified. Thus, the instance of material will run for (have a duration of) 30 seconds from the Head.

Cropping and Masking

Sometimes, you need to crop or mask your video in a segment. For example, you might want to use SD material in an HD promo, and thus, need to crop and mask it.

You can perform cropping and masking directly in a composition. To do so, you add a [Crop](#) and/or [Mask](#) to the [Source](#) that identifies your source video file, and configure the Crop to suit your input frame size and the mask your output target aspect ratio and/or output frame size requirements.

Calculating the New Frame Size

Both elements have top, left, right, and bottom attributes. For maximum flexibility, you can supply integer or real values, identified as a fraction (no designator), pixels (px) or percent (%). If you do not supply a unit designator (% or px), the value is a ratio (for example, 0.222 = 222/1000 or 22.2%) of the frame.

The origin X and Y coordinates are the top left corner—0%, 0% or 0,0 pixels. The bottom right corner is indicated by 100%, 100% or X,Y pixels, where X and Y are the input frame's pixel dimensions.

Cropping Details

You perform cropping (make the frame smaller) to remove material from your input frame *before* creating an output frame with a mask. Cropping is performed on the input frame.

The left and top edge origins are at 0, 0 pixels; the right and bottom edge origins are the dimensional width and height of the frame.

Top and left adjustments values are in relation to the origin; bottom and right adjustments are relative to the bottom right corner. Positive values are downward or to the right; negative values are upward or to the left.

Thus, the top and left values should be positive to reduce the frame size; the bottom and right values should be negative to reduce the frame size.

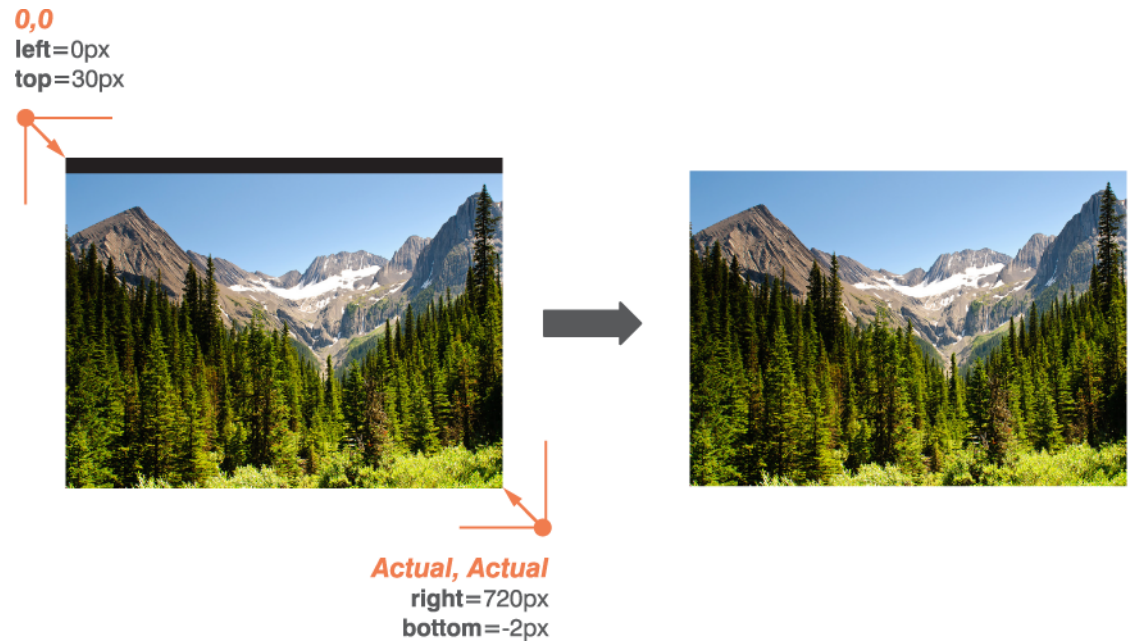
For example, to obtain a centercut from 1080i source for 4x3 SD output, you could specify:

```
<Crop top="0%" left="12.5%" bottom="100%" right="-12.5%" />
```

or

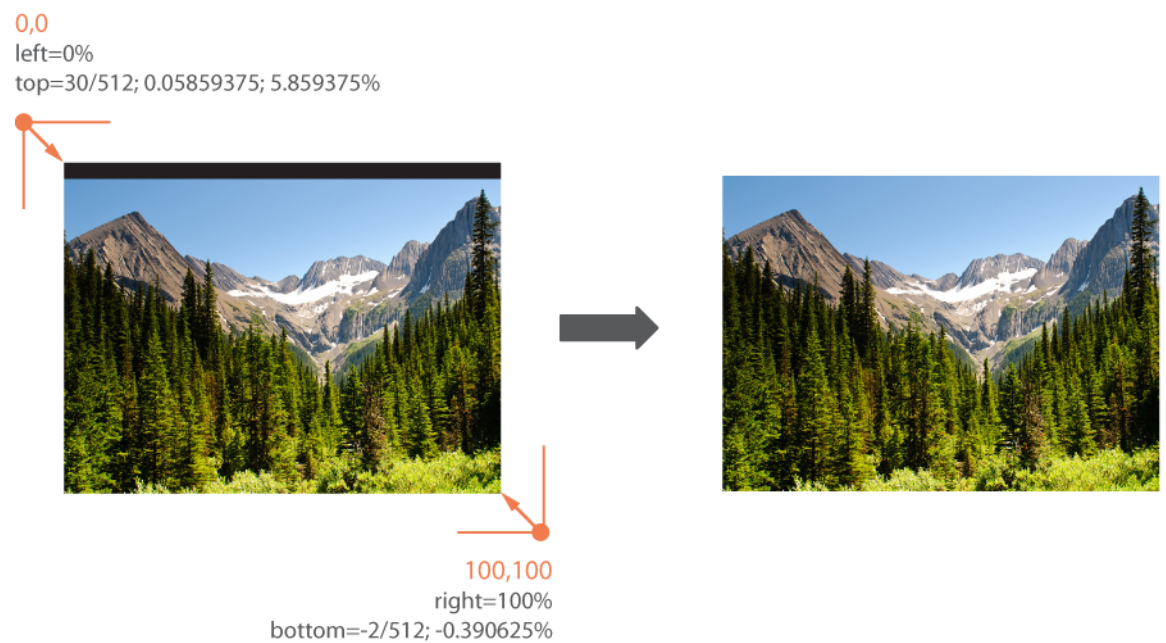
```
<Crop top="0px" left="240px" bottom="1080px" right="-240px" />
```

Figure 27. Specifying Crop Dimensions in Pixels



In this example, VBI is being stripped from SD source using pixels: 30 pixels from the top, 2 pixels from the bottom.

Figure 28. Specifying Crop Dimensions in Percent, Fractions, or Ratios



In this example, percent, fractions and ratios are shown.

Base your crop values on the increase downward and to the right from 0 for top and left values, and the decrease to the left and upward from 100% or N (dimension) pixels for bottom and right. (The bottom and right dimensions obviously may change from job to job, based on the frame size of your source media.)

Masking Details

Masking on the other hand, is performed to implement an active rectangle inside the output frame, relative to the output frame size—often to preserve aspect ratio.

Note: Masking is usually applied only when you have mixed media—converting input media of one aspect ratio to output media of another aspect ratio.

When scaling occurs (for example, from SD to HD), the input frame (after optional cropping) will be scaled into the masked (active) region (if specified) and display correctly.

Figure 29. Typical Masking Application



You also base your mask values on the difference from 0 for top and left, and from 100% or N (dimension) pixels for right and bottom dimensions of the output frame.

Note: By using percent as your unit of measurement on a mask, you can make various HD-aspect ratio output files, without changing the mask specification.

When masking, the default fill color for either pillars or bars is black. To change the color, use the *color* attribute (as shown below in the example). Keyword values are *black* | *white* | *transparent* | *ARGB value*.

To replace black as the fill color, specify an ARGB value indicated by the # sign, followed by 4 pairs of hex values: Alpha, Red, Green, and Blue. (Alpha at FF is fully-opaque; 00 is fully transparent.)

Example

This example converts an SD source file to an HD target aspect ratio. The source contains an NTSC IMX video track (720 pixels by 512 lines). Use the Crop element to remove the vertical blanking lines, and then use the Mask element to convert the source to a 1080 output frame with a 16:9 target aspect ratio by adding a 2:9 (0.222) curtain to each side of the image.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <!-- Name: Crop and Mask Demo -->
  <!-- Output: 1080i x264 w/DolbyE -->
    <Source identifier="1">
      <File location="\\share\path\1_A2_Show_ONLY_NO-GFX2.mov" />
      <Crop top="30px" left="0" bottom="-2px" right="100%" />
      <Mask top="0" left="0.222222" bottom="100%" right="-0.222222"
color="#FFA2A4A6" />
    </Source>
    <Sequence layer="1">
      <Segment>
        <Video adjust="edge" fill="none" source="1" layer="0" />
      </Segment>
    </Sequence>
  </Composition>
```

The Crop element removes 30 lines (pixels) from the top of the source frame, none from the left edge, 2 pixels from the bottom, and no material from the right.

This mask leaves the top edge intact; while removing 22/100 (22%) of the pixels from the left edge. When encoding 1080 HD, this creates a mask boundary 238 pixels in from the left, filling the left pillar with the fill color. The bottom edge is also left intact. The mask also removes 22% of the pixels from the right edge, creates another mask boundary 238 pixels in from the right as well. The region bounded by this rectangle is now a 4:3 ratio, so that the SD image can be scaled proportionally into the new HD frame and presently accurately, at a larger size.

Applying Effects to Material

One of the most powerful (and flexible) features of Post Producer is its ability to manipulate media as it is being played out. You can create dissolves, fades and dips to color, animations, and horizontal and vertical wipes by applying the following effects to material ([Advisory](#) / [Canvas](#) / [Image](#) / [Title](#) / [Video](#) / [Audio](#)) elements:

- *Opacity*—when you want to change the relative opaqueness material, you add an Opacity element to it. For implementation details, see [Segment](#).
- *Scaling*—when you want to change the display dimensions of material, you add a Scaling element to it. For implementation details, see [Segment](#).
- *Translation*—when you want to move the material around in the frame, you add a Translation element to it. For implementation details, see [Translation](#).
- *Rotation*—when you want to rotate material on the Z axis, you add a Rotation element to it. For implementation details, see [Rotation](#).
- *Volume*—For audio material (or video that has audio in it), you can adjust the volume. For implementation details, see [Volume](#).

Each effect has its own element. However, you don't apply these effects directly to a material element (a Video, for example). Instead, you apply it (as appropriate), to portions of the material, to achieve animation effects and smooth changes over time.

In Post Producer, these portions are referred to as Head, Body, and Tail. By identifying each temporal part of the media (and specifying its mark-in or mark-out point and duration)—and applying effects as appropriate to each portion, you can apply effects in almost limitless ways, including fades and animation.

Controlling Material on the Timeline

The functions we discuss in this topic are all about time: they all relate to the temporal location and playout of material (Advisory | Canvas | Image | Video | Audio | Title) in a segment. Each function is specified by a given attribute on the material element, and they are all inter-related.

These functions *only come into play* when the duration of the material is less than the duration of the segment.

These functions provide a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying content. For example, you can consistently display a branding bug (or an advisory bug) on underlying video of arbitrary duration. Or, you can squeeze back a credit roll, and cause them to always end 2 seconds before the end of the promo, regardless of their length.

Note: In practice, most of these situations involve visual material; audio is treated similarly of course.

There are several aspects that come into play when modifying material temporally. Each aspect is identified by a specific attribute you can add to the element:

- [Specifying the Duration of Material on the Timeline](#)—How long to play the material
- [Offsetting Material on the Timeline](#)—When to start (or stop) the playout of the material
- [Aligning Material on the Timeline](#)—Which point to anchor so the other end floats depending on duration
- [Adjusting Material on the Timeline](#)—What to adjust—the body or the edge (using *adjust*)
- [Modifying the Display of Material on the Timeline](#)—What portion of the material to replay

Specifying the Duration of Material on the Timeline

The duration of temporal material (video and audio) is specified by the length of the material in the instance. Thus, the duration attribute is only used for material that does not have a native length, or duration: Image, Advisory, Canvas, and Title.

Duration specifies the amount of time to display the material, and the default value is 0.

The time can be specified using a time, or a timecode, with these patterns: *HH:MM:SS* | *HH:MM:SS.sss* | *HH:MM:SS:FF* | *HH:MM:SS:FF@FPS*.

Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94.

Time is measured on a 24-hour clock. Time may include milliseconds (*sss*); frames (*:|;FF*) as *DF* (*:*) or *NDF* (*:*), and optional frame rate (*FF@FPS*), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source.

Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94.

Timecode references are applied to the timecode track specified in the associated Source element's file.

When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second.

Examples:

```
<Advisory duration = "00:00:05.500"... />
```

```
<Advisory duration = "00:00:05;14@29.97"... />
```

Offsetting Material on the Timeline

By default, all material (Image, Title, Video, etc.) instances in a segment begin at the same time. To change the time when a given instance begins to play, add an *offset* attribute, and supply a time value.

For example: `offset="00:00:10.000"` will cause this material to start playing 10 seconds after the segment begins, provided that the align is set to Head.

Note: You can use a time or timecode value, based on the media and your requirements. For implementation details, see the offset attribute description in any material element.

Aligning Material on the Timeline

When the duration of the material is less than the duration of the segment, you can add an *align* attribute to your material element, and assign the appropriate keyword to pin (anchor) the material to the timeline of the segment. When you pin (or anchor) a point, you prevent it from being altered, when the length of the segment changes from job to job. By default, align = head.

These the keywords that apply to an align attribute:

head (default)—Anchors the beginning of the material to the beginning of the segment.

tail—Anchors the end of the material to the end of the segment.

both—Anchors the center of the material at the center of the segment, so that the Head and Tail are equidistant from the beginning and end of the segment.

Note: If an offset is used in this situation, it is also applied to both ends.

Tail Alignment Example

In this example, you are creating a one minute What's Next promo on a movie channel, and you want to show a preview which may run up to 30 seconds. You always want the preview to end two seconds before the end of the promo, leaving the beginning of the clip (regardless of its length) unspecified:

Example: `<Video align="tail" offset="00:10:02.000"... />`

Using this code, the video is aligned at the end (the tail) of the clip, and it is offset from the total segment duration by 2 seconds from the end. The beginning timecode is not specified: it is calculated by the Conform action when the job runs, based on the exact length of the clip.

Both Alignment Example

Continuing the What's Next promo example, you need to add an Advisory to the promo. You always want advisory bug to start two seconds after the start, and 2 seconds before the end of the promo.

Example: `<Advisory align="both" offset="00:10:02.000"... />`

Using this code, the advisory bug is aligned at both ends of the clip, and it is offset from the total segment duration by 2 seconds on each the end.

Adjusting Material on the Timeline

Use the *adjust* attribute to specify which portion of the material should be extended, using the keywords: *edge* | *body*. For example, using the *adjust* attribute, you can consistently display a branding bug on underlying video of arbitrary duration.

Here are the keywords you can apply to adjust:

edge (default)—The material is adjusted by extending the edge that is *not* identified by the *align* property and is applied to the duration of the head and tail of the material.

body—The material is adjusted by extending the body of the material. It is applied to the end of the body that is *not* identified by the *align* property.

When you adjust an item, you indicate whether you want to extend the duration of the body, or of the edge. When you adjust the body, the head and tail duration remain fixed; when you adjust the edge, the edge that is not anchored (see Align) is the one that is extended.

Example

In this example, 4 PNG files are played out one after the other by using the offset attribute. With an image (which has no temporal value), you have to specify how long to play the image (in this case, 9 seconds), and what part of the material to adjust—the body.

```
<Segment>
  <Image align="head" adjust="body" fill="loop" layer="2"
location="//share/path/SAV_1700_1_0001_curCon.png" frames="1"
duration="00:00:09.000" layout="stretch" />
  <Image align="head" adjust="body" fill="loop" layer="3"
location="//share/path/SAV_1700_2_0001_curCon.png" frames="1"
duration="00:00:09.000" layout="stretch" offset="00:00:10.000"/>
```

