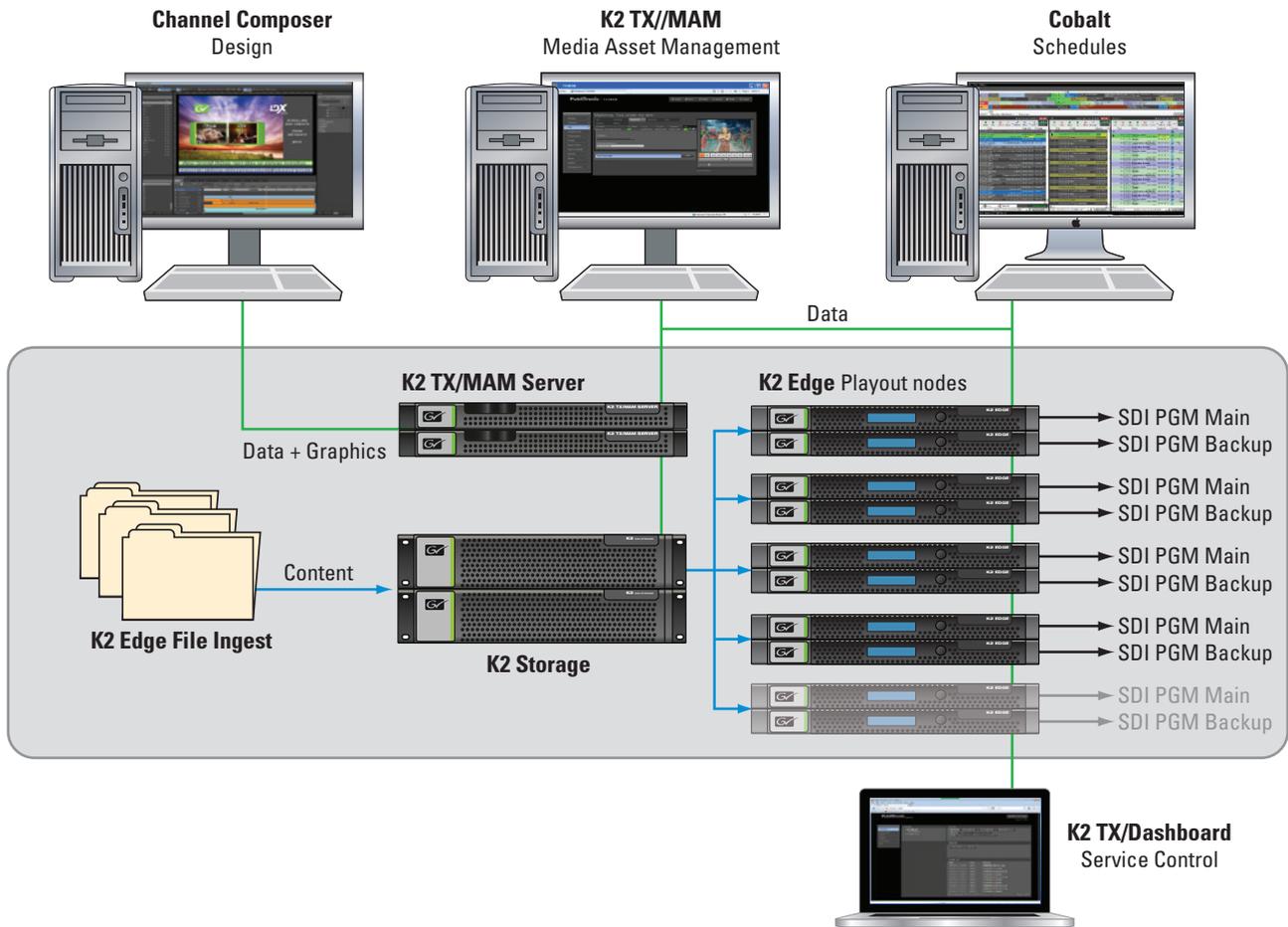


APPLICATION NOTE

THE INTEGRATION OF GRAPHICS IN SMART PLAYOUT CENTER

Matt Allard, *Senior Director, Marketing Programs*

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An integrated playout system must include advanced graphics management and delivery. Grass Valley® Smart Playout Center™ provides advanced tools for a complete graphics workflow with Channel Composer™. The information provided here guides users through an innovative approach to creating sophisticated on-air channel looks that seamlessly integrate with media asset management and playout.

OVERVIEW

Graphics design is dominated by personnel and tools for the print and Internet segments. Television is a much smaller segment, so it makes sense to harness the larger resources that are available. Television facilities anywhere in the world can utilize the talents of local graphic designers that use a common set of design tools from companies such as Adobe and Autodesk.

Smart Playout Center includes a highly creative graphics layout tool optimized for use with television formats. With Channel Composer users can create flexible, multi-layer channel designs that fully integrate with the playlist and asset management environment. Channel Composer provides tools to intuitively create high-quality effects and animations. Features include complex DVE capabilities such as a picture-in-picture and squeeze back, as well as smart animation options such as keyframing and controllers.

A wide variety of static and animated graphic file types, in both 2D and 3D, can be imported. Designers can use personalized, pre-built libraries including items such as analog and digital clocks, tickers, and squeeze backs. Layouts can be built that include multiple live feeds, and multiple clips with multiple DVEs for very sophisticated on-air

looks. Frame-accurate timeline editing allows simple and complex graphic sequences to be laid out and timed, while using a variety of effects including mirroring and blending of 2D and 3D objects.

