

APPLICATION NOTE

Subtitling Solutions Using the Grass Valley[®] Smart Playout Center[™]

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An integrated playout system that consolidates infrastructure and functionality permits broadcasters and playout providers to increase channel count both easily and cost-effectively. However, any reduction in performance, reliability, or capabilities is not acceptable. Subtitling is one of the capabilities that are often a critical component of an automated playout solution. Introduction of a fully file-based, truly integrated subtitling system into a playout environment brings obvious benefits.

Introduction

Although IT-based playout systems are becoming commonplace with broadcasters and playout providers, CTOs are asking: how much functionality can truly be integrated?

There are a number of distinct aspects within an integrated playout environment—such as playlist management, clip playback, graphics/branding, voiceovers, media asset management, live sources, and master control. Depending on the risk factor, or even the commercial value a broadcaster places on its channel, consideration of the density of functionality which is contained in a single platform must always be considered.

While subtitling is often a downstream component in many infrastructures due to its traditional level of complexity, this is changing with regard to integrated playout systems. Today, subtitling is increasingly becoming a very important factor when selecting a playout system. When a traditional platform for subtitling

can cost as much as a single-channel integrated playout system, it is no surprise broadcasters and playout providers are looking for more cost-effective subtitling solutions.

Distribution and transmission methodologies have been placing more and more intelligence into the STB (set-top box) and this has led to upstream changes in the subtitling infrastructure. With user-controlled multi-lingual subtitle legislation in many countries, and the every-increasing multiple platform distribution model facing broadcasters and content owners, subtitles are becoming even more relevant.

Automation of a media's secondary essence like subtitles, audio, graphics, and metadata improves efficiencies with an attractive ROI. Utilizing a single database with a distributed architecture, integrated playout systems reduce bottlenecks, technology islands, and improve workflow efficiency in the delivery chain.

Subtitling Overview

Broadcasters and playout providers have a myriad of solutions to choose from to deliver subtitles in the playout chain. There are many factors and variables to consider: multiple languages, multiple character sets, file formats, transmission formats, in-vision (open/always visible) subtitling, closed captioning, teletext subtitling, DVB subtitling, and regional standards.

In-Vision (open/always visible) Subtitling—Produces subtitles as graphical images which are made permanently visible on-screen. They are “burnt-in” and cannot be switched off downstream of the insertion method. This format supports a very wide range of characters due to its graphical nature.

Teletext Subtitling—A character-based protocol originally developed for the PAL broadcast standard which is added to the broadcast signal. Subtitles can be turned on or off by the viewer on sets which support the teletext standard.

Closed Caption Subtitling—Similar in nature to teletext subtitles. It is a character-based protocol originally developed for the NTSC broadcast standard, which is added to the broadcast signal (on line 21).

DVB (Digital Video Broadcasting) Subtitling—This closed format produces graphical images that are encoded and inserted into a transport stream and identified within the Packet ID (PID). These subtitles can be viewed and turned on or off by the viewer. This format supports a very wide variety of characters due to its graphical nature.

Finding a workflow which reduces transcoding/conversion, reduces the amount of physical integration/boxes, and reduces the manual intervention of operators, will increase both the reliability of the operation as well as limit on-air errors.

Subtitling Solutions

Depending on the complexity, live sources component, legacy infrastructure, and other such factors, broadcasters and playout providers have a choice between traditional and integrated subtitle solutions.

	Traditional	Integrated within Playout Solution
Integration Required	Multiple devices/connections and physical integration required	Standard IP networking
Workflow	Complex	Simplified and fully file-based
Cost	Multiple hardware elements and OPEX	Minimal, often included in the initial cost (CAPEX)

Maintaining a single-vendor for subtitle delivery reduces integration issues, physical infrastructure, support requirements, and simplifies the architecture.