```
<Image align="head" adjust="body" fill="loop" layer="4"  
location="\\share\path\SAV_1700_3_0001_iconmap.png" frames="1"  
duration="00:00:09.000" layout="stretch" offset="00:00:20.000"/>  
<Image align="head" adjust="body" fill="loop" layer="5"  
location="\\share\path\SAV_1700_4_0001_fiveday.png" frames="1"  
duration="00:00:09.000" layout="stretch" offset="00:00:30.000"/>  
</Segment>
```

Modifying the Display of Material on the Timeline

By default, material is only played once per instance in a segment. When the length of the material is less than the duration of the segment, the use of the *fill* attribute determines if and how material continues to play until the end of the segment.

There are three keywords you can use:

none (default)—do not extend the material. (In theory, it actually plays to the end, as empty: no visual or auditory content.)

hold—continue playing the first or last frame to play the material the entire duration of the segment. If *align="head"*, the last (or only) frame is repeated. If *align="tail"*, the first (or only) frame is repeated.

loop—play the media repeatedly for the duration of the segment.

Of course, for temporal (multi-frame) media (video and audio), this will play out differently than for non-temporal (single-frame) media (Image, Advisory, Title, and Canvas).

Composition Markup Language Reference

The purpose of this chapter is to describe each element in Composition Markup Language, and its attributes. The elements are listed below in alphabetic order. The CML hierarchy map shows each element in relation to other elements.

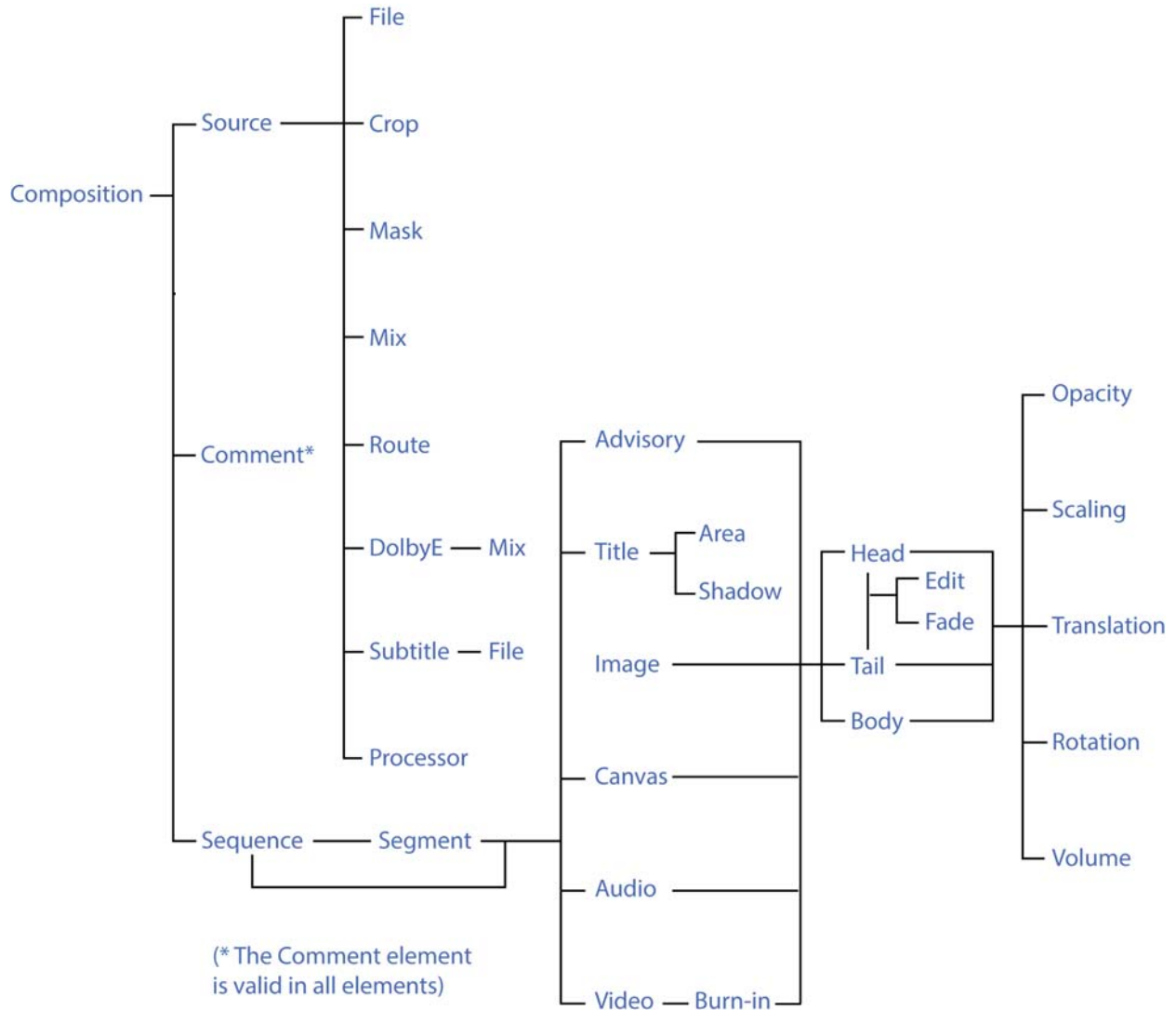
- [CML Elements](#)
- [CML Hierarchy Map](#)
- [Introduction](#)
- [Using Dimensions in CML](#)

CML Elements

- [Advisory](#)
- [Area](#)
- [Audio](#)
- [Body](#)
- [Burn-in](#)
- [Canvas](#)
- [Comment](#)
- [Composition](#)
- [Crop](#)
- [DolbyE](#)
- [Edit](#)
- [Fade](#)
- [File](#)
- [Head](#)
- [Image](#)
- [Mask](#)
- [Mix](#)
- [Opacity](#)
- [Processor](#)
- [Rotation](#)
- [Route](#)
- [ScalingSegment](#)
- [Segment](#)
- [Sequence](#)
- [Shadow](#)
- [Source](#)
- [Subtitle](#)
- [Tail](#)
- [Title](#)
- [Translation](#)
- [Video](#)
- [Volume](#)

CML Hierarchy Map

This tree structure illustrates the relationship between each of the elements in Composition Markup Language. Click on any element to view it's definition.



Introduction

These topics provide general information about CML.

- [Case Sensitivity is Critical in CML](#)
- [Using Dimensions in CML](#)
- [Specifying Files in CML](#)

Case Sensitivity is Critical in CML

XML is case-sensitive. CML elements must be entered as title case to be recognized by Post Producer. If you don't enter the element in upper case it will be ignored—and no error will be displayed. Although attributes are also by convention in upper case, most attributes in CML are all lower case. Be sure to use the case indicated in the definition.

Using Dimensions in CML

CML is designed to be rational, practical, and flexible in its expression of values and units of measure. You can use the following designators for various types of material:

- Frame/image dimensions may be designated in:
 - ratio—default; no designator
 - percent—using the designator %
 - pixels—using the designator *px*
- Audio volume level:
 - ratio—default; no designator
 - percent—using the designator %
 - decibels—using the designator *db*
- Rotations:
 - ratio—default; no designator
 - percent—using the designator %
 - degrees—using the designator °
- Text: points—using the designator *pt*

Although it is valid XML to apply any unit designator to any attribute value, not all make sense. Follow these guidelines for the material you're using.

Specifying Files in CML

File references may be specified in any manner appropriate for accessing media on a given platform: Windows drive letters, UNC paths, URLs, etc. In these examples, files are always shown as a UNC path (for example: `\\share\path\myvideo.mov`) to reinforce the use of shares to access files in a Vantage domain.

Advisory

[CML Elements](#) | [CML Hierarchy Map](#)

To create an advisory, you add an optional *Advisory* element to a [Segment](#). The *Advisory* element is a material element which defines the parental advisory material for the segment. The content advisory value is encoded into the video for use by the V-chip in the television or set top box. The optional advisory graphic must be placed and scaled on each segment where you want it to display. (Typically, the first segment displays a larger advisory bug than the others.)

To specify USTV advisory metadata insertion without creating a visual overlay, you omit all attributes except the *type* and *rating* attributes in the *Advisory* element. See [Example Without Visual Overlay](#), below.

Note: Material items may logically be divided into three temporal parts: the beginning ([Head](#)), the middle ([Body](#)), and the end ([Tail](#)) for the purpose of changing the presentation of the material with the effect elements ([Volume](#), [Scaling](#), [Translation](#), [Rotation](#), [Fade](#)), and applying a [Fade](#) to define the temporal length of the part.

The *Advisory* element adds two types of information:

- Metadata that identifies the rating system, content rating, and parental advisories. It is typically transmitted in the vertical blanking interval (using XDS protocol).
- An optional graphic overlay that displays the content rating. To display the graphic, you must specify the time in the *duration* attribute. The size, position and presentation of the graphic may be controlled using effect elements—*Opacity*, *Scaling*, *Translation*, and *Rotation*.

USTV only: System-supplied images (the larger set) are displayed, based on the ratings you supply. These may be replaced (or supplied when using other rating systems) using the *location* attribute.

The *Advisory* element sets the V-chip encoding value for the entire composition, unless additional *Advisory* elements are added in later segments. Each succeeding *Advisory* sets the V-chip encoding for the remainder of the composition.

Note: To correctly insert advisory metadata into video VBI or VANC, you must enable the Content Advisory Filter in the Transcoder of the Conform action, and configure the repeat rate. The value you put in the *Advisory* element will be repeated at that rate for the entire file unless another *Advisory* element is encountered in a segment, in which case the value that is repeated will be changed to the new value.

- [Child Elements](#)
- [Attributes](#)
- [Ratings Values](#)
- [CELR Ratings](#)
- [CFLR Ratings](#)

- [USTV Ratings](#)
- [Enabling the Advisory Filter in Workflow Designer](#)
- [Example With Visual Overlay](#)
- [Example Without Visual Overlay](#)

Child Elements

One each of these elements may be added to apply effects or alignment to the graphic:

- [Head](#)
- [Body](#)
- [Tail](#)

Attributes

These attributes may be applied to an *Advisory* element. The *rating* and *advisory* attributes are required. The *adjust*, *align*, and *fill* attributes are closely related. Together, they specify how the visual material is arranged along the timeline in the segment.

Table 6. *Advisory* Element Attributes

Name	Description
adjust (optional)	When the visual material’s duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Advisory adjust = "body"... /></code>

Table 6. *Advisory* Element Attributes

Name	Description
align (optional)	Specifies which end (or both) of the visual material to anchor to the timeline of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <Advisory align = "tail"... /> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the Head and Tail are equi-distant from the beginning and end of the segment. Note: If an <i>offset</i> is used in this situation, it is also applied to both ends.

Table 6. *Advisory* Element Attributes

Name	Description
duration (optional)	The amount of time to display an <i>Advisory</i> image. Default: 0. Do not include a duration or layer attribute if you do not want to display a visual overlay. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a frame rate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Note: Timecodes are obviously not applicable for advisory images, because there is no timecode. When processing, the Conform action will report an error and fail. Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Examples: <pre><Advisory duration = "00:00:05.500"... /> <Advisory duration = "00:00:05;14@29.97"... /></pre>

Table 6. *Advisory* Element Attributes

Name	Description
fill (optional)	When the duration of the visual material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> <i>hold</i> <i>loop</i> Example: <code><Advisory fill = "loop"... /></code> There are 3 things to consider when modifying the material: 1. What to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to adjust—hold, loop, none (based on <i>fill</i> attribute) <i>none</i> (default)—extend with empty media (no visual or auditory material). From a practical perspective, no extension. <i>hold</i>—continue playing the first or last frame the entire duration of the segment. If <i>align</i>="head", the last frame is repeated. If <i>align</i>="tail", the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.
layer (optional)	An integer value describing the ordinal position in the composite of all visual material in this segment. Minimum value: 0, default: 0. Do not include a duration or layer attribute if you do not want to display an overlay. Example: <code><Advisory layer = "10"... /></code> Material with a higher layer value obscures material with a lower layer value in the same segment.

Table 6. *Advisory* Element Attributes

Name	Description
location (optional)	Specifies a fully-qualified path to the advisory image, including file name. The location may be specified as: • <i>Windows</i>—D:\pathname\filename.ext • <i>UNC</i>—\\share\path\filename.ext • <i>URL</i>—http://SierraStudio.com/media/Vane_logo.png • <i>URL</i>—s3://aws/bucket/folder/moms_on_strike.mpg"/> CML with URL paths must be processed by a Compose action to localize the file and produce a copy of the CML to process in Post Producer transcoding actions. Example: <Advisory location = "\\Pluto\media\RatingSystems\USTV\PG13.png" /> The location must be accessible to the Vantage Playlist service which is executing the Conform action. For USTV ratings, a default image is supplied, based on the rating(s) you specify. For all other rating systems (or to override the USTV rating system graphics), supply the fully-qualified path to the image. The image may be in PNG, BMP, or JPEG format.

Table 6. *Advisory* Element Attributes

Name	Description
offset (optional)	Specifies a time value which changes the location of the beginning or end of the material, relative to the segment. The offset is applied to the end of the content that is specified by the align property. If align="both" the offset is applied at the defined value to both the head and tail of the material. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a frame rate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for framerates of 29.97 and 59.94 frames per second. Example: <Advisory duration = "00:00:05"... />
rating (required)	Specifies the rating, plus the reason or reasons. Keywords: One or more keywords from the Rating Reasons table, separated by spaces. Example: <Advisory type="USTV" rating="PG-13 V" /> The content rating. You may specify multiple ratings and reasons. If the combination is not logical, no graphic file is displayed, even if the element is configured to do so.

Table 6. *Advisory* Element Attributes

Name	Description
type (required)	Specifies the rating body. Keyword Values. One keyword from the Rating System Keywords (for type attribute) table. Default: MPAA. Optionally, add one or more rating reasons (the Rating Reasons table). Default: Not Rated—specify as an empty string. Example: <pre><Advisory type="USTV" rating="PG-13 V" /></pre>

Ratings Values

These tables provides the string value to use in the *type* attribute to identify the rating system you are using.

Table 7. Rating System Keywords (for *type* attribute)

Keyword	Description
CELR	Canada English Language Rating
CFLR	Canada French Language Rating
MPAA	Motion Picture Association of America
USTV	U.S. TV Parental Guidelines

Note: Graphics are supplied for USTV by Advisory. Graphics for other rating systems must be supplied by the content producer, and must be applied using Image.

This table describes the ratings from various rating systems.

Table 8. Ratings Keywords (for *rating* attribute)

Rating Keyword	Description.
"" (Empty String)	Not rated.
G	General audiences (MPAA, CELR, CFLR)
PG	Parental guidance suggested (MPAA, CELR)
PG-13	Parental strongly cautioned (MPAA)
R	Restricted (MPAA)
NC-17	No one under 17 admitted (MPAA)
X	Explicit (MPAA)

Table 8. Ratings Keywords (for *rating* attribute)

Rating Keyword	Description.
TV-Y	Directed to all children (USTV)
TV-Y7	Directed to children age 7 and up (USTV)
TV-G	General audiences (USTV)
TV-PG	Parental guidance suggested (USTV)
TV-14	Parent strongly cautioned (USTV)
TV-MA	Mature audience only (USTV)

This table describes the rating reasons (which may only apply to one or more ratings). You may use one, or multiple keywords from this list with the Rating value to form a logical rating. For example, *rating* = "PG-13 L V".

Table 9. Rating Reasons

Keyword	Not rated.
V	Fantasy violence (USTV)
V	Violence (USTV)
L	Adult language (USTV)
S	Sexual situations (USTV)
D	Suggestive dialog (USTV)
E	Exempt (CELR, CFLR)
C	Children (CELR)
C8+	Children age 8 and up (CELR)
8+	Age 8 and up (CFLR)
13+	Age 13 and up (CFLR)
14+	Age 14 and up (CFLR)
16+	Age 16 and up (CFLR)
18+	Age 18 and up (CFLR)

CELR Ratings

E | C | C8+ | G | 14+ | 18+

CFLR Ratings

E | G | 8+ | 13+ | 16+ | 18+

USTV Ratings

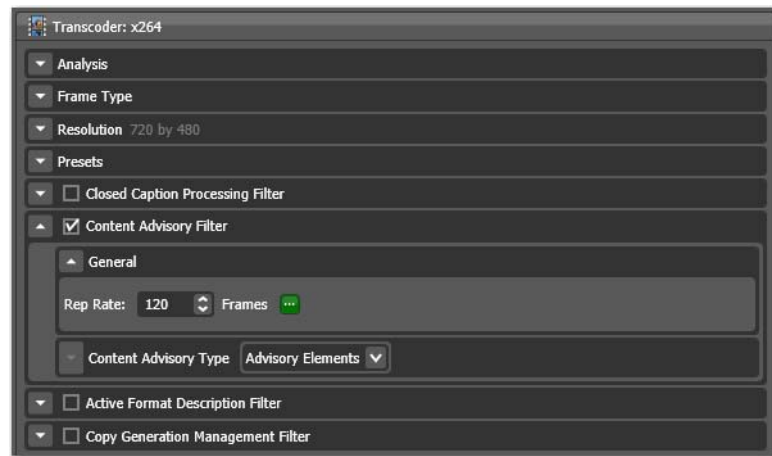
Table 10. USTV Ratings

TV-G	TV-PG D	TV-PG V S D	TV-14 V S	TV-14 V L S D
TV-Y	TV-PG V L	TV-PG L S D	TV-14 V D	TV-MA
TV-Y7	TV-PG V S	TV-PG V L S D	TV-14 L S	TV-MA V
TV-Y7 FV	TV-PG V D	TV-14	TV-14 L D	TV-MA L
TV-PG	TV-PG L S	TV-14 V	TV-14 S D	TV-MA S
TV-PG V	TV-PG L D	TV-14 L	TV-14 V L S	TV-MA V L
TV-PG L	TV-PG S D	TV-14 S	TV-14 V L D	TV-MA V S
TV-PG S	TV-PG V L S	TV-14 D	TV-14 V S D	TV-MA L S
	TV-PG V L D	TV-14 V L	TV-14 L S D	TV-MA V L S

Enabling the Advisory Filter in Workflow Designer

To display the Content Advisory Filter editor panel, open the Conform action's inspector. Add a video transcoder if you haven't already done so, and click on the transcoder panel to display its controls on the right.

Figure 30. Configuring the Advisory Filter to Implement a Parental Advisory



Click to open the Content Advisory Filter editor panel and set the repeat rate, as shown.

Note: For a practical example of implementing an advisory, see Adding a Content Advisory in the Post Producer Cookbook.

Example With Visual Overlay

This example code snippet illustrates how to implement a typical advisory graphic in a segment, using the *Advisory* element.

Figure 31. Advisory Element Example



In the code below, the USTV advisory graphic has a head, body, and tail, so that a half-second fade can be applied, and the graphic positioned 5 percent down and to the right of the origin of the frame, with a total duration of 15 seconds.

Also note that the volume was set to 0 in the tail so that the Fade would also modify the audio volume.

CML

```
...
</Segment>
...
<Advisory align="head" adjust="edge" layer="1" type="USTV"
rating="TV-PG V" duration="00:00:15.00" >
  <Head>
    <Translation x="5%" y="5%" />
    <Opacity level="0%" />
    <Fade duration="00:00:00.500" />
  </Head>

  <Body>
    <Opacity level="100%" />
    <Translation x="5%" y="5%" />
  </Body>
  <Tail>
    <Translation x="5%" y="5%" />
    <Opacity level="0%" />
    <Fade duration="00:00:00.500" />
    <Volume level="0%" />
  </Tail>
</Advisory>
</Segment>...
```

Example Without Visual Overlay

This example code snippet illustrates how to implement a Parental Advisory without displaying any graphic overlay, using the *Advisory* element.

In the code below, the *Advisory* element only has a type and rating. The *align*, *adjust*, *layer*, and *duration* attributes have been removed—these all affect the visual image. *Head*, *Body*, and *Tail*, likewise.

CML