The integration of graphics with the playout environment and media asset management in Smart Playout Center makes it easy and practical to include metadata and dynamic data from assets and schedules. Elements such as now/next presentations, menus, clip titles, and tickers are all easily filled with the appropriate data. Even the more technical challenges—such as aspect ratios and dynamic text widths—can be planned and set up with automated routines.

Channel Composer offers offline channel branding layout tools for Mac- and Windows-based personal computers. Creative designers can build the actual channel looks, while being isolated from the technical infrastructure. Advanced graphics systems, especially 3D systems, have a tendency to become complex in their operation. The intuitive user interface of Channel Composer is designed so that basic functionality remains simple for standard layouts and operational demands. When more sophisticated capabilities are required, it can offer advanced functionality for the more experienced user.

WORKFLOW SUMMARY

A very well-defined workflow—from graphics creation to the moment the eventual layout is taken live to air—is fundamental in a channel branding experience. Channel Composer runs on Mac and Windows operating systems, permitting offline preparation of graphics layout and channel looks.

The channel design is built in a Channel Composer project. Smart options such as the “Merge” and “Save to TX/MAM” features make it possible to reuse projects and collaborate on a channel design from various locations. Once the channel design is finished, the design is bundled in a Channel Pack and exported to the K2 TX/MAM™ media

asset management database. The Channel Pack contains all fixed design elements (formats, templates, objects, applets, and fixed assets such as logos and straps). Everything necessary for scheduling and on-air presentation is within a Channel Pack. Channel Composer and the Channel Pack Manager are used to manage the activation date for a specific channel. Dynamic files are referenced using placeholders. All dynamic content (media files) is pulled from storage for playout. Other dynamic content (such as metadata and ticker stories) is pulled from the applicable sources such as the K2 TX/MAM media asset database or from the optional RTic™ live data application.



CHANNEL COMPOSER CONCEPTS AND OPERATIONS

Channel Composer Workspace

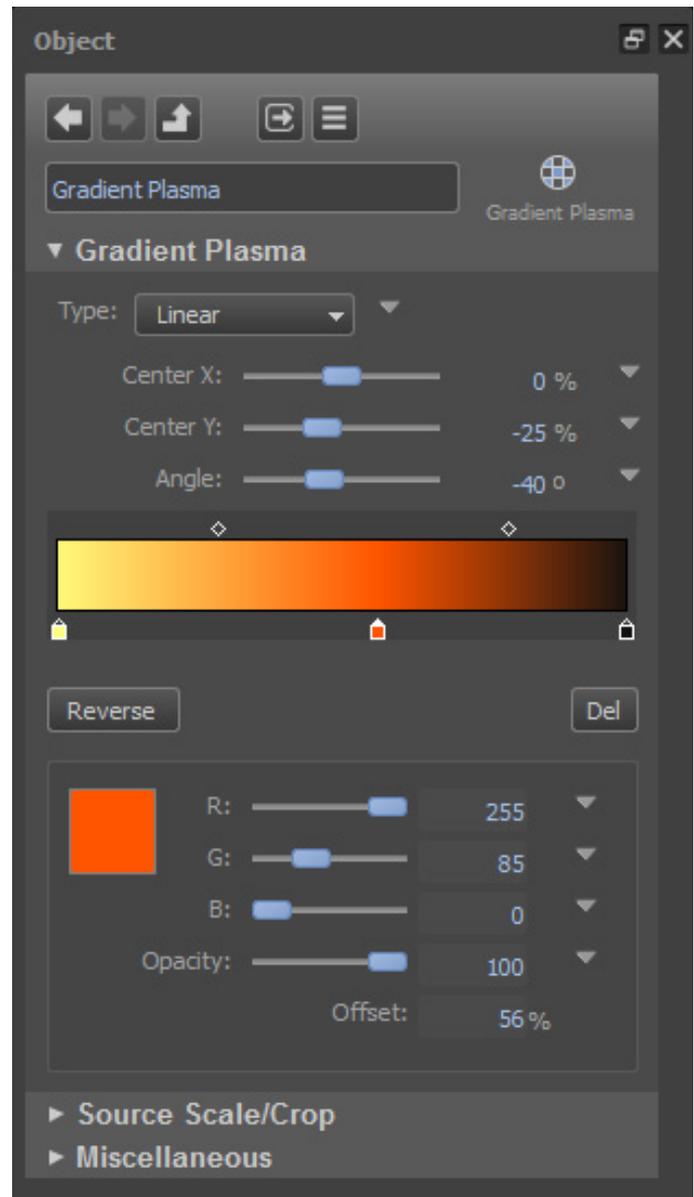
The Channel Composer workspace can be easily customized. One way to do this is by adding or removing windows, or by scaling and repositioning windows. Other options include customizing grids and guidelines. The Channel Composer workspace consists of:

- Main menu and toolbar
- Stage. This represents the Channel's output. The Stage includes a transform box
- Projects window. This lists the Formats, Templates, and Applets that have been defined for a Channel. Three windows are docked on the Projects window: the Object window (view and edit an Object's properties), the Library (the prefabs and test media libraries), and the Project Assets window (view and edit the Project's Assets and metadata)
- Objects window. This lists the Objects available in the Project and shows their layering
- History window. This is where actions can be viewed and redone or undone. Two windows are docked on the History window: the Scene Parameters window (view and edit Scene Parameters) and the Text Styles window (view and edit text styles)
- Template Timeline. This is where Objects are animated in time
- Format Timeline. This is where Formats are edited

Objects

Channel Composer comes with a full range of Stage Objects that can be modified for fast and easy use. These include:

- Analog Clock Object
- Animation Object
- Audio Object
- Box Object
- Clip Object
- Cylinder Object
- Group Object
- Live Object
- Mesh Clip Object
- Plane Object
- Sphere Object
- Still Object
- Text Object
- Ticker Object
- Subtitles Object



CHANNEL COMPOSER CONCEPTS AND OPERATIONS (CONT.)