```
...  
  </Segment>  
...  
  <Advisory type="USTV" rating="TV-PG V" >  
    </Advisory>  
  </Segment>...
```

Area

[CML Elements](#) | [CML Hierarchy Map](#)

One *Area* element should be added to a [Title](#) to define the location and size of the rectangle in which to render the title text. Without it, the default area is the same as the output frame, and the title text is rendered in the vertical center of the frame, on the left edge. Though the *Area* element is optional, in most cases an *Area* element is a practical necessity.

You can not define an area off-screen (outside the output frame). To place it offscreen for a slide, add a *Head*, *Body*, and *Tail* and use *Translate* to animate it.

There are no child elements in an *Area* element.

Note: For a practical example of using titles with an *Area*, see [Adding Titles in the Composition Cookbook](#).

See also [Title](#), [Shadow](#).

Attributes

These attributes may be applied to an *Area* element. These attributes are relative to origin of output frame at 0,0—the upper, left corner.

The effect of attributes is easier to predict by also locating the title text in the area at the top left corner using the vertical-align and horizontal-align settings.

You can specify a unit designator of pixels (px) or a ratio (no designator) or percent (%). For example, specifying *bottom=90%* places the bottom edge 10% above the bottom of the frame.

Note: If you use pixels, be aware that the area definition is directly correlated to the output frame—which is defined in the Conform action, beyond the scope of the Composition. Thus, if you design for HD output, but submit the composition to an SD Conform workflow, the area will not be located correctly. Use percent or ratio to specify the definition relative to the output frame regardless of its size.

If you specify a value without a unit designator, it is treated as a ratio. (The only functional difference between a ratio and a percent is the location of the decimal point.) The ratio may be expressed as an integer, a decimal number, or a rational number {5/10} and must be presented as an expression, in braces. The ratio is the relationship of the edge to the output frame in the appropriate dimension.

Positive (on-screen) and negative (off-screen) values may be used to specify the area.

Table 11. Area Element Attributes

Name	Description
bottom (optional)	Specifying the distance from the top of the frame to the bottom edge of the area, as pixels (px), percent (%), or ratio (no unit designator). Default: 1. (The bottom of the output frame.) Example: <code><Area bottom="480px" . . . /></code> specifies the bottom edge of the area as 480 pixels below the top edge of the output frame.
left (optional)	Specifies the distance from the left edge of the frame to the left edge of the area, as pixels (px), percent (%), or ratio (no unit designator). Default: 0. (The left edge of the frame.) Example: <code><Area left="33.3%" . . . /></code> specifies the left edge of the area as 1/3 of the way across the frame from the left edge of the output frame.
right (optional)	Specifies the distance from the left edge of the frame to the right edge of the area, as pixels (px), percent (%), or ratio (no unit designator). Default: 1. (The right edge of the frame.) Example: <code><Area right="100%" . . . /></code> specifies the right edge of the area identical to the right edge of the output frame.
top (optional)	Specifying the distance from the top of the frame to the top edge of the area, as pixels (px), percent (%), or ratio (no unit designator). Default: 0. (The top of the frame.) Example: <code><Area top="0" . . . /></code> specifies the top edge of the area identical to the top edge of the output frame.

Example

In this example—from the Lower Third with Text composition (for details, see [Post Producer Composition Examples](#))—an area is added to the *Title* element, and specified as a rectangle positioned directly over the race frames, in which to display the title text, as shown in the figure below.

Figure 32. Using the Area Element to Position the Title Text on the Frame



Note that in this code snippet, the *Area* attribute values are specified as a percentage of the frame size, not in pixels.

CML

```
...
<Title align="head" adjust="edge" fill="none" layer="2"
duration="00:00:04.00" offset="00:00:01.000" font="Helvetica"
size="50pt" style="italic" weight="bold"
    foreground-color="bisque" background-color="transparent"
wrap="false" horizontal-align="left" vertical-align="middle"
layout="stretch">
    <Area top="70%" left="20%" bottom="90%" right="80%" />
    <Shadow color="gold" softness="10%" vertical-offset="6%"
horizontal-offset="6%" />
    Post Producer Titles
</Title>
...
```

Audio

[CML Elements](#) | [CML Hierarchy Map](#)

You can add one or more *Audio* elements to a segment. The *Audio* element is a material element, which adds audio material from the file identified by a [Source](#).

Note: Material items may logically be divided into three temporal parts: the beginning ([Head](#)), the middle ([Body](#)), and the end ([Tail](#)) for the purpose of changing the presentation of the material with the effect elements ([Volume](#), [Scaling](#), [Translation](#), [Rotation](#), [Fade](#)), and applying a [Fade](#) to define the temporal length of the part.

Child Elements

One each of these elements may be added to apply effects or alignment:

- [Head](#)
- [Body](#)
- [Tail](#)

Attributes

These attributes may be applied to an *Audio* element.

Table 12. Audio Element Attributes

Name	Description
adjust (optional)	When the material's duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Audio adjust = "body" ... /></code>
align (optional)	Specifies which end (or both) of the material to anchor to the timeline of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <code><Audio align = "tail" ... /></code> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the <i>Head</i> and <i>Tail</i> are equi-distant from the beginning and end of the segment. Note: If an offset is used in this situation, it is also applied to both ends.

Table 12. Audio Element Attributes

Name	Description
fill (optional)	When the duration of the material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> <i>hold</i> <i>loop</i> Example: <code><Audio fill = "loop" ... /></code> <i>none</i> (default)—extend with empty media (no visual or auditory material). <i>hold</i>—continue playing the first or last frame to play the material the entire duration of the segment. If <i>align="head"</i>, the last frame is repeated. If <i>align="tail"</i>, the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.
offset (optional)	The amount of time to wait from the beginning of the segment to play the material. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a frame rate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <code><Audio offset = "00:00:05" ... /></code>
source (required)	Integer value corresponding to the Source element's <i>identifier</i> value, to identify the file to be used in this instance. Example: <code><Audio source = "6" ... /></code>

Example

This represents a typical *Audio* element in a segment. In this code snippet—from the Promo composition (for details, see [Post Producer Composition Examples](#))—an audio source file (6C_Audio_Overlay.mov) is specified as Source 6, and the *Audio* element references it (source="6"), to play the audio during the segment in which it is located.

CML

```
...
  <Source identifier="6">
    <File location="//share/path/6C_Audio_Overlay.mov" />
  </Source>
...
  <Sequence layer="1">...
    <Segment>
      <Audio align="head" adjust="edge" fill="none" source="6"
layer="0">
    </Audio>
```

Body

[CML Elements](#) | [CML Hierarchy Map](#)

The *Body* element is the temporal portion (duration) of a material item identified by the beginning of the material (or the head, if defined, and the end of the material (or the tail, if defined).

The *Body* (like the [Head](#) and the [Tail](#)) may contain elements that control the audio and video composition. interpolates between the values set in the body and those in the *Head* and *Tail* to create transition and video effects.

There are no attributes in a *Body* element.

See also [Head](#), [Tail](#).

Child Elements

One each of these effects elements may be optionally added to a *Head*, *Body*, or *Tail* element:

- [Opacity](#)
- [Scaling](#)
- [Translation](#)
- [Rotation](#)

Example

In this example a video clip is superimposed on a background to highlight the upcoming show. A sample frame is shown below, for reference.

Figure 33. Sample Frame from HD Input Source



The inset video fades in and out (using *Head* and *Tail*), is positioned at 5% over and 10% down on the frame, and displays on 66% of the frame. The *Body* element for this video merely continues the positioning and size of the inset for the duration.

Figure 34. Body Elements Often Continue Positioning and Size for the Duration

CML

```

...
<Video align="head" adjust="body" fill="hold" source="5"
layer="2">
  <!--           HD Promo           -->
  <!--   hold the last frame until summary done   -->
  <!--           -->
  <Head>
    <Edit time="00:00:00.000" />
    <Scaling x="66%" y="66%" />
    <Translation x="5%" y="10%" />
  </Head>
  <Body>
    <Scaling x="66%" y="66%" />
    <Translation x="5%" y="10%" />
  </Body>
  <Tail>
    <Edit time="01:00:26:23" />
    <Opacity level="0"/>
    <Scaling x="66%" y="66%" />
    <Translation x="5%" y="10%" />
    <Fade duration="00:00:05.000"/>
  </Tail>
</Video>
...

```

Burn-in

[CML Elements](#) | [CML Hierarchy Map](#)

The *Burn-in* element is used to render external text strings onto frames of the conformed output media. *Burn-in* can be used to render timecode or text from caption files onto the video.

When the *source* attribute is set to the keyword *captions*, the *Burn-in* element is used to process a captions file and render the captions into the conformed output media. When set to *timecode*, *Burn-in* renders the source timecode on the output frames.

When rendering captions, the *Burn-in* element uses the specified SCC or STL file identified as a Source in the CML. Burn-in follows caption placement per the captions file, along with EIA 608 values for size, color, and font.

Child Elements

The *Translation* element may be added to a *Burn-in* element to animate the text over time.

Examples

In this example, an SCC file of sample caption text is burned into a media file, using this CML snippet:

```
<Video source="1">
  <Burn-in source="captions" background-color="#00000000"
    string-background-color="#77000000" />
</Video>
```

Figure 35. Sample Frame of Burned-in Caption Text



In this example, the caption's location/style/color is determined by the 608 data. Optionally, the caption font, size, style, weight, and foreground color, background color and string background color can be set from an attribute for the Burn-in element.

```
<Composition>
  <Source identifier="1">
    <Subtitle>
      <File location="//share\spanish.scc" />
    </Subtitle>
    <File location="//share\CC_CHI002_2398.mov" />
  </Source>
  <Sequence>
    <Segment>
      <Video>
        <Burn-in source="captions" background-color="green"
          string-background-color="green" />
      </Video>
    </Segment>
  </Sequence>
</Composition>
```

Table 13. *Burn-in* Element Attributes

Name	Description
background-color (optional)	Specifies the background color for the caption text region that is painted. SCC captions default: <i>black</i>. STL captions default: <i>transparent</i>. Keywords: <i>transparent</i> <i><supported color keywords></i> <i>ARGB</i> The supported colors are defined in .NET. For details, see Color Structure. ARGB—The RGB + Alpha color, in #AARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 00 represents a pixel that is fully transparent and a value of FF is fully opaque. For example, #00000000 creates a totally transparent background, and #77000000" is a translucent black.
font (optional)	The family name of the font, which must be present on the system where the Vantage Edit service executing the Conform action is hosted. Default: Helvetica. For details, see .NET Font Family. For composition file encoding requirements for non-Roman fonts, see Composition File Requirements.

Table 13. *Burn-in* Element Attributes

Name	Description
foreground-color (optional)	Specifies the text color for the caption text that is painted. Default: <i>black</i>. Keywords: <i><supported color keywords></i> <i>ARGB</i> The supported colors are defined in .NET. For details, see Color Structure. <i>ARGB</i>—The RGB + Alpha color, in #AARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 00 represents a pixel that is fully transparent and a value of FF is fully opaque.
size (optional)	Applies only to Burn-in. An integer value describing the nominal height of the font in points (pt). Default: 36 points. Example: <code><Burn-in size="72pt"... /></code>
source (required)	Keyword value specifying the type of source. Keywords: <i>captions</i> <i>timecode</i> Example: <code><Burn-in source = "timecode"... /></code>
string-background-color (optional)	Specifies the background color for each caption character that is painted. Default: <i>black</i>. Keywords: <i>transparent</i> <i><supported color keywords></i> <i>ARGB</i> The supported colors are defined in .NET. For details, see Color Structure. <i>ARGB</i>—The RGB + Alpha color, in #AARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 00 represents a pixel that is fully transparent and a value of FF is fully opaque.
style (optional)	Specifies the style in which the font face is rendered. Default: <i>normal</i>. Keywords: <i>normal</i> <i>italic</i> <i>underline</i> <i>strikeout</i> <i>overline</i> Example: <code><Burn-in style="italic"... /></code>
weight (optional)	Specifies the thickness of the stroke of each character. Default: <i>normal</i>. Keywords: <i>normal</i> <i>bold</i> <i>light</i> <i>medium</i> <i>heavy</i> Example: <code><Burn-in weight="medium"... /></code>

Canvas

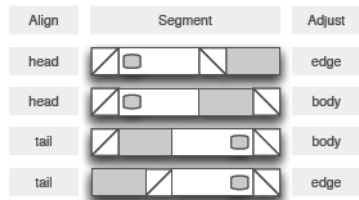
[CML Elements](#) | [CML Hierarchy Map](#)

The optional *Canvas* element adds a visual rectangle at the same size as the output frame, to a *Segment*. The *Canvas* element is a material element, which is intended as a filler, and is rendered in black.

The *Canvas* element is used as content fill or as a background layer when fading in and out or dipping to black.

For a visual representation of the effect of *adjust* and *align* attributes when using a *Fade* element, see the illustration below.

Figure 36. *Align and Adjust Attributes Work Together on Material Expansion*



There are no child elements in *Canvas*.

Attributes

These attributes may be applied to a *Canvas* element.

Table 14. *Canvas* Element Attributes

Name	Description
adjust (optional)	When the material's duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Canvas adjust = "body"... /></code>
align (optional)	Specifies which end (or both) of the material to anchor to the timeline of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <code><Canvas align = "tail"... /></code> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the <i>Head</i> and <i>Tail</i> are equi-distant from the beginning and end of the segment. Note: If an <i>offset</i> is used in this situation, it is also applied to both ends.

Table 14. Canvas Element Attributes

Name	Description
Background (optional)	Specifies the color that the area is painted. Default: <i>black</i> . Keywords: <i>transparent</i> <i>black</i> <i>white</i> <i>ARGB</i>
Note: The Background attribute has an upper case B. Lower case instances are incorrect and ignored.	The supported colors are defined in .NET. For details, see Color Structure . <i>ARGB</i> —The RGB + Alpha color, in 0xAARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 0x00 represents a pixel that is fully transparent and a value of 0xFF is fully opaque.
duration (optional)	The amount of time to display the canvas. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS;FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Note: Timecodes are obviously not applicable for canvases, because there is no timecode. When processing, the Conform action will report an error and fail. Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Examples: <pre><Canvas duration = "00:00:05.500"... /> <Canvas duration = "00:00:05;14@29.97"... /></pre>

Table 14. *Canvas* Element Attributes

Name	Description
fill (optional)	When the duration of the material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> <i>hold</i> <i>loop</i>. Example: <code><Canvas fill = "loop"... /></code> <i>none</i> (default)—extend with empty media (no visual or auditory material). <i>hold</i>—continue playing the first or last frame to play the material the entire duration of the segment. If <i>align</i>="head", the last frame is repeated. If <i>align</i>="tail", the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.
layer (optional)	An integer value describing the ordinal position in the composite of all material in this segment. Default: 0. Example: <code><Canvas layer = "10"... /></code> Material with a lower layer value may be obscured by material with a higher layer value in the same segment. When used in <i>Canvas</i>, the value may be higher or lower than the video (or other material) you are fading with, because in either case one becomes fully transparent.

Table 14. *Canvas* Element Attributes

Name	Description
offset (optional)	The amount of time to wait from the beginning of the segment, to display the material. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <Canvas duration = "00:00:05"... />

Example

This example—from the Backtimed Graphic composition (for details, see [Post Producer Composition Examples](#))—illustrates the typical use of a *Canvas* element in a *Segment* (shown in bold).

CML

```
...
<Segment>
  <Canvas align="head" adjust="body" duration="00:00:18.700"
  Background="black" layer="0" />
...
```

Comment

[CML Elements](#) | [CML Hierarchy Map](#)

The optional *Comment* element can be placed in any element in the composition. The purpose of the Comment element is to enable you to pass information (for example, a key-pair value) through the system for use downstream or to explain the composition.

Note: The Comment element is not an HTML or XML comment.

There are no child elements or attributes in a Comment element. You can place any text in the comment element that is valid XML.

Comment elements are unused by Post Producer; they remain in the composition unused and are also passed through a Chronicle action unaltered.

Example

```
<Segment>
  <Canvas align="head" adjust="body" duration="00:00:18.700"
Background="black" layer="0" />
    <Comment>TRP ID = urn:uuid:06a4-e204-407b-ac8b </Comment>
    <Comment>TRP Hash = emtXD7kMraxeTojicE60fva2HAc</Comment>
    <Comment>TRP Size = 224957607</Comment>
</Segment>
```

Composition

[CML Elements](#) | [CML Hierarchy Map](#)

The *Composition* element identifies this XML as a composition object. It is the root element of every composition. Each composition (whether as a file or an object in a program) must have one *Composition* element, at the highest level in the XML. The *Composition* element is the container for all other CML elements (except the XML (<?xml>) tag).

Child Elements

These elements may be added to a *Composition* element:

- [Source](#) (one or more)
- [Sequence](#) (one or more).

Attributes

These attributes may be applied to a *Composition* element.

Table 15. *Composition* Element Attributes

Name	Description
created (optional)	optional string, providing a creation or modification date.
version (optional)	optional string, providing a version number.

Example

This basic (and impractical) composition creates one sequence with a single video file, and encodes it. The output is the same as the input. This simple example demonstrates the basic functionality of a *Composition* element: to contain all CML elements which comprise the composition.

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/path/My_TV_Show_Promo.mov" />
  </Source>
  <Sequence layer="1">
    <Segment>
      <Video adjust="edge" fill="none" source="1" layer="0" />
    </Segment>
  </Sequence>
</Composition>
```

Crop

[CML Elements](#) | [CML Hierarchy Map](#)

To crop the frames of source video, you add a *Crop* element to the [Source](#) element that identifies the instance. (The *Crop* element is optional; one may be added per *Source*.) All Video instances that reference a *Source* with a *Crop* element inherit the media as specified—that is, cropped.

The *Crop* element creates a new rectangle of the input frame that is smaller than the original. All pixels that lie outside the crop rectangle are discarded from the source, based on your configured dimensions.

For example, you can use *Crop* to:

- Produce a centercut HD 16:9 to SD 4:3
- Crop 32 lines off the top of IMX video to remove VBI lines
- Make an aspect ratio adjustment.

The crop frame is defined relative to the dimensions of the source frame. Positive values originate from the top, left corner. Negative values originate from the bottom, right corner.

For example, to remove 25% of a frame evenly from left and right, you could specify:

```
<Crop left = "12.5%" right = "-12.5%"... />
```

or

```
<Crop left = "12.5%" right = "87.5%"... />
```

The result is the same.

You could also crop 32 pixels off the top and 2 pixels off the bottom of a 640 x 280 frame in either manner:

```
<Crop top = "32px" bottom = "-2px"... />
```

or

```
<Crop top = "32px" bottom = "478px"... />
```

The dimensions may be specified in pixels, or as a ratio, fraction, or percent.

The cropped input frame is resized (if necessary) to fit the output frame size (or mask, if specified) before encoding. Cropping is frequently used in conjunction with masking. With a mask, you'll end up with pillars or bars, depending on how the mask ratio differs from the frame ratio.

There are no child elements in a *Crop* element.

See also [Mask](#).

Attributes

Each of these attributes may be specified by a units designator: pixels (px), ratio, fraction, or percent (%). If you don't specify a designator, the value is treated as a ratio of the frame dimension. For example, *bottom*="-0.222" is the same as *bottom*="-22.2%".

Positive values originate from the top, left corner. Negative values originate from the bottom, right corner. Values may be integers or decimal numbers.

Table 16. Crop Element Attributes

Name	Description
bottom (optional)	Specifies the amount of material to remove upward from the bottom edge of the input frame. Default: 0. Example: <Crop bottom = "-2px"... />
left (optional)	Specifies the amount of material to remove from the left edge of the input frame. Default: 0. Example: <Crop left = "0.125"... />
right (optional)	Specifies the amount of material to remove from the right edge of the input frame. Default: 0. Example: <Crop right = "-12.5%"... />
top (optional)	Specifies the amount of material to remove from the top edge of the input frame. Default: 0. Example: <Crop top = "32px"... />

Examples

Two examples describe using a *Crop* element.

- [Center Cutting an HD Frame with Pillars](#)
- [Center Cutting an HD Frame for SD Frame](#)

Center Cutting an HD Frame with Pillars

In this example, a center cut is applied to 16x9, 1920 by 1080 input to produce 4x3, 1440 by 1080 output by removing 480 pixels from the width of the image. (25% total; 12.5% from each side).

Input HD Frame: 1920x1080

Output HD Frame: 1440x1080

To remove the 480 pixels, you can configure *Crop* by percent, ratio, or by pixels:

CML

```
<Crop left="12.5%" right="-12.5%" />  
<Crop left="0.125" right="-0.125" />
```

```
<Crop left="240px" right="-240px"/>
```

Center Cutting an HD Frame for SD Frame

In the 2nd example, you want to center cut a 16x9 1920x1080 input to down-convert to 4x3 720x540 output, also by removing 480 pixels from the width of the image.

Input HD frame: 1920x1080

Output SD frame: 720x540, specified in the encoder.

To remove the 480 pixels, you can configure Crop in the same manner as the first example. In both cases, it is necessary to remove 480 pixels from source, 240 from the left and right of the original frame. In the first case, no scaling is performed on the output after cropping. In the second case, the image is scaled to 1/2 in the x and y directions, by virtue of the frame size set in the encoder.

CML

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/path/1920x1080.mov"/>
    <Crop left="240px" right="-240px" />
    <!-- center cut 4x3 cropping for any resolution output-->
  </Source>
  <Sequence layer="0">
    <Segment>
      <Video source="1" >
        <Head>
          <Edit time="00:00:00.000"/>
        </Head>
        <Tail>
          <Edit time="00:00:05.000"/>
        </Tail>
      </Video>
    </Segment>
  </Sequence>
</Composition>
```

Summary

Cropping parameters are applied to the input frame and the resulting frame is placed within the output frame, re-rendering to fit, if necessary.

In both cases, it is necessary to remove 480 pixels from source, 240 from the left and right of the original frame. In the first case, no scaling is performed on the output after cropping, in the second case, the image is scaled to 1/2 in the x and y directions.

Therefore, specifying the cropping values in pixels produces exactly the same result in both cases. Crop values specified as a percent are relative to the output resolution. 240 pixels is 16.17% of 1440 and 33.34% of 720.

DolbyE

[CML Elements](#) | [CML Hierarchy Map](#)

The *DolbyE* element specifies the audio track layout of a source file that contains compressed, Dolby E audio channels that are to be decoded and remapped or remixed to the output. You add a *DolbyE* element to a *Source* when you want to re-arrange the channels in the output media.

The *Mix* element should be added to the *DolbyE* element to decode and remap the audio channels. The *Route* element is used to perform Dolby E pass through.

Dolby E source must be in one of these program layouts for processing in Post Producer:

- 5.1+2 Surround plus one stereo pair.
- 2+2+2+2 Four stereo pairs.
- 5.1 5.1 Surround.
- 7.1 7.1 Surround.

When using Dolby E audio, it is necessary to:

- Silence the WAV pair that contains the Dolby E audio. This is accomplished by mixing it to channels 1 and 2 at zero volume. Failure to do this will result in output with static.
- Specify the Dolby E program configuration that is contained in the source.
- Map and mix the desired tracks that will be contained in the output.

DolbyE Program Channel Configurations

Each of these attributes are required in a *DolbyE* element.

In the table below, each Dolby E program is identified in the column on the left. On the right, each channel (from 1 through 8) is identified by its logical segment of the program. (-1 indicates the channel is unused in this program configuration.)

For example, if your input is a 4+2+2 Dolby E program, then channels 1,2,5, and 6 comprise the 4 segment; channels 3 and 7 comprise the first 2 segment, and channels 4 and 8 comprise the second or last 2 segment.

Table 17. Dolby E Program Channel Indexes

Program	Index by Channel
5.1 + 2	0, 0, 0, 1, 0, 0, 0, 1
2 + 2 + 2 + 2	0, 1, 2, 3, 0, 1, 2, 3
5.1	0, 0, 0, 0, 0, 0, -1, -1
7.1	0, 0, 0, 0, 0, 0, 0, 0

Child Elements

One or more *Mix* or *Route* elements may be added to a *DolbyE* element.

Attributes

Each of these attributes are required in a *DolbyE* element.

Table 18. DolbyE Element Attributes

Name	Description
channels (required)	Specifies the PCM WAV stereo pair that contains Dolby E audio, in the form N N. The two values should be separated with a space. Keywords: <i>None</i> 1... 32 <i>All</i> Example: <DolbyE channels = "1 2"... /> <i>None</i>—use to specify no channels. 1...32—The channel pair, separated by spaces. <i>All</i>—use to specify all channels.
program (required)	Specifies the channel layout of the compressed Dolby E audio, by keyword. Keywords: 5.1+2 4+2+2 5.1 7.1 Example: <DolbyE program = "5.1"... />

Example

This example code snippet illustrates mapping a 5.1 Dolby E stereo pair source to a stereo pair in the output file.

CML

```
<?xml version="1.0" encoding="utf-8"?>
<Composition version="1.0"
xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/Dolby_E\dolbye_audio.GXF" />
    <!-- Mute track 1 and 2 in prep for decoding -->
    <Mix source="1 2" target="1 2" level="0" />
    <DolbyE channels="3 4" program="5.1">
      <!-- Mix Left (1) > Stereo Left (1) -->
      <Mix source="1" target="1" />
      <!-- Mix Right (4) to Stereo Right (2) -->
      <Mix source="4" target="2" />
      <!-- Mix Center (2) to Stereo Left & Right (2) at -3dB -->
      <Mix source="2" target="1 2" level="0.707107" />
      <!-- Mix Left Rear (3) to Stereo Left (1) at -3dB -->
      <Mix source="3" target="1" level="0.707107" />
    </DolbyE>
  </Source>
</Composition>
```

```
<!-- Mix Right Rear (6) to Stereo Right (2) at -3dB -->
<Mix source="6" target="2" level="0.707107" />
</DolbyE>
</Source>
<Sequence>
  <Segment>
    <Video source="1" />
  </Segment>
</Sequence>
<Composition>
```

Edit

[CML Elements](#) | [CML Hierarchy Map](#)

The optional *Edit* element can be used in the [Head](#) and the [Tail](#) of material. The purpose of adding an *Edit* element is to create a clip from a longer source—by specifying a mark-in or mark-out point—for this instance of the material. Used in the *Head*, it is the mark-in point; in the *Tail*, the mark-out point.

By default, the mark-in point of material is the beginning of the file, the mark-out point is the end of the file. Effectively, the *v* element moves the beginning or ending of the clip from its default position (the beginning or ending of the file) to the point specified.

In any given instance, you can provide an *Edit* in either the *Head* or the *Tail*, or in both. Providing an *Edit* only in the *Head* results in a clip running from the *Head's Edit* point to the end of the file. Providing an *Edit* only in the *Tail* results in a clip running from the beginning of the clip to the *Edit* point in the *Tail*. In *both*, you have a clip trimmed at both the beginning and ending of the file.

Note: It is important to note that *Head Edits* are inclusive; *Tail Edits* are exclusive. That is, the first frame after the specified time in the *Head Edit* is *included* in the clip. However, the first frame after the specified time in the *Tail Edit* is *excluded*.

supports back-timing edits from either end. For example, you may want to roll movie credits in a What's Next promo. So, you align the video at the tail (*align = "tail"*), so that it ends at the same time as the segment. Next, create an *Edit* in the *Head* and place a mark-in at the credits cut using *mode = "duration"*, and set the time equal to the length of the credit roll.

There are no child elements in an *Edit* element.

Attributes

These two attributes may be applied to an *Edit* element. The combination of the two attributes *mode* and *time* enable you to specify edit points in any manner you choose, depending on your media and your requirements.

Table 19. Edit Element Attributes

Attribute Name	Description
mode (required)	Specifies how the time or timecode (for <i>absolute</i> and <i>relative</i> only) is applied to the head or tail of the material. Keywords: <i>absolute</i> <i>relative</i> <i>duration</i>. Example: <code><Edit mode = "relative"... /></code> <i>absolute</i> (default)—used when a timecode is present in the source; identifies the edit point relative to the timecode. If you supply a timecode but the source lacks a timecode, it is converted to a time value and utilized. <i>relative</i>—specifies an edit point measured from the beginning (in a Head) or ending (in a Tail) of the source, irrespective of the timecode (if present). <i>duration</i>— specifies an edit point measured as a length of time, from the end (in a Head) or the beginning (in a Tail) of the source. Note: You can't use <i>duration</i> in both Head and Tail in the same instance of material.
time (optional)	Specifies (by time or timecode) the location of the edit point. Drop frame, non-drop frame and time references are valid. A time is not valid when mode is set to <i>absolute</i>. A timecode is not valid when mode is set to <i>duration</i>. Examples: <pre><Edit mode = "absolute" time = "01:00:10" /> <Edit mode = "absolute" time = "01:27;10" /> <Edit mode = "relative" time = "00:00:10.000" /> <Edit mode = "duration" time = "00:00:10.600" /></pre>

Examples

This example—from the Lower Third with Text Animation composition illustrates trimming the video tail to a duration of 2 seconds.

CML

```
...
  <Sequence layer="0">
    <Segment>
      <Title align="head" adjust="edge" fill="none" layer="2"
duration="00:00:04.00" offset="00:00:01.000" font="Helvetica"
size="50pt" style="italic" weight="bold"
      foreground-color="bisque" background-color="transparent"
wrap="false" horizontal-align="left" vertical-align="middle"
layout="stretch">
        <Area top="70%" left="20%" bottom="90%" right="80%" />
        <Shadow color="gold" softness="10%" vertical-offset="6%"
horizontal-offset="6%" />
        Post Producer Titles
      </Title>
      <Image align="head" adjust="body" fill="none" layer="1"
location="\\share\path\frame-000000.png" frames="132"
duration="00:00:00.000" layout="stretch">
      </Image>
      <Video align="head" adjust="edge" fill="none" source="1"
layer="0">
        <Head>
          <Edit time="00:00:00.000" />
        </Head>
        <Tail>
          <Edit time="00:00:07.000" />
        </Tail>
      </Video>
    </Segment>
  </Sequence>
...
```

Fade

[CML Elements](#) | [CML Hierarchy Map](#)

The *Fade* element adds a duration, and smoothly interpolates between the effects (*Opacity*, *Scaling*, *Transition*, *Rotation*, *Volume*) elements specified for the *Head* and *Tail* elements and those in the *Body*. The interpolation occurs over the specified duration.

It is common to think of the term *fade* as diminishing video or audio material; in the context of CML, the term is used generally, to increase or decrease *any effect*, blending it gradually and harmoniously with the properties of the *Body*, based on the duration and shape specified.

The optional *Fade* element may be used in the *Head* and *Tail*.

If you are using *Fade* for effects other than *Volume* or *Opacity* (that is, you do not want to fade these), you must supply a volume or opacity level explicitly, because in *Head* and *Tail*, the default level for both is 0%.

Note: The duration of a fade (or group of fades) can not be longer than the duration of the element to which the fade is being applied. For example, if you fade a *Head* and *Tail* 4 seconds each on a 6-second image or clip, it will fail.

There are no child elements in a *Fade* element.

See also [Opacity](#), [Scaling](#), [Translation](#).

Attributes

These attributes may be applied to a *Fade* element.

Table 20. *Fade* Element Attributes

Name	Description
duration (optional)	The amount of time to perform the fade. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS;FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Note: If the material being faded is not video, you can only supply a time, you can not supply a timecode. Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Examples: <pre><Fade duration = "00:00:05.500"... /> <Fade duration = "00:00:05;14@29.97"... /></pre>
motion-blur (optional)	A real or integer value (range 0-10), indicating the number of intermediate steps between each frame used to generate the blur. The faster you move material using the visual effects elements (<i>Rotate</i>, <i>Translate</i>, <i>Scale</i>, <i>Opacity</i>), the larger the number should be, to smooth out DVE motion effects. For instance, if the image moves 20 pixels per frame, and you set a value of 10 (the maximum) then the blur will be generated by averaging 10 frames, each 2 pixels apart. Note: The higher the value, the longer transcoding will take.

Table 20. Fade Element Attributes

Name	Description
shape (optional)	Specifies the shape of the interpolation. Keywords: <i>linear</i> <i>s-curve</i> <i>positive-3dB</i> <i>negative-3dB</i> Default: <i>linear</i>. Example: <Fade shape = "s-curve"... /> <i>linear</i> (default)—Maintains a constant rate of change over the length of the fade. <i>s-curve</i>—Eases in and out of a fade with the midpoint at 0 dB. <i>positive-3dB</i>—Starts quickly; slowly tapers toward the end. <i>negative-3dB</i>—Starts slowly; quickly tapers toward the end.

Example

In this example the *Head* and *Tail* of the image have a one-second fade, during which the effects in each—*Scaling*, *Translation*, and *Opacity*)—are applied.

Figure 37. Using the Fade to apply affects



CML

```
...
<Sequence layer="1">
  <Segment>
    <Image align="both" adjust="body" fill="loop" layer="1"
location="//share/path/vantage-logo small.png" frames="1"
duration="00:00:15.000" offset="00:00:02.000" layout="none">
      <Head>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
      </Head>
      <Body>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
```

```
        <Opacity level="100%" />
    </Body>
    <Tail>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
    </Tail>
</Image>
</Segment>
</Sequence>
...
```

File

[CML Elements](#) | [CML Hierarchy Map](#)

The *File* element adds a fully-qualified path to a file identified by a [Source](#) or [Subtitle](#). The path identifies a file to be utilized in a [Video](#) or [Audio](#) element.

The file must be in a valid format.

The connection between the two elements is that the source value in a *Video* or *Audio* element matches the identifier value in the *Source* element.

There are no child elements in a *File* element.

Attributes

These attributes may be applied to a *File* element.

Table 21. *File* Element Attributes

Name	Description
location (optional)	Specifies the fully-qualified path to a file, including file name. The location must be accessible to the Vantage Playlist service which is executing the Conform action. Locations that can be processed directly in Conform may be specified as: • <i>Windows</i>—D:\pathname\filename.ext • <i>UNC</i>—\\share\path\filename.ext Locations that must be pre-processed by Colocate before processing in Conform may be specified as: • <i>URL</i>—http://WebServerDNSName/Folders/filename.ext • <i>URL</i>—s3://bucket/folder/filename.ext"/> (this syntax is a CML construct for use in Vantage only). • <i>Non-accessible Local Paths</i>—network-accessible AFP SMB CIFS paths that are not Vantage accessible. URL paths and non-accessible local paths that you enter in compositions must be processed by a Colocate action before processing. Files identified by URL paths are localized (using credentials you supply in Colocate Colocators), and the URL paths in the CML are replaced by the new, localized path where the file was saved. Local paths to files that are not accessible by Vantage (for example, files created by NewBlueFX, Avid, Premiere, Final Cut or other Mac OS programs) must be replaced (using a simple string find and replace function) by a share path that IS accessible to Vantage. Colocate produces a copy of the original CML with the new paths, to process in Post Producer workflows.

Note: For more information on Mac OS file processing, see [Colocate Action](#) and [Creating Compositions from Final Cut Pro 7 XML](#). For details on configuring the Colocate action, review the Colocate action man pages.

Example

This example illustrates using a *File* element to specify a file, accessed in the *Video* element via its *Source* identifier value.

CML
<Composition>

```
<Source identifier="1">
  <File location="//share/path\Mystic River Seg 1.mov" />
</Source>
<Source identifier="2">
  <File location="//share/path\3_FTD_Start at_16.21.mov" />
  <Mask left="12.5%" right="87.5%" top="0%" bottom="100%" />
</Source>
```

...

Note that the *Segment*'s video clip is referenced as *source 1*. It points to the *Source* element with an identifier attribute of value 1. The *source 1* attribute in the *Segment* ties the clip to the file specified in the *Source* element with identifier 1.

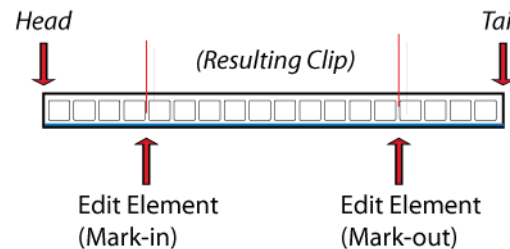
Head

[CML Elements](#) | [CML Hierarchy Map](#)

The *Head* element is the point (the first frame) of the material (or mark-in point, when using an [Edit](#)). *Heads* (and *Tails*) by default have no duration; they can represent either edge of the material.

The *Head* (like the [Body](#) and the [Tail](#)) may contain effects elements (*Opacity*, *Scaling*, *Translation*) that control the audio and video composition. If you do not supply a *Fade* duration, the effects change instantaneously with the time transition from the *Head* to the *Body*—the *Head* effects will not be applied to any video, because the *Head* and *Body* begin at the same moment.

Figure 38. The *Head* is the Beginning of the Material or the *Head's Edit* Element Value



You define a *Head* when you want to add effects on the beginning of the material.

There are no attributes in a *Head* element.

See also [Body](#), [Tail](#), [Edit](#).

Child Elements

One each of these elements may be optionally added to a *Head* or *Tail* element:

- [Edit](#)
- [Fade](#)

One each of these effects elements may be optionally added to a *Head*, *Body*, or *Tail* element:

- [Opacity](#)
- [Scaling](#)
- [Translation](#)

Example

In this example the *Head* of the image is scaled and translated to the lower right corner of the frame. Opacity is set to 0 (fully transparent for the 1 second fade).

Figure 39. Using the *Head* to size, position an image, and apply affects



CML