Objects have properties, such as opacity, position, rotation, projection, and blending that can be modified and animated. Other properties include effects such as bevel, blur, colorize, drop shadow, skinning, lighting, and scaling.

Objects are placed on the Stage and are animated on the Template Timeline. Each Object is placed on its own layer. Objects on higher layers overlap Objects on lower layers. The priority of layers can be changed to the desired order by the user.

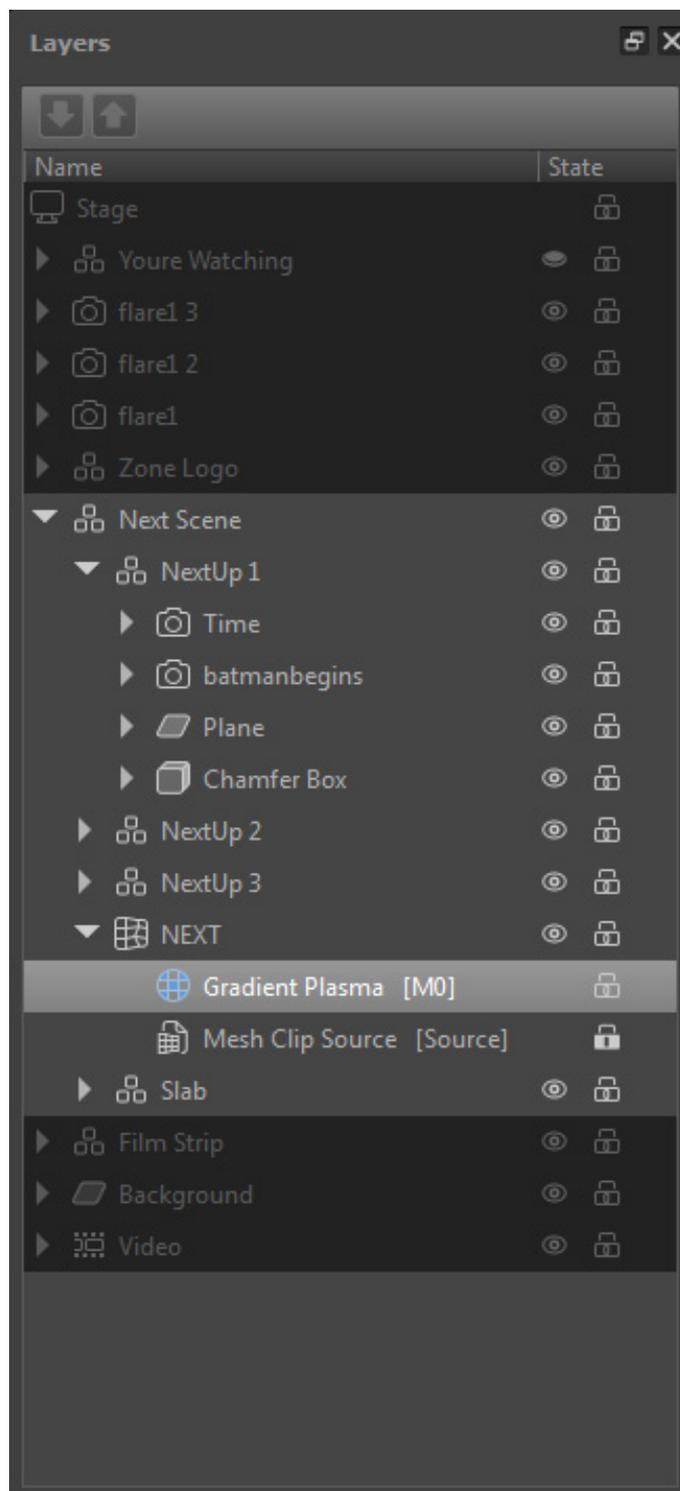
To animate Objects in a Template, In and Out Points are used. In and Out Points specify when an Object is active, such as being audible or visible. Points can be positioned in time and set. Player type Objects can be set to auto-stop at the Out Point.