```
...  
<Image align="both" adjust="body" fill="loop" layer="1"  
location="//share/path/vantage-logo small.png" frames="1"  
duration="00:00:15.000" offset="00:00:02.000" layout="none">  
  <Head>  
    <Scaling x="30%" y="30%" />  
    <Translation x="80%" y="70%" />  
    <Opacity level="0%" />  
    <Fade duration="00:00:01.000" />  
  </Head>  
  <Body>  
    <Scaling x="30%" y="30%" />  
    <Translation x="80%" y="70%" />  
    <Opacity level="100%" />  
  </Body>  
  <Tail>  
    <Scaling x="30%" y="30%" />  
    <Translation x="80%" y="70%" />  
    <Opacity level="0%" />  
    <Fade duration="00:00:01.000" />  
  </Tail>  
</Image>  
...
```

Note that the body and tail have identical scaling and translation—resulting in the image displaying at exactly the same size and location for the duration.

Image

[CML Elements](#) | [CML Hierarchy Map](#)

The *Image* element is a material element which adds a raster graphic image (or a sequence of images) to a Segment. Unlike *Video* elements, an *Image* element references source files directly, via the *location* attribute.

You can add a single image, or you can add an image sequence—a series of pictures that constitutes a video clip when conformed. For example, you may have a 3-second, cartooned series of images to portray cloudy weather in a weather update promo.

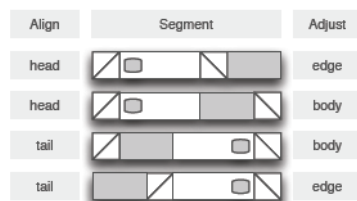
Images are typically used in two ways:

- As an overlay (branding bug, rendered title, etc., applied to an upper layer; typically smaller (or resized) so that the underlying layers are visible. Or, the image may contain an alpha channel to achieve the same goal.
- To produce full frame video at the same resolution as the output frame.

Note: Material items may logically be divided into three temporal parts: the beginning (*Head*), the middle (*Body*), and the end (*Tail*) for the purpose of changing the presentation of the material with the effect elements (*Volume*, *Scaling*, *Translation*, *Rotation*, *Fade*), and applying a *Fade* to define the temporal length of the part.

For a visual representation of the effect of *adjust* and *align* attributes on material that is temporally shorter than the segment itself, see the illustration below, depicting a material element with a *Head*, *Body*, and *Tail*.

Figure 40. *align* and *adjust* Attributes Work Together on Material Expansion



In the first row, adjustment is on the edge (which could be either the head or tail), and with alignment on the head, the entire clip is started and played normally, at the beginning of the segment.

In the second row, adjustment is on the body. Thus, the head and body (forcing the head) are aligned at the beginning, but the tail is right-aligned to the segment end and the body is stretched.

In the third row, the reverse is depicted, by aligning on the tail.

In the fourth row, the reverse of the first row is depicted, also by aligning on the tail.

Implementing Image Sequences

To implement an image sequence (create video in your output), you should add all of the images to a given directory, each named with a numerically increasing pattern. In the Image element, you only specify the file name of the image (*PartlyCloudy0001.png*, for example) that starts the sequence. Based on its based name at the start, Post Producer will attempt to determine the rest of the files in the sequence. Post Producer (without the presence of a wild card character) assumes all files in the sequence start with the same base name, and are sequentially numbered—you can't have any gaps: *PartlyCloudy0002*, *PartlyCloudy0003*, etc.

Or, you can use the asterisk (*) as a wildcard. If you supply the file name with a wildcard, Post Producer will perform an alpha-numeric sort on all the files in the folder and use them in the sequence, even if there is a gap in sequence.

The wildcard is used to specify image sequence file names that precede a fixed name, where the files may be produced by systems and workflows with naming conventions that embed the incremental component at other places in the file name. For example:

000filename.png
001filename.png
002filename.png

In this case, the wildcard would be used in this manner: **filename.png*.

Child Elements

One each of these elements may be added to apply effects or alignment:

- *Head*
- *Body*
- *Tail*

Attributes

The following attributes may be applied to an *Image* element.

Table 22. Image Element Attributes

Name	Description
adjust (optional)	When the material's duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Image adjust = "body" ... /></code>
align (optional)	Specifies which end (or both) of the material to anchor to the timeline of the segment, when the duration of the material is less than the duration of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <code><Image align = "tail" ... /></code> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the Head and Tail are equidistant from the beginning and end of the segment. Note: If an offset is used in this situation, it is also applied to both ends.

Table 22. Image Element Attributes

Name	Description
duration (optional)	The amount of time to display the image. Default: 0. If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: Note: Timecodes are obviously not applicable for images, because there is no timecode. When processing, the Conform action will report an error and fail. Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (: ;FF) as DF (:) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Examples: <pre><Image duration = "00:00:05.500"... /> <Image duration = "00:00:05;14@29.97"... /></pre>
fill (optional)	When the duration of the material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> <i>hold</i> <i>loop</i>. Example: <code><Image fill = "loop"... /></code> <i>none</i> (default)—extend with empty media (no visual or auditory material). <i>hold</i>—continue playing the first or last frame to play the material the entire duration of the segment. If <i>align="head"</i>, the last frame is repeated. If <i>align="tail"</i>, the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.

Table 22. Image Element Attributes

Name	Description
frames (optional)	An integer (default=1), which specifies the number of frames in the image sequence. Example: <code><Image frames = "60" ... /></code> If there are more images in the folder than you want to use in a given instance (Image), you can specify the first frame you want to use (by file name) in the <i>location</i> attribute, and then limit the number to use in the sequence with the <i>frames</i> attribute. You should use a numerical file naming sequence that Post Producer can discern (for example 00001.png, 0002.png, etc.,) so that your sequence will be successful. For templates, however, there may be an unknown number of frames; in that case only the numerical sequence is used.
layer (optional)	An integer value describing the ordinal position in the composite of all material in this segment. Default: 0. Example: <code><Image layer = "3" ... /></code> Material with a lower layer value may be obscured by material with a higher layer value in the same segment. You should supply a layer value higher than the video layer—by default, layer is 0; thus, the video will obscure the graphic.

Table 22. Image Element Attributes

Name	Description
layout (optional)	Specifies the method used to alter the image to the target dimensions prior to applying any Scaling effects. Default: <i>none</i>. Keywords: <i>none</i> <i>center</i> <i>tile</i> <i>zoom</i> <i>fill</i> <i>stretch</i>. Example: <code><Image layout = "zoom" . . . /></code> <i>none</i>—The image is top-left aligned to the target area. Any unused target area is masked. Usually, when you overlay an image using <code>layout = none</code>, you are layering a smaller image on top of the main video/image. If you are not applying any effects (scaling, rotation etc.), the image is composited at the source image size unless you set the <code>compose</code> attribute to <i>output-size</i>. If effects are applied, the compositing is performed at the output size. The size used by the conforming process is reported back to you using the <code>compose</code> attribute. <i>center</i>—The image is centered within the target area while maintaining the source size and aspect ratio. Any unused target area is masked. <i>tile</i>—The image is tiled across the target area maintaining the source size and aspect ratio. Any unused source area is cropped. <i>zoom</i>—The image is resized to fill the closest dimension of the target area while maintaining the source aspect ratio. Any unused target area is masked. This results in underfill when the target and material are not of the same aspect ratio. <i>fill</i>—The image is resized to fill both dimensions of the target area while maintaining the source aspect ratio. Any unused source area is cropped. This results in overfill when the target and material are not of the same aspect ratio. <i>stretch</i>—The image is resized to completely fill the target area.

Table 22. Image Element Attributes

Name	Description
location (optional)	Specifies the fully-qualified path to the image (or first image) file, including file name. The location may be specified as: <i>Local Drive Letter</i>—D:\pathname\filename.ext <i>UNC</i>—\\share\path\filename.ext <i>URL</i>—http://SierraStudio.com/media/Vane_logo.png <i>URL</i>—s3://aws/bucket/folder/moms_on_strike.mpg"/> CML with URL paths must be processed by a Compose action to localize the file and produce a copy of the CML to process in Post Producer transcoding actions. The location must be accessible to the Vantage Playlist service which is executing the Conform action. Example: <Image location = "\\share\path\PartlyCloudy0001.png" . . . /> The image(s) may be in png, jpeg, bmp or psd format.
offset (optional)	The amount of time to wait from the beginning of the segment, to display the material. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <Image offset = "00:00:05.000" . . . />

Example—Single Image

This example—from the Branding Graphic Layer composition (for details, see)—illustrates using an *Image* element in a composition to display a small Vantage logo in the lower right corner of the video for 15 seconds, with fade effects.

Figure 41. Use the *Image* Element to display raster graphic files.



CML

```
...
<Sequence layer="1">
  <Segment>
    <Image align="both" adjust="body" fill="loop" layer="1"
location="//share/path/vantage-logo-small.png" frames="1"
duration="00:00:15.000" offset="00:00:02.000" layout="none">
      <Head>
        <Scaling x="30%" y="30%"/>
        <Translation x="80%" y="70%" />
        <Opacity level="0%"/>
        <Fade duration="00:00:01.000"/>
      </Head>
      <Body>
        <Scaling x="30%" y="30%"/>
        <Translation x="80%" y="70%" />
        <Opacity level="100%"/>
      </Body>
      <Tail>
        <Scaling x="30%" y="30%"/>
        <Translation x="80%" y="70%" />
        <Opacity level="0%"/>
        <Fade duration="00:00:01.000"/>
      </Tail>
    </Image>
  </Segment>
</Sequence>
...
```

Example—Image Sequence

This example—from the Lower Third With Text composition (for details, see)—illustrates the use of an image sequence to create a lower third title.

Figure 42. Creating a Lower Third with an Image Sequence



CML

```
...
<Image align="head" adjust="body" fill="none" layer="1"
location="//share\path\frame-000000.png" frames="132"
duration="00:00:00.000" layout="stretch">
</Image>
...
```

The first file of the image sequence is identified with a count of the total image sequence (using the *frames* attribute). The *duration* of the entire sequence can be set to a desired value. Specify 00:00:00:00 to output one frame per image, at the frame rate of the output video.

The *fill* attribute may be used to extend the duration of the image sequence by looping the entire sequence or replaying the final frame.

Adjusting the Edge will prevent the application of any effects (opacity, scale, translation and rotation). If this is desired, then adjust the *Body*.

Example—Image Sequence with Wildcard

In this example, a wild card (***_iah.jpg**) is used in the *Image* element's file name reference (bold):

CML

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="0">
    <File location="//share\path\Radar.wav" />
  </Source>
  <Sequence>
    <Segment>
      <Audio fill="hold" source="0">
```

```
<Head>
  <Edit mode="absolute" time="00:00:00.000" />
</Head>
<Tail>
  <Edit mode="absolute" time="00:00:10.000" />
</Tail>
</Audio>
<Image fill="loop"
location="//share/path/Wx_Image_Sequence\*_iah.jpg" frames="35"
duration="00:00:03.917" />
</Segment>
</Sequence>
</Composition>
```

The settings for implementing image sequences:

1. The first image of the sequence.
2. The total number of images in the sequence.
3. The length in time of the sequence. This may be specified or you can use the default of frame count * the output frame rate.

For example, you can provide 40 frames and then specify a 4-second duration—Post Producer will play each file the proportionate number of frames for 4 seconds, to play it out correctly. If you don't specify a duration, the frames are played out at the output frame rate specified in the encoder settings in the Conform action.

Note: For a practical example of an Image sequence, see Basic Image Overlays in the Composition Cookbook.

Mask

[CML Elements](#) | [CML Hierarchy Map](#)

To specify *Mask* frame—a rectangle within the output frame in which to present material—add a *Mask* element to the [Source](#) element that identifies the instance. (The *Mask* element is optional; one may be added per *Source*.)

The *Mask* element resizes the source frame (which may have already been cropped) to fill the *Mask* frame, not the output frame. The space beyond the mask (typically pillars or bars) is filled with the fill color specified.

Mask is commonly used for filling space when converting content of 4x3 aspect ratio to output with a 16x9 aspect ratio. The *Mask* element is also commonly used in conjunction with a [Crop](#) element.

The *Mask* frame is defined relative to the dimensions of the output frame. Positive values originate from the top, left corner. Negative values originate from the bottom, right corner.

The *Mask* values can be specified as a ratio (no designator), fraction (in {}), percent (%), or pixels (px). Pixels are useful if the output resolution will be constant for all output. Percent (or ratio) is useful if the aspect ratio remains constant, but the resolution is likely to change.

There are no child elements in a *Mask* element.

See also [Crop](#).

Attributes

These attribute values may be specified by a units designator: pixels (px), ratio, fraction 9 (in {}), or percent (%). If you do not specify a designator, you are specifying a ratio. For example, *bottom*="0.222" is the same as specifying *bottom*="22.2%". Values may be integers or decimal numbers.

Table 23. *Mask* Element Attributes

Name	Description
bottom (optional)	Specifies the bottom edge of the frame. Example: <Mask bottom="480px" . . . />

Table 23. *Mask* Element Attributes

Name	Description
color (optional)	Keywords: <i>transparent</i> <i>black</i> <i>white</i> <i>ARGB value</i> The default keyword is <i>black</i>. Example: <code><Mask color="#FFA2A4A6"... /></code> The supported colors are defined in .NET For details, see the Color Structure. <i>ARGB</i>—The RGB + Alpha color, in 0xAARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 0x00 represents a pixel that is fully transparent and 0xFF is fully opaque.
left (optional)	Specifies the left edge of the output frame. Example: <code><Mask left="0"... /></code>
right (optional)	Specifies the right edge of the output frame. Example: <code><Mask right="-12.5%"... /></code>
top (optional)	Specifies the top edge of the output frame. Example: <code><Mask top="0px"... /></code>

Mix

[CML Elements](#) | [CML Hierarchy Map](#)

You apply a *Mix* element to a [Source](#) element to map and mix audio channels from the source file into the output file. For example, a single master file with 10 stereo language tracks might be used in 10 separate source definitions in the composition. Each language-specific *Source* instance would contain the same video, with a different set of audio channels that are moved to the output file using the *Mix* element.

Both mixing and routing may require that you set up and configure the Channel Map filter in the Conform action.

There are no child elements in a *Mix* element.

Note: For a practical example of typical audio mixing applications, see [Mixing Audio](#) in the [Composition Cookbook](#).

See also [Route](#).

Attributes

These attributes may be applied to a *Mix* element.

Table 24. Mix Element Attributes

Name	Description
level (optional)	A numeric value (default: 1), specifying the level in unit gain, in percent (%) (default) or decibels (dB). Examples: <pre><Mix level=".707"... /> <Mix level="3dB"... /></pre>
phase (optional)	A numeric value specifying the phase shift in degrees. (The degree symbol is not required.) A negative number rotates clockwise, and a positive number rotates counter-clockwise. The default value is 0.0 degrees. Example: <code><Mix level="-90"... /></code> Phase may be used to implement surround sound matrix encoding (+/-90°) or to correct phase inversions (+/-180°).

Table 24. Mix Element Attributes

Name	Description
source (required)	Specifies the channel number (as an integer) or other channel identifier key word, of the input audio track or tracks. Keywords: <i>None</i> 1 through 32 <i>All</i> Example: <Mix source="1 2" ... /> Combine multiple channels by separating them with a space. You can also specify <i>None</i> or <i>All</i>, as defined below. <i>None</i>—use to specify no channels. 1...32—the channel number. <i>All</i> (default)—use to specify all channels.
target (required)	Specifies the channel number (as an integer) or other channel identifier key word, of the output audio track or tracks. Keywords: <i>None</i> 1 through 32 <i>All</i> Example: <Mix source="1 2" ... /> Combine multiple channels by separating them with a space. You can also specify <i>None</i> or <i>All</i>, as defined below. <i>None</i>—use to specify no channels. 1...32—the channel number. <i>All</i> (default)—use to specify all channels.

Example

This example is from the Multiple Languages composition (for details, see [Post Producer Composition Examples](#)).

It is necessary to map the channels to the output for wrapping of the final encoded output. Metadata labels for channels (Left/Right), language (French, German) are defined in the Channel Map filter and the stream settings of the Conform action.

CML

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/path/Master.mov"/>
    <Mix source="1 2" target="1 2" level="0%"/>
  </Source>
  <Source identifier="2">
<!-- English -->
    <File location="//share/path/Master.mov"/>
    <Mix source="1 2" target="1 2" level="0.707"/>
    <Mix source="3" target="1" level=".9"/>
    <Mix source="3" target="2" level=".9"/>
  </Source>
```

```

<Source identifier="3">
  <!-- French -->
    <File location="//share/path/Master.mov" />
    <Mix source="1 2" target="3 4" level="0.707"/>
    <Mix source="4" target="3" level=".9"/>
    <Mix source="4" target="4" level=".9"/>
</Source>
...
<!-- stereo audio in video source and 10 VO's. -->
<!-- Map source mono track to a track in the output file. -->
<!-- Channel map must be set in the Compose action in workflow. -->
<Sequence layer="1">
  <Segment>
    <Video source="1"/>
    <Audio align="head" source="2" />
    <Audio align="head" source="3" />
    <Audio align="head" source="4" />
    <Audio align="head" source="5" />
    <Audio align="head" source="6" />
    <Audio align="head" source="7" />
    <Audio align="head" source="8" />
    <Audio align="head" source="9" />
    <Audio align="head" source="10" />
    <Audio align="head" source="11" />
  </Segment>
</Sequence>
</Composition>

```

Opacity

[CML Elements](#) | [CML Hierarchy Map](#)

One *Opacity* element may optionally be added to a *Body*, *Head*, or *Tail*.

The *Opacity* element specifies the degree to which items behind it (as indicated by the *layer* attribute) it can be viewed—its transparency.

For practical purposes, the default *Opacity* value in a *Body* element is 100%, while in the *Head* and *Tail*, it is 0%. This makes it easy to apply a *Fade*, and its duration must be greater than 0. If you are using *Fade* for effects other than fading the opacity to 0 (that is, you do not want to fade the opacity—or you want a partial fade), you must supply an opacity level explicitly.

There are no child elements in an *Opacity* element.

See also [Volume](#), [Scaling](#), [Translation](#), [Rotation](#), [Fade](#).

Attributes

This attribute must be applied to an *Opacity* element.

Table 25. *Opacity* Element Attributes

Name	Description
level (required)	An integer or decimal number representing the relative opaqueness (where 0 is fully transparent and 100 is fully opaque), expressed as a ratio (no designator) or percent (%) of the original material. Example: <code><Opacity level="50%" /></code> Default (in <i>Head</i> and <i>Tail</i> elements): 0%. Default (in <i>Body</i> elements): 100%.

Example

In this example—from the Branding Graphic Layer composition (for details, see)—a Vantage logo is placed over a video, and *Opacity* is used to fade the logo in and out.

Figure 43. Using *Opacity* in the *Head*, *Body*, and *Tail* to Create Visual Fades



By setting *Opacity* to zero in the *Head* and *Tail*, and 100% in the *Body*, the logo fades in and out over the course of the video.

CML

```
...
<Sequence layer="1">
  <Segment>
    <Image align="both" adjust="body" fill="loop" layer="1"
location="//share/path/vantage-logo-small.png" frames="1"
duration="00:00:15.000" offset="00:00:02.000" layout="none">
      <Head>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
      </Head>
      <Body>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="100%" />
      </Body>
      <Tail>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
      </Tail>
    </Image>
  </Segment>
</Sequence>
...
```

Processor

[CML Elements](#) | [CML Hierarchy Map](#)

The *Processor* element is a named reference to a specific set of Conform or Tempo action processor settings, which are created, named, and configured directly in the Conform or Tempo action(s) in the target workflow. Processors enable extended or customized media processing on files.

Processors can be added to an action and configured to perform special processing, on a file-by-file basis. For example, you can add a Video Processor to an input file that has specific decoding requirements for audio and video, such as frame rate conversion, Telecine or inverse Telecine, and other pre-processing filters. You can also add an Advanced Title Processor to add animated text and transitions to a composition, such as rendering of 2D/3D animated title sequences. The Advanced Title Processor uses the Titler Engine which implements NewBlueFX Titler Pro. Processors are implemented as appropriate in the Conform and Tempo actions and may not be available in both.

To use a processor in a given file (or job, in a single-file composition), you must specify the processor (for example, *CS_601_BeforeGamma*) by name in the Source of your composition, as shown in the example below.

There are no child elements in a *Processor* element.

Attributes

These attributes may be applied to a *Processor* element.

Table 26. Processor Element Attributes

Name	Description
template (required)	The name of the processor template (as defined in the target Conform or Tempo action) to use for applying the specialized processing to this file. Example: <code><Processor template="Telecine" /></code>

Example

This example illustrates the use of a *Processor* element, which specifies how a Telecine file should be decoded when processed by a Conform action, by specifying *Telecine*, which contains the decoding and pre-processing requirements specified in the Conform action.

CML

```
<Source identifier="1">  
  <File location="//share/path/speed_racer.mov" />  
  <Processor template="Telecine" />  
</Source>
```

Rotation

[CML Elements](#) | [CML Hierarchy Map](#)

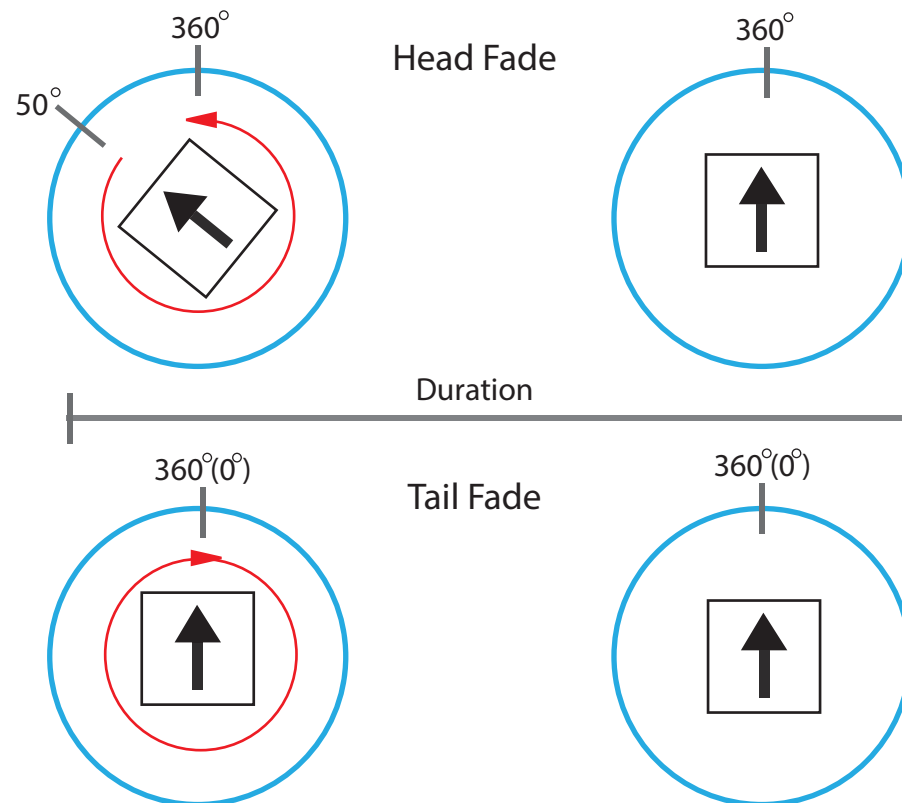
One *Rotation* element may optionally be added to a *Head*, *Body*, or *Tail*. The material (any visual element) rotates as specified, during the Head or Tail duration. It does not rotate during the Body duration, because a Fade is not permitted in a Body. During a Head Fade, the material displays at the specified degree in the Head and then rotates to the specified degree in the Body; during a Tail Fade, it rotates from the specified degree in the Body to the specified degree in the Tail.

Note: Although the Z value represents a point on the circle, a value greater than 360 requires additional trips around to achieve the same point. Thus, 720 is straight up just as 360 is, but with two trips around required, to arrive at the same point. Thus Z is simultaneously used as a point and as a distance.

You can use Rotate to rotate material on the Z axis for the duration of the fade. A relative increase in the rotation value rotates the material counter clockwise, a relative decrease in the rotation value rotates the material clockwise.

In this illustration, an image of an arrow pointing up is rotated in the head and tail: 50 to 360, and then from 360 to 0.

Figure 44. Rotating an Arrow with Tail 50 Body 360 Tail 0



In the Head (Z value = 50), the arrow is presented at 50 degrees and rotated counterclockwise to 360 degrees (Body Z value = 360). In the Tail (Z value = 0), the arrow is presented at 360 degrees and rotated clockwise one full turn back to 0 degrees.

For Rotate to be of practical value the *Fade* element must be present in the *Head* or *Tail* element, and its duration must be greater than 0.

There are no child elements in a *Rotation* element.

See also [Volume](#), [Opacity](#), [Scaling](#), [Translation](#).

Calculating Rotation Distance and Direction

To determine the rotation distance (the number of turns or amount of a partial turn), and the direction of the spin, use this formula and rule:

The rotation value = Target – Source. A negative rotation value rotates material clockwise; a positive rotation value rotates material counterclockwise.

In a Head fade, the Head Z value is the source; the target is the Body Z value. In a Tail fade, the Body Z value is the source; the Tail Z value is the target.

Examples

Rotate may be difficult to grasp in theory. Here are some examples to help you understand it in practice.

Counter-Clockwise Rotation

At the beginning of a video, you want a Head transition where the material rotates twice counter-clockwise. You specify a positive Body Z value of 720 greater than the Head Z value. For example: Head Z value = 0 and Body Z value = 720. $720 - 0 = 720$. Thus, the material rotates 2 full turns from 0 degrees, counter-clockwise.

Clockwise Rotation

At the end of the video, you want a Tail transition where the material rotates twice clockwise. You specify a Tail Z value of 720 less than the Body Z value. Tail Z value = 720 and Body Z value = 0. $0 - 720 = -720$. Thus, the material rotates 2 full turns from 0 degrees, clockwise.

Random Rotations

These examples are presented primarily as math problems, just to drill home how to apply the rule:

Scenario One

Head = 50; Body = 360

$360 - 50 = 310$. Thus, the image rotates counterclockwise from the presentation point of 50 degree (NW) to 360 (which is the same as the 0 point).

Scenario Two

Head Z = 50; Body = 0
 $0 - 50 = -50$. Thus the image rotates clockwise from 50 to 0.

Scenario Three

Body 360; Tail = 0
 $0 - 360 = -360$; thus the image rotate clockwise 360 degrees—one full turn.

Scenario Four

Body 360, Tail 360
 $360 - 360 = 0$; the image does not rotate.

Scenario Five

Body 360, Tail -360
 $-360 - 360 = -720$ = thus the image rotates clockwise 2 full turns

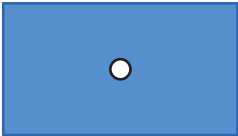
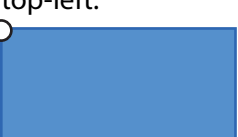
Attributes

These attributes may be applied to a *Rotation* element.

Table 27. *Rotation* Element Attributes

Name	Description
z (optional)	The amount of rotation on the Z axis. Negative values rotate clockwise; positive values rotate counter-clockwise. Default: 0 degrees. The unit of measure is in degrees. Example: <Rotation z="360"... />

Table 27. *Rotation* Element Attributes

Name	Description
center (optional)	Keyword: the point on the image that is the center of rotation; the point about which the image will move when the rotation occurs. Default: top-left. center bottom-left bottom-right top-right top-left top-right. Example: <Rotation center="bottom-left"... /> center:  bottom-left:  bottom-right:  top-right:  top-left: 

Example

This example—from the Alpha Channel with Animation composition (for details, see [Post Producer Composition Examples](#))—illustrates the application of a typical set of effects on an image, including scaling, translation, and opacity.

Figure 45. Transforming an Image



CML

```
...
<Image align="head" adjust="edge" fill="loop" layer="1"
location="//share\path\alpha channel.png" duration="00:00:04.000"
frames="1" layout="none" >
  <Head>
    <Fade duration="00:00:02.000"/>
    <Scaling x="100%" y="100%" />
    <Rotation z="0" center="center" />
    <Opacity level="100%" />
  </Head>
  <Body>
    <Scaling x="20%" y="100%" />
    <Rotation z="20" center="center" />
    <Opacity level="100%" />
  </Body>
  <Tail>
    <Scaling x="100%" y="100%" />
    <Rotation z="0" center="center" />
    <Opacity level="100%" />
    <Fade duration="00:00:02.000"/>
  </Tail>
</Image>
...
```

Route

[CML Elements](#) | [CML Hierarchy Map](#)

You add a *Route* element to a [Source](#) to map audio tracks from the input file in the associated [File](#) to other tracks in the output file. Unlike the *Mix* element, the *Route* element does not decode the audio.

Note: When routing tracks other than 1 or 2, tracks 1 and 2 must explicitly be mixed at a level of 0 (`<Mix source="1 2" target="1 2" level="0"/>`) in addition to your intended *Route* elements.

Both mixing and routing may require that you set up and configure the Channel Map filter in the Conform action.

The *source* and *target* attributes are required in a *Route* element.

There are no child elements in a *Route* element.

Note: For a practical example of typical audio routing applications, see Routing Audio Without Decoding in the Post Producer Cookbook.

See also [Mix](#).

Attributes

These attributes may be applied to a *Route* element.

Table 28. *Route* Element Attributes

Name	Description
source (required)	Specifies the channel number (as an integer) of the input audio track. Default: "". Keywords: null 1 through 32 All Example: <code><Route source="1 2" ... /></code> Combine multiple channels by separating them with a space. You can also specify "" (empty string) or All, as defined below. null (""-empty string) (default)—use to specify no channels. 1...32—the channel number itself. May be combined, separated by spaces. All—use to specify all channels.

Table 28. Route Element Attributes

Name	Description
target (required)	Specifies the channel number (as an integer) of the output audio track. Default: "". Keywords: <i>none</i> 1 through 32 <i>All</i> Example: <Route target = "1"... /> Combine multiple channels by separating them with a space. You can also specify <i>none</i>— "" (empty string) or <i>All</i>: <i>none</i>—use to specify no channels. <i>1...32</i>—the channel number itself. May be combined, separated by spaces. <i>All</i>—use to specify all channels.
order (optional)	If multiple Route elements are present, specifies (by an integer) the order of this route relative to other routes targeting the same channels. Default: 0. Example: <Route order = "4"... /> This value determines the order in which routes to the same target channel are resolved. The route with the lowest number takes precedence.

Example

This example illustrates how audio in track 5 and 6 are placed in output track 1 and 2 without decoding the audio, by utilizing a *Route* element.

CML

```
...
<Source identifier="2"> <!-- English -->
  <File location="//share/path/Master_DolbyE_Stereo_German.mov"/>
    <Route source="5 6" target="1 2"/>
  </Source>
...
```

Scaling

[CML Elements](#) | [CML Hierarchy Map](#)

One *Scaling* element may be added optionally to a [Body](#), [Head](#), or [Tail](#). By default, if the source is Video, it is scaled to 100 percent of the target frame size. If it is an Image, it is scaled according to the [Image](#)'s layout attribute keyword: zoom or stretch, for example.

Add a *Scaling* element when you want to change the display dimensions of visual material. Adjustment is made from the origin, at the upper left corner.

You can adjust the vertical and horizontal dimensions independently, by ratio, percent or pixels. Values greater than the original size will stretch the size of the image beyond the boundaries of the target frame size, and smaller values will shrink it. For example, x=20% will reduce the horizontal display rectangle to 1/5 of the target frame size.

If you don't supply a *Scaling* element, will be stretched if necessary to fit in the target frame size.

For this effect to be of practical value in a *Head* or *Tail* element, the *Fade* element must be present, and its duration must be greater than 0.

The *Scaling* element is often used in conjunction with the [Translation](#). Use a [Fade](#) to create animation.

There are no child elements in a *Scaling* element.

See also [Volume](#), [Opacity](#), [Translation](#), [Rotation](#).

Attributes

These attributes may be applied to a *Scaling* element. Although both x and y are optional, if neither were supplied, the *Scaling* element as defined would be of no practical value.

Table 29. Scaling Element Attributes

Name	Description
x (optional)	Specifies the change in the horizontal dimension of the display rectangle of the visual material, as pixels (px), percent (%), or ratio (no unit designator). Example: <Scaling x="200%" y="200%"/>
y (optional)	Specifies the change in the vertical dimension of the display rectangle of the visual material, as pixels (px), percent (%), or ratio (no unit designator). Example: <Scaling x="2" y="2"/>

Example

In this example an *Advisory* image (the default image—thus, not specified) is scaled to twice its original size. A percent is used here; but a ratio (of 2) could also be used. The result is the same in both cases.

Figure 46. Using *Scaling* to Resize an Image in the Output Frame



CML

```
...
<Video align="head" adjust="edge" fill="none" source="1" layer="0"
>
  <Head>
    <Edit time="00:00:30.00" />
    <Scaling x="100%" y="100%" />
    <Translation x="0%" y="0%" />
    <Opacity level="100%" />
    <Fade duration="00:00:05.00" />
  </Head>
  <Body>
    <Translation x="0" y="0%" />
    <Scaling x="50%" y="100%" />
    <Opacity level="100%" />
  </Body>
  <Tail>
    <Edit time="00:00:45.00" />
    <Opacity level="100%" />
    <Scaling x="0%" y="100%" />
    <Fade duration="00:00:05.00" />
  </Tail>
</Video>
...
```

If you were to use a pixel designator (*px*), you'd have less flexibility in uniformly applying this attribute to images of varying sizes: Adding 10 pixels to a 100 pixel image would increase its size by 10 percent, but adding 10 pixels to a 200 pixel image would only increase it by 5 percent.

Note also, that when using a ratio or a percent, the use of the same but negative value does not have the directly opposite effect. For example: To double the size of an image, you would increase it by a ratio of 2 or 200%; but to reduce the size of an image by half, you would decrease it by a ratio of 0.5, or 50%.

Segment

[CML Elements](#) | [CML Hierarchy Map](#)

One or more *Segment* elements may be added to a *Sequence*. A *Segment* is comprised of material items (video, audio, titles, graphics, etc.). A *Segment* may also contain one or more *Sequences*, which allows a single material item to span a sequence of other material items.

The duration of a *Segment* is determined by the duration of the longest item (including any offset applied to that item).

Child Elements

Optionally, one each of these material elements may be added to a *Segment*:

- *Advisory*

Optionally, a *Sequence* may also be added to a *Segment* to create an independent timeline for additional segments. The *Sequence* and *Segment* elements are the only recursive elements in CML.

Attributes

These attributes may be applied to a *Segment* element.

Table 30. *Segment* Element Attributes

Name	Description
identifier (optional)	A user-assigned SCTE-35 ID for this segment. May be a description or an ad insertion ID, for example.

Table 30. *Segment* Element Attributes

Name	Description
instructions (optional)—Conform action only	Keywords applied to segments for stream conditioning. They specify how Conform should insert I-frames for VOD DAI, regarding placement of keyframes and splice points to support Black Arrow dynamic ad insertion specifications. Multiple keywords permitted, separated by a space. Chronicle instructions (below) are ignored in Conform; they are passed through Conform into the As Run CML output. Keywords: <i>clear-captions</i> <i>keyframe</i> <i>keyframe splice</i> <i>keyframe splice-end</i> <i>keyframe splice splice-end</i> Example: <Segment instructions="keyframe splice"/>. <i>clear-captions</i>—Clears buffered captions from the previous segment, preventing captions for the previous segment from being displayed in the current segment, in case an out point was set in the CML before the embedded captions are cleared automatically. This is useful when changing source files or removing content between segments. <i>keyframe</i>—instructs the x264 encoder to insert an IDR frame; the MPEG-2 encoder to add black frames to complete the GOP of the CURRENT segment. <i>keyframe splice</i>—instructs the x264 encoder to insert an IDR frame; the MPEG-2 encoder to add black frames to complete the GOP of the PREVIOUS segment, so that the segment containing the tag is aligned to an IDR/I-frame, inserted at the START of the segment. The CSV file output from the Chronicle action will list a single frame as the stop and start point for ad insertion. <i>keyframe splice-end</i>—instructs the x264 encoder to insert an IDR frame; the MPEG-2 encoder to add black frames to complete the GOP of the SELECTED segment, so that the segment containing the tag is aligned to an IDR/I-frame, inserted at the END of the segment. The CSV file output from the Chronicle action will list separate stop and start points at the start and end of the segment. DAI enabled systems will skip the content segment. <i>splice</i>—adds an SCTE-35 dynamic ad flag to the output stream. This flag is tagged with an ID that is passed with the SCTE-35 location to the transport stream output. <i>keyframe splice splice-end</i>—the x264 encoder inserts an IDR frame; the MPEG-2 encoder adds black frames to complete the last GOP of the PREVIOUS and SELECTED segments and an IDR/ I-frame is inserted at the END of BOTH segments.

Table 30. *Segment* Element Attributes

Name	Description
instructions (optional)—Chronicle Action Only (for use in VOD DAI applications)	These keywords define the behavior of the Chronicle Action for proper alignment of the fields when creating the output CSV file. Keywords: <i>avail</i> <i>local</i> <i>midroll</i> <i>next</i> <i>postroll</i> <i>preroll</i> <i>avail</i> <i>local</i>—flags for local spots; either term may be used. The keywords set flags to be processed by a Chronicle action that follows Conform in a workflow, and passed to the Chronicle action as part of VOD Producer DAI workflows. Alignment within a Canoe CSV output from the Chronicle action is determined by the <i>preroll</i> <i>midroll</i> <i>postroll</i> keywords.
time (As Run)	As Run attribute. This is the starting time of the segment in the output file, after the composition has been conformed. This value is set by the Conform action and inserted in the As Run composition by the Chronicle action, and should not be set by you.
transcode (As Run)	As Run attribute. This attribute advises if this segment was direct converted or not. This value is set by the Conform action and inserted in the As Run composition by the Chronicle action, and should not be set by you.

Example

This example illustrates the use of a *Segment* in a composition: simply as a container for one or more instance of media.

CML