Players

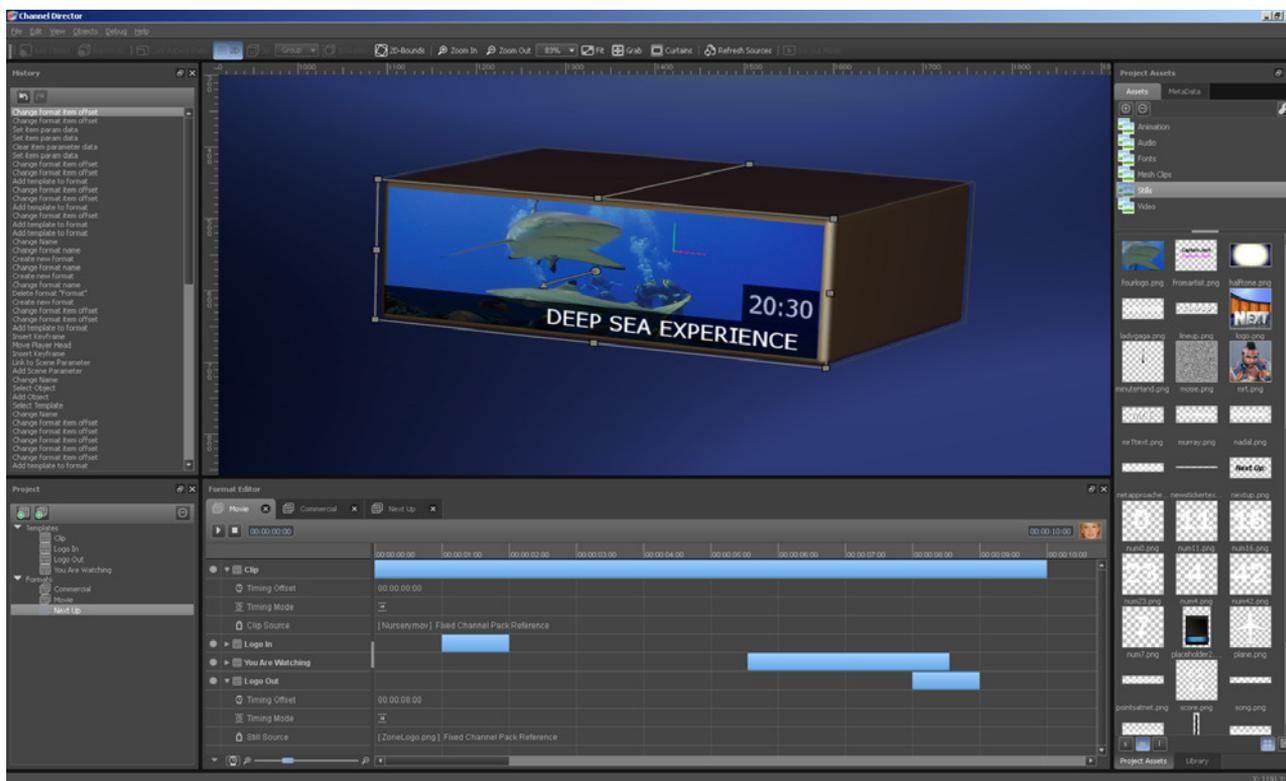
Objects such as Clips, Audio, and Still Objects use a Player to work with the content. Players can be used to control playout. Players can be linked, modified, and different actions can be defined. Player actions include play, stop, pause, resume, and auto-stop at out point. Examples of Players include:

- Still Player
- Animation Player
- Plasma Player
- Clip Player
- Audio Player
- Gradient Player
- Live Player
- Text Player
- Ticker Player
- Subtitle Player

A main Player can be defined for each Channel. The main Player is used to assign resources with priority over other Players. The main Player is also used to control playout of embedded closed caption subtitle streams, the ATC (HD) or VITC (SD) timecode signal, and the VBI-data in the SDI output.



CHANNEL COMPOSER CONCEPTS AND OPERATIONS (CONT.)



Templates and Formats

Templates are used to set Object properties such as opacity, position, and scale in time. Each Object has its own track on the Timeline. A player head in the interface can be moved, paused, and rewound to preview animations on the Stage.

Templates can be previewed on the Stage in try-out mode. The output will be exactly the same as on the K2 Edge™ playout nodes, but will not be guaranteed to play in real-time with the preview mode.

Template Rules can be used to start a Template based on a predefined Event, such as start at the end of a Ticker (Event).

Formats describe the on-air layout of programs. They are built of Templates and Applets. Cobalt playlist management Format Control provides the ability to dynamically add Formats to Events in a Playlist, and thus apply the correct graphics to the associated Events. Format Control applies Formats based on customizable Rules.

Applets

Applets are customized software components. Applets are used to add smart functionality to Formats, such as retrieving information from sources including schedules, the asset database or RSS-feeds, as well as to update scene parameters.

CHANNEL COMPOSER CONCEPTS AND OPERATIONS (CONT.)

Projects and Channel Packs

Projects contain all the elements that comprise a channel's on-air layout: fixed Assets, Objects, Templates, Formats, and Applets.

The user can create a new Project, open an existing Project, import a Project from a Channel Pack on disk or from the K2 TX/MAM database, restore a backup, or merge Projects. Merging is an easy means to reuse parts of a Project. Merging can also be useful when working with several people on a Project.

New Projects have a name, location, author, and description. Preferences can be set for broadcast format, anti-aliasing, and other parameters.

Each time a Channel Composer Project is saved, a backup is automatically created. This backup contains all project data, except for Project Assets.