```
...
<Sequence layer="1">
  <Segment>
    <Image align="both" adjust="body" fill="loop" layer="1"
location="//share/path/vantage-logo-small.png" frames="1"
duration="00:00:15.000" offset="00:00:02.000" layout="none">
      <Head>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
      </Head>
      <Body>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="100%" />
      </Body>
      <Tail>
        <Scaling x="30%" y="30%" />
        <Translation x="80%" y="70%" />
        <Opacity level="0%" />
        <Fade duration="00:00:01.000" />
      </Tail>
    </Image>
  </Segment>
</Sequence>
...
```

Sequence

[CML Elements](#) | [CML Hierarchy Map](#)

You can add one or more *Sequence* elements to a *Composition*, or as sub-sequences, to a *Segment*. You add a *Sequence* when you need to establish a separate, independent timeline in your composition, upon which to place segments of material.

Child Elements

One or more *Segments* may be added to a *Sequence* element. *Sequence* and *Segment* elements are the only recursive elements in CML.

Attributes

The layer attribute may be applied to a *Sequence* element.

Table 31. *Sequence* Element Attributes

Name	Description
layer (optional)	An integer value describing the ordinal position in the composite of all material in this segment. Default: 0. Example: <Sequence layer = "10" ... /> Material in a lower layer sequence may be obscured by material in a higher layer sequence.

Example

A *Sequence* is always used to organize media on an independent timeline, with one or more *Segment* elements, which contain the media. It's often used to combine multiple material elements.

CML

Shadow

[CML Elements](#) | [CML Hierarchy Map](#)

One *Shadow* element can optionally be added to a *Title* to apply a shading effect to your title text. The shadow is a replication of the *Title* text using the same attributes, but offsetting the text, applying a different color, and adjusting opacity through the softness attribute.

There are no child elements in a *Shadow* element.

Note: For a practical example of adding a shadow to a title, see Adding Titles in the Composition Cookbook.

See also [Title](#), [Area](#).

Attributes

These attributes may be applied to a *Shadow* element to control shading.

Table 32. Shadow Element Attributes

Name	Description
color (optional)	This is the color that the shadow is rendered in. Keywords: <i>transparent</i> <i>black</i> <i>white</i> <color> ARGB Default: <i>black</i>. Supported color names are defined in .NET. See Color Structure. Example: <Shadow color="10" ... /> ARGB—The RGB + Alpha color, in 0xAARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 0x00 represents a pixel that is fully transparent and a value of 0xFF is fully opaque.
horizontal-offset (optional)	Specifies the horizontal offset of the shadow, as pixels (px), percent (%), or ratio (no unit designator). Positive numbers adjust the shadow text to the right. Default: 4 px. Example: <Shadow horizontal-offset="10px" ... />

Table 32. Shadow Element Attributes

Name	Description
softness (optional)	Specifies the relative blurriness of the shadow as a ratio or percent. Larger numbers increase softness. Default: 0.5 (50%). Example: <Shadow softness="10%" ... /> The value may be an integer or real number to 3 digits, as a ratio (no unit designator) or percent (%).
vertical-offset (optional)	Specifies the vertical offset of the shadow, as pixels (px), percent (%), or ratio (no unit designator). Positive numbers adjust the shadow text downward. Default: 4 px. Example: <Shadow horizontal-offset="20px" ... />

Example

In this example—from the Lower Third with Text composition (for details, see [Post Producer Composition Examples](#))—a *Title* is applied, with every attribute, including an *Area* and *Shadow* element (*Shadow* highlighted).

CML

```
...
<Title align="head" adjust="edge" fill="none" layer="2"
duration="00:00:04.00" offset="00:00:01.000" font="Helvetica"
size="50pt" style="italic" weight="bold"
  foreground-color="bisque" background-color="transparent"
wrap="false" horizontal-align="left" vertical-align="middle"
layout="stretch">
  <Area top="70%" left="20%" bottom="90%" right="80%" />
  <Shadow color="gold" softness="10%" vertical-offset="6%"
horizontal-offset="6%" />
  Post Producer Titles
</Title>
...
```

Note that the value of the *Title* is not specified in an attribute. It is specified as the text of the element.

Source

[CML Elements](#) | [CML Hierarchy Map](#)

One or more *Source* elements may be added to a *Composition*. *Source* elements by convention are the first elements in a composition, because it is helpful to know the file you’re targeting, and it is common to change the file names each time a job is run.

You add one *Source* element for each file you want to identify, to be used as material in a *Video*, *Audio*, and *Image* element.

Child Elements

These optional elements may be added to a *Source* element. Elements with a limit (1 only) may be used multiple times.

- [File](#)
- [Subtitle](#)

Attributes

These attributes may be applied to a *Source* element.

Table 33. *Source* Element Attributes

Name	Description
identifier (required)	An integer value, which must be unique among all <i>Source</i> elements. Example: <Source identifier="1"> This identifier value is used in the <i>source</i> attribute of elements to reference this specific file.
timecode (optional)	Keyword to specify which type of timecode to read from the file. Default: <i>none</i>. Example: <Source timecode="vitc1"> Keywords: <i>none</i> <i>ltc</i> <i>vitc1</i> <i>vitc2</i> <i>none</i>—timecode is derived from the source file container (for example: Header Timecode.) If the source does not have header timecode, the Conform action assumes that the first frame starts at 00:00:00:00. <i>ltc</i>—use timecode flagged as longitudinal timecode <i>vitc1</i>—use timecode flagged as VITC line 1 <i>vitc2</i>—use timecode flagged as VITC line 2 Note: VITC timecodes are not the same as timecode from VBI.

Example

This example illustrates the typical use of a *Source* element to reference an input file being used in a video instance in one of the segments in the composition.

CML

Subtitle

[CML Elements](#) | [CML Hierarchy Map](#)

Optionally, you can add one or more *Subtitle* elements to a [Source](#). The *Subtitle* element optionally uses a *File* element to associate the source media file with a closed caption (.scc) file. If the media and the SCC file are not already timecode-aligned, they can be aligned in the composition directly, using the *offset* parameter.

SCC file supported frame rates: 23.976, 29.970, and 59.94 fps.

Only one subtitle file can be played at a time; when multiple files (and subtitle files) are present, use the *order* attribute to specify the subtitle file to use.

Without specifying an SCC file, you can also process embedded captions to propagate subtitles. You can also optionally preserve 708 captions; see the *preserve708* attribute, below.

To process captions in either case (file-based or embedded,) the action in the workflow that processes the CML source file must have the Closed Captions filter enabled, and it must use a frame rate that supports closed captions (608: 29.97, 708: 23.976, 29.97 or 59.94 fps.)

If the action is configured to encode the media in a QuickTime container, the 608 and/or 708 tracks must be enabled for the container.

See also [File](#).

Child Elements

One [File](#) can be added to a *Subtitle* element.

In this example, the SCC file has a start timecode one hour later than the media file, which must be reconciled. In addition, the media is edited to have an in point 1 minute into the clip, which must also be taken into consideration.

- Media start timecode 00:00:00;00
- SCC file start timecode 01:00:00;00
- In point edit 00:01:00;00 (<Edit time="00:01:00;00"/>)
- Offset 01:00:00;00
- Result 01:01:00;00

The SCC file's offset value is added to the timecode of the media files' in point before it is applied to the SCC file. The result is that the edit point in the SCC file specifies the frame that is one minute into the SCC file, so that it aligns with the media:

$00:01:00;00 + 01:00:00;00 = 01:01:00;00$

In a second example, the media file has a one hour start time, but the SCC file starts at zero. The media file also has the in point 1 minute into the clip, as in the first example.

- Media start timecode 01:00:00;00

- SCC file start timecode 00:00:00;00
- In point edit 01:01:00;00 (<Edit time="00:01:00;00"/>)
- Offset 23:00:00;00
- Result 00:01:00;00

In this example, a 23 hour offset is added to the specified in point to create a matching in point in the SCC file at 0 hours (as in a 24-hour clock, where 2400 is actually 0000 hours):

01:01:00;00 + 23:00:00;00 = 00:01:00;00

Attributes

These attributes may be applied to a *Subtitle* element.

Table 34. Subtitle Element Attributes

Name	Description
offset (optional)	The amount of time required to align non-matching timecode references of source media and the closed caption file. The offset value is added to the media timecode reference to adjust for the difference. The offset has a range of 24 hours. Default: "00 : 00 : 00 . 000". If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS;FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <Subtitle offset = "01:43:05.333"... />

Table 34. Subtitle Element Attributes

Name	Description
order (optional)	Integer (default: 0), which specifies the rank of this subtitle in relation to other subtitle files, if present. Only the highest-ranking subtitle file is actually played out.
preserve708	When propagating captions, the default <i>behavior</i> (false) is to enable propagation per source with the Subtitle element. Assuming the Conform action is configured appropriately for captions creation, with the caption filter enabled and caption tracks added as needed, the use of this attribute will up-convert 608 captions in the source to make 708 captions. This behavior can be modified with an attribute preserve708 set to true: <code><Subtitle preserve708="true" /></code> will keep any 708 captions in the source. If there are no 708 captions in the source, 608 captions will be up-converted regardless.

Examples

Here are two subtitle examples—one using file-based captions, the second using embedded captions.

Basic Subtitle with an SCC File

In this example the subtitle file (*Chronicle St Lucia TC.scc*) is assigned order number 1 (there's only one in this example).

CML

```
<?xml version="1.0" encoding="utf-8"?>
<Composition xmlns="Telestream.Soa.Facility.Playlist">
  <Source identifier="1">
    <File location="//share/path/Chronicle St. Lucia TC.mov" />
    <Subtitle order="1">
      <File location="//share/path/Chronicle St. Lucia TC.scc" />
    </Subtitle>
  </Source>
  <Sequence>
    <Segment>
      <Video source="1" />
    </Segment>
  </Sequence>
</Composition>
```

Propagating Embedded Captions

Another aspect of the *Subtitle* element is that it will propagate embedded captions from a source file if no file attribute is set.

For example:

```
...  
  <Source identifier="1">  
    <File location="//share/path/bxcy_420.mxf" />  
    <Subtitle />  
  </Source>  
...
```

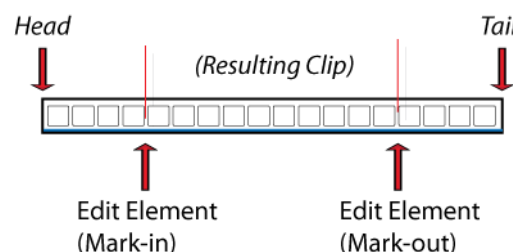
Tail

[CML Elements](#) | [CML Hierarchy Map](#)

The *Tail* element is the point (or frame) on an *Advisory*, *Image*, *Title*, or *Media* element at the end (or mark-out point, when using an [Edit](#)) of the instance. *Tails* (as well as *Heads*) by default have no duration; they can represent either edge of the material.

However, the *Tail* (like the [Head](#) and the [Body](#)) may contain effects elements (*Opacity*, *Scaling*, *Translation*, *Rotation*, and *Volume*) that control the audio and video composition. If you do not supply a *fade* and *duration*, the effects change instantaneously with the time transition from the *Body* to the *Tail*—the *Tail* effects will not be applied to any video, because the end of the *Body* and *Tail* are at the same moment—the end of the material.

Figure 47. The *Tail* is the End of the Material or the *Tail's Edit Element*



You define a *Tail* when you want to perform effects on the end of the material.

There are no attributes in a *Tail* element.

See also [Head](#), [Body](#).

Child Elements

One each of these elements may be optionally added to a *Head*, *Body*, or *Tail* element:

- [Edit](#)
- [Fade](#)

One each of these effects elements may be optionally added to a *Head*, *Body*, or *Tail* element:

- [Opacity](#)
- [Scaling](#)
- [Translation](#)
- [Rotation](#)
- [Volume](#)

Example

In this example—from the Crossfade composition (for details, see)—the video is trimmed by 4 seconds at the end, by adding an *Edit* to the *Tail*.

CML

```
...
<Source identifier="1">
  <File location="//share/path/Color bars.mov" />
</Source>
<Source identifier="2">
  <File location="//share/path/Mystic River Seg 1.mov" />
</Source>
<Sequence layer="0">
  <Segment>
    <Video source="1">
      <Head>
        <Edit time="00:00:00.000"/>
      </Head>
      <Tail>
        <Edit time="00:00:04.000"/>
      </Tail>
    </Video>
  </Segment>
  ...

```

Title

[CML Elements](#) | [CML Hierarchy Map](#)

When you want to display rendered text in your video, add a *Title* element to the segment. There may be multiple *Title* elements per segment.

The *Title* element is a material element that provides a text string, with optional formatting. You specify the text string as the value of the element. For example: `<Title>Up Next...</Title>`.

Note: Material items may logically be divided into three temporal parts: the beginning (*Head*), the middle (*Body*), and the end (*Tail*) for the purpose of changing the presentation of the material with the effect elements (*Volume*, *Scaling*, *Translation*, *Rotation*, *Fade*), and applying a *Fade* to define the temporal length of the part.

The *Title* element has two optional child elements: *Area* and *Shadow*. The *Area* element enables you to position the title text exactly where you want on the frame. The *Shadow* element enables you to shadow the text.

Note: For a practical example of adding a title, see [Adding Titles in the Composition Cookbook](#).

See also [Area](#), [Shadow](#).

Child Elements

One each of these optional elements may be added to control the title text:

- *Area*—specifies the rectangle in which to render the text.
- *Shadow*—specifies an optional shadow on the text.

One each of these elements may be added to apply effects or alignment:

- *Head*
- *Body*
- *Tail*

Attributes

These attributes (some required, some optional) may be applied to a *Title* element.

Table 35. Title Element Attributes

Name	Description
adjust (optional)	When the material's duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Title adjust = "body"... /></code>
align (optional)	Specifies which end (or both) of the material to anchor to the timeline of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <code><Title align = "tail"... /></code> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the <i>Head</i> and <i>Tail</i> are equi-distant from the beginning and end of the segment. Note: If an offset is used in this situation, it is also applied to both ends.

Table 35. Title Element Attributes

Name	Description
background-color (optional)	Specifies the color that the area is painted, over which the text is rendered. Default: <i>transparent</i>. Keywords: <i>transparent</i> <i>black</i> <i>white</i> <i>ARGB</i> The supported colors are defined in .NET. For details, see Color Structure. ARGB—The RGB + Alpha color, in 0xAARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 0x00 represents a pixel that is fully transparent and a value of 0xFF is fully opaque.
duration (required)	The amount of time to display the <i>Title</i>. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS:FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a frame rate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Note: Timecodes are obviously not applicable for titles, because there is no timecode. When processing, the Conform action will report an error and fail. Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Examples: <pre><Title duration = "00:00:05.500"... /> <Title duration = "00:00:05;14@29.97"... /></pre>

Table 35. Title Element Attributes

Name	Description
fill (optional)	When the duration of the material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> <i>hold</i> <i>loop</i>. Example: <code><Title fill = "loop"... /></code> <i>none</i> (default)—extend with empty media (no visual or auditory material). <i>hold</i>—continue playing the first or last frame to play the material the entire duration of the segment. If <i>align</i>="head", the last frame is repeated. If <i>align</i>="tail", the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.
font (optional)	The family name of the font, which must be present on the system where the Vantage Edit service executing the Conform action is hosted. Default: Helvetica. For details, see .NET Font Family. For composition file encoding requirements for non-Roman fonts, see Composition File Requirements.
foreground-color (optional)	Keyword or ARGB value to define the color that the font should be rendered in. Default: white. Keywords: <i>black</i> <i>transparent</i> <i>white</i> Example: <code><Title foreground-color = "black"... /></code> The supported colors are defined in .NET. For details, see Color Structure. ARGB—The RGB + Alpha color, in 0xAARRGGBB format, where the high-order byte (AA) contains the alpha channel and the remaining bytes contain color components for red, green and blue, respectively. The alpha channel specifies the opacity of the pixel, where a value of 0x00 represents a pixel that is fully transparent and a value of 0xFF is fully opaque.
horizontal-align (optional)	A keyword describing how the text is rendered on the horizontal plane, relative to the area. Default: left. Keywords: <i>left</i> <i>right</i> <i>center</i> <i>justify</i> Example: <code><Title horizontal-align="right"... /></code>

Table 35. Title Element Attributes

Name	Description
layer (required)	An integer value describing the ordinal position in the composite of all material in this segment. Default: 0. Example: <Title layer = "10"... /> Material with a lower layer value may be obscured by material with a higher layer value in the same segment. You should supply a layer value higher than the video layer—by default, layer is 0; thus, the video will obscure the graphic.
offset (optional)	Specifies the amount of time to wait from the beginning of the segment, to display the material. Default 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS;FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <Title duration = "00:00:05.000"... />
size (optional)	An integer value describing the nominal height of the font in points (pt). Default: 36 points. Example: <Title size="72pt"... />
style (optional)	Specifies the style in which the font face is rendered. Default: <i>normal</i>. Keywords: <i>normal</i> <i>italic</i> <i>underline</i> <i>strikeout</i> <i>overline</i> Example: <Title style="italic"... />

Table 35. Title Element Attributes

Name	Description
vertical-align (optional)	Specifies where the text is rendered, relative to the area. Default: <i>top</i> . Keywords: <i>top</i> <i>middle</i> <i>bottom</i> Example: <Title vertical-align="bottom"... />
weight (optional)	Specifies the thickness of the stroke of each character. Default: <i>normal</i> . Keywords: <i>normal</i> <i>bold</i> <i>light</i> <i>medium</i> <i>heavy</i> Example: <Title weight="medium"... />
wrap (optional)	Specifies how text is treated when it extends beyond the area: wrap it or not. Default: <i>false</i> . Boolean: (<i>true</i> <i>false</i>) Example: <Title wrap="false"... />

Example

In this example—from the Lower Third with Text composition (for details, see [Post Producer Composition Examples](#))—a *Title* is added to a *Segment*, illustrating every attribute, plus an *Area* and *Shadow* element.

Figure 48. Using the Area Element to Position the Text on the Frame



CML