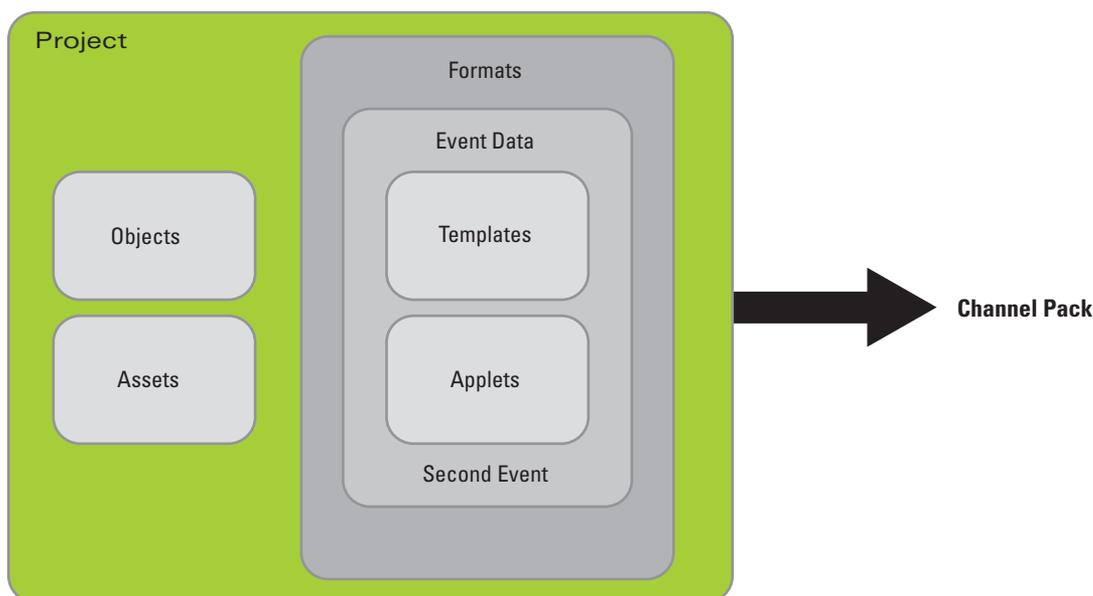
When exporting a Project, the user can export to a specified destination folder, export to the K2 TX/MAM database, or export to a playout server for third-party scheduling or testing purposes. When exported to the K2 TX/MAM database, the design is ready for scheduling.

Channel Composer's "Manage Exports" options provides management of Channel Packs. These options are:

- View Project Packs, per Channel or Project, in chronological order (Grouped)
- Remove a Channel Pack from the database
- Modify the activation properties of a Channel Pack (Channel, activation date/time)
- View Channel Pack contents

These options are also available in the Channel Pack Manager.

Before playout, the Channel Pack is transferred from the K2 TX/MAM database to the K2 Edge playout nodes. All design elements are thus available for playout. Any required dynamic content is fetched from storage and transferred to the playout nodes. A Channel Pack's activation period is specified in Channel Composer or using the Channel Pack Manager.



Assets, Metadata, and Scene Parameters

All fixed files that belong to a Channel design—logos, straps, and other elements—are added to the Channel Composer Project as Assets. These Assets are included in the Channel Pack when the Project is exported to the K2 TX/MAM database. Thus, all fixed design elements needed for playout are available in the Channel Pack.

To refer to dynamic content, Scene Parameters are defined and added to the design. These placeholders are dynamically updated with the assets' filename when Events are scheduled. Dynamic content is fetched from storage before playout. Scene parameters can be linked to:

- A dynamic reference—the main Asset in a schedule
- An external reference—an external reference to the main Asset
- A fixed Asset reference—a reference to an Asset in the K2 TX/MAM database

- Manual Text—manual text
- Import Field—custom Event data
- An Asset from the Channel Composer Assets pool
- A metadata field

Objects can also refer to the assets' metadata fields. This metadata can be used in on-air presentation or to trigger Events. To work with metadata, the relevant metadata definitions are imported from Cobalt or K2 TX/MAM. The metadata definition (.xml file name) and metadata fields are imported, and metadata fields can be linked to Scene Parameters.

For testing purposes, test media (images/videos) can be added to the Test Media library. Note that test media will not be included in the Channel Pack when the Project is exported.

TEMPLATE, OBJECT, AND FORMAT CAPABILITIES

Keyframing

With keyframing the start, intermediate, and end points of an animation can be defined—such as moving or scaling an Object. Frames in between the defined keyframes are automatically calculated by Channel Composer. A keyframe acts as a snapshot of the properties of one or more Objects at a specific point in time. The type of interpolation for the selected keyframes can be determined as constant speed, ease in, ease out, and step. Keyframes for Objects can be added, updated, deleted, copied, and detached.

Commands

Various commands are available in the Prefabs library—such as ticker commands or the GPIO command—and can be added to Templates. Some (such as tickers) are included with the Channel Composer application while others can be created by users and added to the library for future use in other Templates and Projects.

GPIO

The Channel Composer GPIO command can be used to manipulate an output pin of a K2 Edge playout node. The command is added to a Template Timeline. The number of the GPIO output pin can be selected. The value is also selectable with “0” disabling the pin, a logical “off” or “low,” and “1” enabling the pin, a logical “on” or “high.”

Supported GPIO types are:

- DB9M—Represents the internal GPIO device, available through the DB9 socket on the device
- 410E—Represents the optional Sealevel 410E device that allows GPIO control over Ethernet
- VBI—Represents the virtual GPIO device that does GPIO-over-VBI on the video output(s) of the associated channel. Alternatively, real device names (such as VBI0, VBI1, VBI2, etc.) can be used to explicitly address the GPIO devices dedicated to channels 0, 1, 2, and so on

Tickers

Tickers are a common type of graphic Object used to display information moving across the screen. Smart Playout Center has an optional software application (RTic) that will accept a live data feed. Using Channel Composer, templates can be created to display the data in a desired manner. A template will be set up to place the Ticker on-screen. Commands can be edited to select the desired ticker, the desired data source, which text or scene linkage to use, text style, and if still or animated graphics will be included.