```
...
<Segment>
  <Title align="head" adjust="edge" fill="none" layer="2"
duration="00:00:04.00" offset="00:00:01.000" font="Helvetica"
size="50pt" style="italic" weight="bold" foreground-color="bisque"
background-color="transparent" wrap="false" horizontal-
align="left" vertical-align="middle" layout="stretch">
    <Area top="70%" left="20%" bottom="90%" right="80%" />
    <Shadow color="gold" softness="10%" vertical-offset="6%"
horizontal-offset="6%" />
  Post Producer Titles
</Title>
...
```

Translation

[CML Elements](#) | [CML Hierarchy Map](#)

One *Translation* element may optionally be added to a *Body*, *Head*, or *Tail*.

Add a *Translation* element when you want to animate visual material along the X/Y axes over time. Positive values move the frame to the right/bottom. Negative values move the frame to the left/top.

The Head Translation X/Y values determine the original placement of the frame; the Body X/Y values specifies that target point that the frame is moved to during the Head duration. Similarly, the Tail X/Y values are the target that the frame is moved to from the Head X/Y source, during the Tail duration.

For this effect to be of practical value, the Fade element must be present in a *Head* or *Tail* element, and its duration must be greater than 0. The animation occurs during the Head and Tail duration, not during the Body duration.

The *Translation* element is often used in conjunction with the *Scaling*. See *Rotation* for animating material on the Z axis.

There are no child elements in a *Translation* element.

See also *Volume*, *Opacity*, *Scaling*, *Rotation*.

Attributes

These attributes may be applied to a *Translation* element. Although both are optional, supplying neither would be impractical, and result in no change to the location.

Table 36. *Translation* Element Attributes

Name	Description
x (optional)	Specifies the horizontal translation relative to the left edge of the frame, as a ratio (no designator), a percent (%), or as an absolute position in pixels (px). Default: 0. Example: <Translation y="9%" x="16%"/>
y (optional)	Specifies the vertical translation relative to the top edge of the frame, as a ratio (no designator), a percent (%), or an absolute position in pixels (px). Default: 0. Example: <Translation y="9%" x="16%"/>

Example

In this example Video 1 is placed at 0,0 in the *Head*, and translated to 50,50 (the top-left corner is placed dead-center on the frame) in the *Body*, over a 5-second duration.

CML

```
...
<Video source="1" layer="1" >
  <Head>
    <Edit time="00:00:00.00"/>
    <Opacity level="50%" />
    <Scaling x="100%" y="100%" />
    <Translation x="0%" y="0%" />
    <Fade duration = "00:00:05.00" />
  </Head>
  <Body>
    <Opacity level="100%" />
    <Scaling x="50%" y="50%" />
    <Translation x="50%" y="50%" />
    <Volume level="0%" />
  </Body>
  <Tail>
    <Edit time="00:00:08.00"/>
  </Tail>
</Video>
...
```

Video

[CML Elements](#) | [CML Hierarchy Map](#)

The *Video* element is a material element that adds video (with audio, if present) to a [Segment](#), from a file identified by a specific [Source](#), using the *source* attribute (required).

Note: A segment's length is defined by the duration of the longest material element within the segment. Material items may logically be divided into three temporal parts: the beginning ([Head](#)), the middle ([Body](#)), and the end ([Tail](#)) for the purpose of changing the presentation of the material with the effect elements ([Volume](#), [Scaling](#), [Translation](#), [Rotation](#), [Fade](#)), and applying a [Fade](#) to define the temporal length of the part.

Child Elements

One each of these elements may be added to apply effects or alignment:

- [Head](#)
- [Body](#)
- [Tail](#)

Attributes

These attributes may be applied to a *Video* element.

Note: The *adjust*, *align*, and *fill* attributes are closely related. Together, they specify how the material is aligned, and how it is adjusted along the timeline in the segment.

Table 37. Video Element Attributes

Name	Description
adjust (optional)	When the material's duration is less than the duration of the segment, the material may be extended within the segment. This provides a flexible method to define the behavior of overlay material so that it is consistently applied, regardless of the duration of the underlying material. For example, using the <i>adjust</i> attribute, you can consistently display a branding bug on underlying video of any duration. There are 3 things to consider when modifying material: 1. What part to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to display—hold, loop, none (based on <i>fill</i> attribute). Keywords: <i>edge</i> (default) <i>body</i> <i>edge</i> (default)—The material is adjusted by extending the edge that is <i>not</i> identified by the <i>align</i> property and is applied to the duration of the head and tail of the material. <i>body</i>—The material is adjusted by extending the body of the material. It is applied to the end of the body that is <i>not</i> identified by the <i>align</i> property. Example: <code><Video adjust = "body"... /></code>

Table 37. Video Element Attributes

Name	Description
align (optional)	Specifies which end (or both) of the material to anchor to the timeline of the segment. Keywords: <i>head</i> <i>tail</i> <i>both</i>. Example: <code><Video align = "tail"... /></code> <i>head</i> (default)—Anchors the beginning of the material to the beginning of the segment. <i>tail</i>—Anchors the end of the material to the end of the segment. <i>both</i>—Anchors the center of the material at the center of the segment, so that the Head and Tail are equi-distant from the beginning and end of the segment. Note: If an <i>offset</i> is used in this situation, it is also applied to both ends.
cadence-sensitivity (Optional; used only when source-type is <i>mixed</i> .)	Specifies the level of sensitivity for xxx detection. Range: 0-100. Default: 50. Example: <code><Video source="329366133" tempo="variable" source-type="mixed" cadence-sensitivity="50"></code>
fill (optional)	When the duration of the material is less than the length of the segment, the fill attribute determines if and how the item continues to play: Keywords: <i>none</i> (default) <i>hold</i> <i>loop</i> Example: <code><Video fill = "loop"... /></code> There are 3 things to consider when modifying the material: 1. What to adjust—the body or the edge (using <i>adjust</i>) 2. Which end to adjust from (based on <i>align</i> attribute) 3. How to adjust—hold, loop, none (based on <i>fill</i> attribute) <i>none</i> (default)—extend with empty media (no visual or auditory material). From a practical perspective, no extension. <i>hold</i>—continue playing the first or last frame the entire duration of the segment. If <i>align</i>="head", the last frame is repeated. If <i>align</i>="tail", the first frame is repeated. <i>loop</i>—play the media repeatedly for the duration of the segment.

Table 37. Video Element Attributes

Name	Description
layer (optional)	An integer value describing the ordinal position in the composite of all material in the segment. Default: 0. Visual material with a higher layer value obscures material with a lower layer value in the same segment. Example: <Video layer = "10"... />
offset (optional)	Specifies a time value which changes the location of the beginning or end of the material, relative to the segment. The offset is applied to the end of the content that is specified by the align property. If align="both" the offset is applied at the defined value to both the head and tail of the material. Default: 0. If you are specifying a relative timecode for video with a timecode track, use these formats: HH:MM:SS:FF@RR HH:MM:SS:FF HH:MM:SS;FF If you are specifying an absolute timecode or time value, you can also use these formats if the material has a framerate; otherwise you must use one that can be converted to a time: HH:MM:SS.sss HH:MM:SS:FF@RR Time is measured on a 24-hour clock. Time may include milliseconds (sss); frames (:;FF) as DF (;) or NDF (:), and optional frame rate (FF@FPS), as an integer, decimal number, or rational (for example, 30000/1001). If FPS is not specified, it is inferred from the associated source. Rates supported: 23.976, 24, 25, 29.97, 30, 50, 59.94. Timecode references are applied to the timecode track specified in the associated Source element's file. When using DF timecode, the first 2 (29.97 fps) or 4 (59.94 fps) timecode numbers are dropped every minute except minutes divisible by 10. DF timecode is supported for frame rates of 29.97 and 59.94 frames per second. Example: <Video offset="00:10:00"... />

Table 37. Video Element Attributes

Name	Description
rate (optional)	Specifies the frame rate of the video within a composition, relative to its original speed. May be specified as a percent (% units designator), or as a ratio (no units designator.) You can not specify an absolute speed. Used for changing the duration of a video clip, such as shortening the time required to roll credits in a promo. When the original rate is changed, volume (if any) is set to 0. Example: <code><Video rate="250%" ... /></code> In this example, this video is played at 2.5 times the original speed. Note: The modified rate also applies to any effects applied to the video element. For example, slowing a clip to 50% doubles the duration of fade-ins and fade-outs.
source (required)	Integer, corresponding to the Source element's identifier value, to identify the file to be used in this instance.

Table 37. Video Element Attributes

Name	Description
source-type (required)	Specifies various types (or combinations of types) of video, including progressive, interlaced, Telecine, etc. to improve output quality. Keywords: <i>auto</i> <i>progressive</i> <i>telecined</i> <i>Telecined unk cad</i> <i>telecine edit</i> <i>interlaced</i> <i>mixed</i> <i>Auto-Progressive</i> sources are treated as progressive. Interlaced sources at 29.97 fps are treated as mixed (see the description below), but interlaced sources at other rates are treated as interlaced. If the entire source is known to be interlaced at 29.97 fps, you should not select Auto; select Interlaced instead. <i>Progressive</i>–Sources are treated as progressive even when interlaced. <i>Telecined (Unedited, with fixed known cadence)</i>–Sources are treated as Telecine, unedited, with known cadence and first repeated field position. The fields for cadence type and first repeated field position must be set correctly for correct rendering of the video output. The output is Telecined. <i>Telecined (Unedited, with fixed unknown cadence)</i>–Sources are treated as Telecine, unedited, but with unknown cadence and/or first repeated field position. With this selection, cadence is automatically determined with the first strong cadence. This option should not be selected if there are any changes in the Telecine cadence of the source. The output is Telecined. <i>Telecined (Edited)</i>–Sources are treated as Telecine, with possible edits and cadence changes. This option should be selected if there are any changes in the Telecine cadence of the source. The output is Telecined. <i>Interlaced</i>– Sources are treated as interlaced, even when the source is encoded as progressive. The output is interlaced. <i>Mixed</i>– Sources are assumed to have broken cadence and may also include interlaced and progressive fragments. For example, a Telecined source with interlaced or progressive commercial inserts. The output is interlaced. Specify Cadence Detection Sensitivity. Example: <code><Video source="329366133" tempo="variable" source-type="mixed" cadence-sensitivity="50"></code>

Table 37. Video Element Attributes

Name	Description
tempo (required)	Specifies the type of adjustment. Keywords: <i>variable</i> <i>loop</i> Example: <Video fill = "loop"... />

Example

Volume

[CML Elements](#) | [CML Hierarchy Map](#)

The *Volume* element is an element that allows you to adjust the volume of audio in certain material.

One *Volume* element may optionally be added to a *Body*, *Head*, or *Tail* in a *Video* or an *Audio* element.

The default *level* in a *Body* element is 100%, while in a *Head* or *Tail*, it is 0%, making it easier to apply fades. For this effect to work, the *Fade* element must be present, and its duration must be greater than 0. If you are using *Fade* for effects other than volume (that is, you do not want to fade the volume), you must supply a *Volume level* explicitly.

You can adjust volume by percent, or by decibels. Positive values apply a gain, negative values attenuate the audio. The level is applied equally to all channels targeted by default or by a *Mix*. (This element does not effect any channels targeted by a *Route*.)

There are no child elements in a *Volume* element.

See also [Opacity](#), [Scaling](#), [Translation](#), [Rotation](#).

Attributes

These attributes may be applied to a *Volume* element.

Table 38. *Volume* Element Attributes

Name	Description
level (optional)	A positive or negative integer or decimal number representing the volume level as a ratio (no designator), percent (%) or in decibels (dB) of the original material. Default (in Head and Tail elements): 0%. Default (in Body elements): 100%. Example: <code><Volume level="30%" /></code>

Example

This example—from the Backtimed Graphic composition (for details, see [Post Producer Composition Examples](#))—applies a 1-second audio fade-in and fade-out to the beginning and end of the clip.

Notice that in the *Head*, a *Volume* at 0% is specified, but in the *Tail*, it is not specified. Because `Volume level="0%"` is the default value for a *Head* and *Tail*, you're not required to provide it—it still works as intended—fading the tail to zero audio volume.

CML

...

```
<Segment>
  <Canvas align="head" adjust="body" duration="00:00:18.700"
    Background="black" layer="0" />
  <Video source="1" layer="1">
    <Head>
      <Edit time="00:00:50.300" />
      <Opacity level="0%" />
      <Volume level="0%" />
      <Fade duration="00:00:00.500"/>
    </Head>
    <Body>
      <Opacity level="100%" />
      <Volume level="100%" />
    </Body>
    <Tail>
      <Edit time="00:01:09.00" />
      <Opacity level="0%" />
      <Fade duration="00:00:00.500"/>
    </Tail>
  </Video>
...

```

Post Producer and Related Formats

This chapter identifies the supported input formats for both video and audio, and images, and the supported output formats for the Conform action.

- [Input Media Formats](#)
- [Graphic File Input Formats](#)
- [Output Video Formats](#)
- [DolbyE Program and Channel Specifications](#)

Input Media Formats

The following tables list the video and audio formats that the Conform action can process, by container.

Video Formats

Table 39. Conform Action Input Video Formats

Container	DV ¹	IMX	MPEG2 ²	ProRes & ProRes 4:4:4:4	DNxHD	J2K	H.264	AVCI	QT Anim.
TIFO	■	■	■	■	■				
AVI	■								
MOV ³	■	■	■	■	■				■
MP4							■		
GXF	■	■	■			■		■	
LXF			■						
MPEG2 PS			■						
MPEG2 TS			■						
MXF OP-1a	■		■		■	■		■	
MXF AS02 ⁴	■		■			■		■	
MXF AS11								■	

1. DV includes DV25, DVCPro25, DV50/DVCPro50, and DVCProHD.

2. MPEG2 includes Long-GOP and I-Frame only formats.

3. QuickTime formats include alpha channel support.

4. Files produced by Omneon Media Subsystem (6.1) and Amberfin ICR (7.8) were tested.

Audio Formats

Table 40. Conform Action Audio Input Formats

Container	PCM	MPEG	302M	331M	AAC	AC3 ¹	Dolby E
TIFO	■					■	■
AC3						■	
AVI	■						
LXF	■						

Table 40. Conform Action Audio Input Formats

Container	PCM	MPEG	302M	331M	AAC	AC3 ¹	Dolby E
MOV	■				■		■
MP4	■				■		■
GXF	■						■
MPEG2 PS		■					
MPEG2 TS	■	■	■		■	■	■
MXF OP-1a	■			■			■
MXF AS02 ²	■						■
MXF XDCAM HD	■						
MXF AS11	■					■	■
WAVE	■						■

1. AC3 includes Dolby Digital and Dolby Digital Plus (E-AC3)
2. MPEG2 includes long GOP, I-Frame, XDCAM, XDCAM HD

Graphic File Input Formats

The supported raster image formats are:

- BMP
- JPEG
- TIFF
- PNG
- TGA
- PSD—Single-layer Photoshop files with transparency

Alpha channels are supported.

Output Video Formats

The following table lists the video formats that the Conform action can produce, and their containers. The output files produced by the Conform action may be distributed directly, or they can be utilized by any Vantage encoder (in Flip, IPTV VOD, or Multiscreen actions) to produce any other Vantage output format.

Table 41. Video Output Formats and Containers

Container	ProRes	DNxHD	JP2K	MP2	x264	Uncompr.	XDCAM HD
TIFO	■	■	■	■	■	■	■
MP4	■		■	■	■	■	■
MOV	■	■	■	■	■	■	■

Output Audio Formats

The following table lists the audio formats that the Conform action can produce, and their containers.

Table 42. Conform Action Audio Output Formats and Containers

Container	PCM	AC3	AAC	MPEG1 Layer 2
TIFO	■	■	■	■
MP4	■	■	■	■
MOV	■	■	■	■

DolbyE Program and Channel Specifications

The table below identifies each Dolby E program ID, the sequence of programs, and the channel positions for the programs.

Table 43. Dolby E Program Sequences and Channel Positions

Program	Sequence	Channel Positions							
0	5.1+2	0L	0C	0Ls	1L	0R	0LFE	0Rs	1R
1	5.1+1+1	0L	0C	0Ls	1C	0R	0LFE	0Rs	2C
10	4+4	0L	0C	1L	1C	0R	0S	1R	1S
11	4+2+2	0L	0C	1L	2L	0R	0S	1R	2R
100	4+2+1+1	0L	0C	1L	2C	0R	0S	1R	3C
101	4+1+1+1+1	0L	0C	1C	3C	0R	0S	2C	4C
110	2+2+2+2	0L	1L	2L	3L	0R	1R	2R	3R
111	2+2+2+1+1	0L	1L	2L	3C	0R	1R	2R	4C
1000	2+2+1+1+1+1	0L	1L	2C	4C	0R	1R	3C	5C
1001	2+1+1+1+1+1+1	0L	1C	3C	5C	0R	2C	4C	6C
1010	1+1+1+1+1+1+1+1	0C	2C	4C	6C	1C	3C	5C	7C
1011	5.1	0L	0C	0Ls	0R	0LFE	0Rs		
1100	4+2	0L	0C	1L	0R	0S	1R		
1101	4+1+1	0L	0C	1C	0R	0S	2C		
1110	2+2+2	0L	1L	2L	0R	1R	2R		
1111	2+2+1+1	0L	1L	2C	0R	1R	3C		
10000	2+1+1+1+1	0L	1C	3C	0R	2C	4C		
10001	1+1+1+1+1+1	0C	2C	4C	1C	3C	5C		
10010	4	0L	0C	0R	0S				
10011	2+2	0L	1L	0R	1R				
10100	2+1+1	0L	1C	0R	2C				
10101	1+1+1+1	0C	2C	1C	3C				
10110	7.1	0L	0C	0Ls	0Bsl	0R	0LFE	0Rs	0Bsr
10111	7.1 screen	0L	0C	0Ls	0Lc	0R	0LFE	0Rs	0Rc