Subtitles

Channel Composer supports the following subtitle output formats:

In-Vision Subtitling

The open In-Vision format produces subtitles as graphical images that are permanently visible on screen. They cannot be switched off. Due to the graphical nature of this format, a large set of Unicode characters is supported. Using a grid, placement of subtitles on screen can be controlled as well as font style.

DVB Subtitling

The closed DVB-subtitling format produces graphical images that are encoded and inserted into an MPEG-transport stream and identified with given a PID. These subtitles can be displayed (optionally) on set-top boxes or TV sets that support the DVB format. This format also supports a wide variety of Unicode characters due to its graphical nature. The grid and font style options available for the In-Vision format apply here as well.

Teletext Subtitling

Closed teletext subtitling is a character-based protocol originally developed for the PAL broadcast format. Subtitles are added to the broadcast signal. Subtitles can be (optionally) shown on screen on TV sets that support the teletext protocol. The grid and font style editing features do not apply.

Closed Captioning Subtitling

Closed caption subtitles are similar in nature to teletext subtitles. It is a character-based protocol originally developed for the NTSC broadcast format. Subtitles are added to the broadcast signal. Subtitles can be (optionally) shown on suitable TV sets. The character set is relatively limited. The grid and font style editing features do not apply.

File formats

- EBU STL files. Other STL file formats are not supported
- SRT files with UTF-8 encoding. Other encoding formats are not supported

Mode

- In-Vision subtitling (open)
- DVB subtitling (closed)
- Teletext subtitling (closed)
- Closed captioning (closed)

Language

The EBU STL file format covers five different language groups (character sets), but at the moment only the Latin (for western languages) and Cyrillic (for Russian languages) groups are supported.

The SRT file format with UTF-8 encoding covers the full Unicode character set, but at the moment only left-to-right oriented languages are supported.

In Point

The In Point defines the time (as defined in the input file) of the first subtitle that must be shown when playback of the subtitle file is started. This option makes it possible to skip a number of initial subtitles entries, or restart subtitling in the middle of a clip (for example, after a commercial break).

Grid

For In-Vision and DVB, a grid—built of a number of slots—must be defined. The number of grid slots, the slot dimensions, and the position of the grid on the screen can be fully customized. For example, it is possible to cover the full screen with the grid, or to define a grid of just a couple of slots, and place it near the bottom of the screen.

Style

- For In-Vision and DVB, a Text Style must be defined
- Select Text Styles for Normal, Bold, and/or Italic text

Fade Duration

For In-Vision, use the Fade Duration menu to define the number of fields or frames (depending on the broadcast mode) used to fade-in the subtitle text on screen.

Teletext Page

For teletext, the subtitles will be made available on the teletext page defined here.

DVB PID

For DVB, the subtitles will be made available in the transport stream under a given PID value.

TEMPLATE, OBJECT, AND FORMAT CAPABILITIES (CONT.)

The table below shows which output formats are supported for the different input file formats and language group combinations:

File format	Language group	In-Vision	DVB	Teletext	Closed
Captioning					
EBU STL	Latin	Yes	Yes	Yes	Yes
EBU STL	Cyrillic	Yes	Yes	Yes	No
SRT	Left-to-right	Yes	Yes	No	No

Controllers

A Controller automatically animates properties of an Object. Controllers can be an alternative to keyframing. Controllers are ideal for animations that are endlessly repeating, or animations that depend on real-time data. Available Controllers are:

Anchor

Use an Anchor to keep (a side of) an Object in a specific position: align the Object's Left, Right, Bottom, Top, Back, or Front to an Anchor Point X, Y, or Z.

FromTo

Use a FromTo Controller to animate a property from one to another value, for example move from Position Z 5000 to Position Z 0 using a FromTo controller with a Duration taken from the Scene Parameter Move Duration. This Controller is similar to a keyframed animation with two keyframes. However, the "From" and "To" values can be linked to a Scene Parameter. This cannot be done with keyframes.

Link

The Link Controller is used to link a property of a source Object to the property of a target Object. For example, a target's color value could be linked to the height of a graphic cylinder using a Link Controller.

Oscillate

Use an Oscillate Controller to oscillate (Sinus, Sawtooth, Square, or Triangle wave) an Object's properties.

Stack

The Stack Controller is used to tightly stack grouped Objects on the X, Y, or Z-axis and avoid overlap. Note that this Controller can only be used for Groups.

Operator Panels

Operator Panels for manual operations can be created in Channel Composer for use in Cobalt™ Playout Control (POC). Each Project can have one Operator Panel, which consists of buttons representing Templates, Applets, and Scene Parameters. When a button is clicked in POC, the Template, Applets, and Scene Parameters associated with the button are triggered on the designated playout node.

When a Project is exported to the K2 TX/MAM database and the Channel Pack is activated, the Operator Panel will be available for the related channel in Cobalt Playout Control (POC).

Simulcast

For simulcast broadcasts, two instances of each Template are created: one is played out on the HD channel, the other is played out on the SD channel. The playout Channel is defined in the Format, using the Template's Opt-Out option setting. It is not necessary to create separate Formats for HD and SD, but only add both the HD and SD Templates per Format.

In Cobalt, only one Channel has to be scheduled. Formats will be played out on both channels defined in the Templates. HD and SD settings are defined on the K2 Edge playout node, via the IP Manager.

QUALITY ASSURANCE AND PERFORMANCE

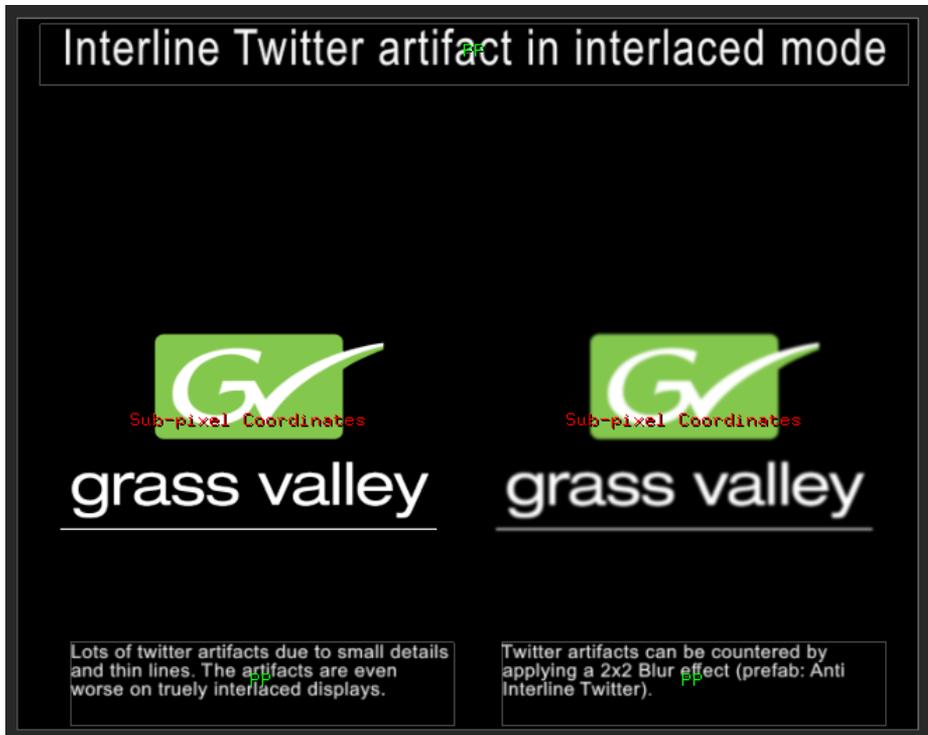
Pixel Perfect

Television presents unique challenges in the use of graphics. Channel Composer includes tools and techniques that can be used to counter graphics artifacts that can be problematic in broadcasting. These can include how to deal with distortions for 2D elements such as sub-pixel positioning and texture filtering of interlaced content.

An Object becomes pixel perfect when it maps its content straight to playout and does not transform the content's pixels during the rendering process. Distortions can occur for many reasons. Some examples include:

- The Object is rotated, scaled, and positioned in front or behind the 2D plane or on sub-pixel coordinates
- The content is stretched over the surface of a 3D object
- Texture filtering and/or effects are applied

These distortions are undesirable, especially for 2D elements such as text and main clips. With Pixel Perfect, various discrepancies are made visible to the user. An exact match is displayed in green while possible problems are displayed in red. Some of the issues that are illuminated include material distortion, off the 2D plane, shape/size mismatch, plane rotation, sub-pixel coordinates on edges, texture filtering on, effects on, or that height is not an even value for interlacing.

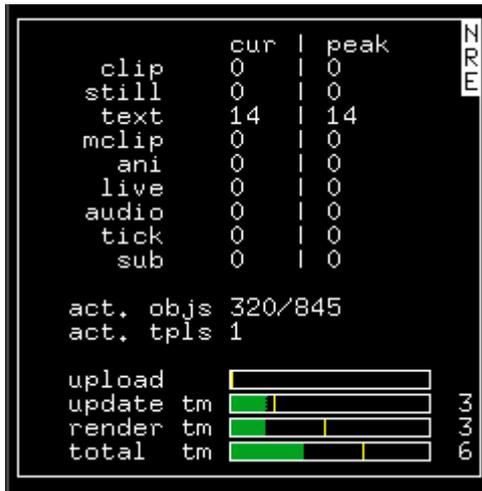


Validation

Channel Packs can be validated against a test schedule. There is a playback statistics tool that can be helpful with validation. While the test schedule is playing out on a test server—using hardware, content, and a schedule similar to the that for actual playout—the statistics tool is displayed as an on-screen overlay and shows real-time playback information:

- Current and peak amount of active players per type
- Amount of active templates
- Amount of upload bandwidth used
- Durations of the update and render phases in milliseconds and the sum of both durations

The test schedule and statistics tool can be run without monitoring. Results for peak values can be checked at the end of the test. If the statistics tool's outline is red, unacceptable peak values have occurred and further analysis and testing is required.



SYSTEM REQUIREMENTS

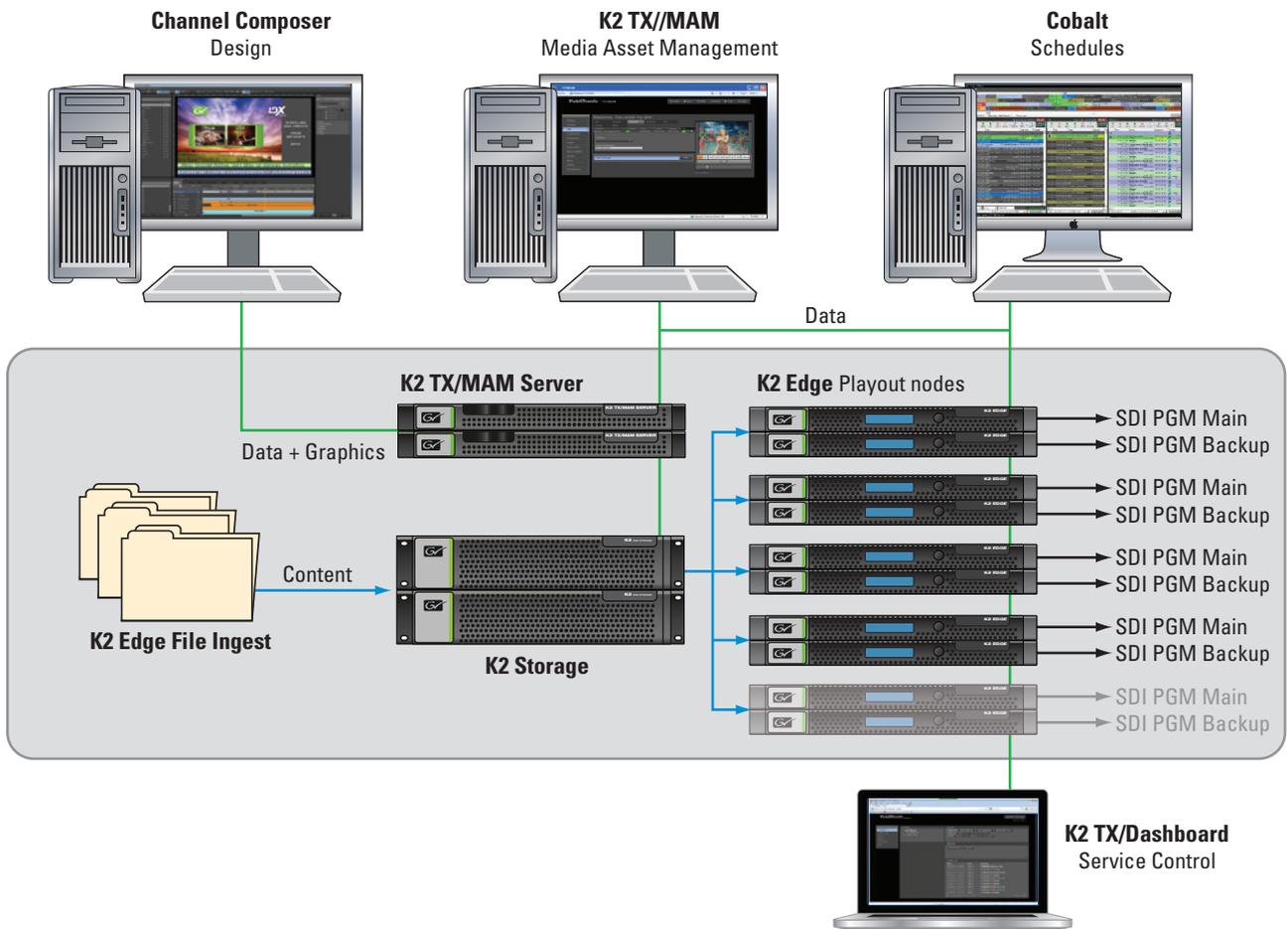
Apple Macintosh

- A Mac-based computer with a multicore Intel processor (64-bit)
- Mac OS X v10.6 (Snow Leopard) or later
- Memory: 4 GB of RAM
- Video card:
 - 512 MB of VRAM or more.
 - OpenGL 2.1 and the following OpenGL extensions:
 - ◊ EXT_framebuffer_multisample
 - ◊ EXT_framebuffer_blit
 - ◊ ARB_texture_rectangle
 - ◊ APPLE_flush_buffer_range
 - NOT recommended: NVIDIA Quadro cards.
 - Recommended: ATI Radeon HD5670 or better, NVIDIA GeForce GT320 or better
- A USB dongle with a Channel Composer license

Microsoft Windows

- An Intel/AMD 64-bit multiprocessor PC
- A 64-bit edition of Windows Vista or Windows 7
- Memory: 4 GB of RAM
- Video card:
 - 512 MB of VRAM or more
 - OpenGL 2.1 and the following OpenGL extensions:
 - ◊ EXT_framebuffer_multisample
 - ◊ EXT_framebuffer_blit
 - ◊ ARB_texture_rectangle
 - ◊ ARB_map_buffer_range
 - NOT recommended: NVIDIA Quadro cards
 - Recommended: NVIDIA GeForce GTS250 or better
- A USB dongle with a Channel Composer license

Channel Composer is installed on Mac- or Windows-based workstations which are networked to the K2 TX/MAM server for asset management interactions. The network may also contain storage systems for accessing assets and sending completed work.



ABOUT GRASS VALLEY

For more than 50 years, the Grass Valley name has been synonymous with innovation, leadership, and performance. Our full range of solutions and services is unmatched in the industry, leveraging the economies of scale of the IT industry with our proprietary core knowledge of media processing and storage. Grass Valley customers include most of the world's leading broadcasters, teleproduction facilities, and service providers, as well as independent video professionals who rely on our products to cover the world's most high-profile live events, as well as to

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