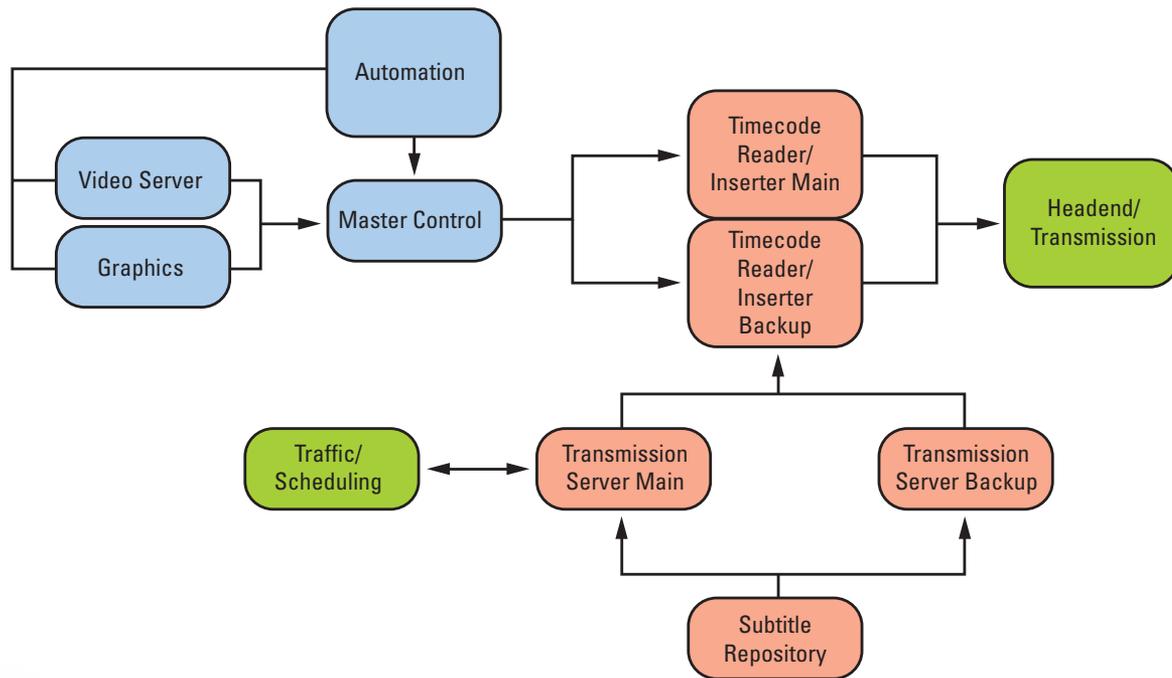


Figure 1 – Typical Traditional File-Based Subtitle Solution.

Subtitling Solutions (cont.)

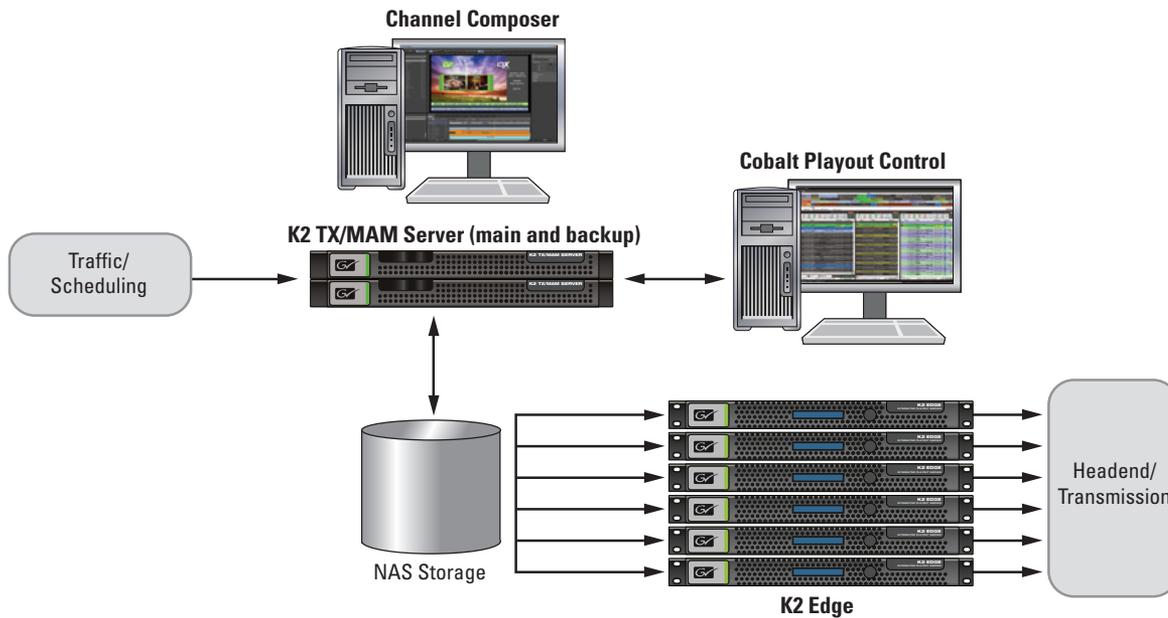


Figure 2 – Grass Valley Smart Payout Center Integrated Subtitle Solution.

The Grass Valley Smart Payout Center is purpose-built for multichannel integrated content delivery. This high-performance solution combines playout nodes, graphics, asset management, and playout control to enable a highly efficient operation. The IT-based distributed architecture—which includes a single point of integration to the traffic system—allows for a unified approach to playout.

Smart Payout Center utilizes a centralized repository and asset management system for video, audio, subtitle, graphics, scheduling, and metadata. All the

components: K2 Edge™ playout nodes, K2 TX/MAM™ media asset management, Cobalt™ playlist management, Channel Composer™ on-air graphics management, and RTic™ real-time information collector are specifically designed to work together. The system is optimized for 24/7/365 mission-critical broadcast and playout, and creates a cohesive system that provides exceptional efficiency. While each component plays a vital role, when put together as Smart Payout Center, they are extremely powerful.

Introducing The Smart Playout Center Subtitling Playout Workflow

Choosing an integrated playout system with a single-vendor approach requires discipline in selecting methodologies and approaches to the technology being deployed. One key factor is that upstream of the solution will be subtitle files, prepared for playout either internally by the broadcaster/playout provider or via an outsourced subtitle production vendor. Standards in the broadcast industry allow for interoperability and Smart Playout Center is no different.

File Formats

Smart Playout Center supports the EBU STL standard (TECH. 3264-E) and also the SRT UTF-8 encoding format. The SRT file format allows the full Unicode character set. Depending upon the subtitle transmission standard, there are a number of different supported combinations:

File Format	Language Group	In-Vison (open/always visible)	Teletext	Closed Captioning	DVB
EBU STL	Latin	√	√	√	√
EBU STL	Cyrillic	√	√	X	√
SRT	Left-to-right	√	X	X	√

Subtitle Management & Playout

Grass Valley Smart Playout Center includes playlist management (Cobalt), with main and secondary essence management (K2 TX/MAM) as part of an integrated solution.

K2 TX/MAM includes a central database which is responsible for managing the assets within the system which are located on network attached storage (NAS), and for ensuring all assets arrive at the correct playout nodes on time. This intelligence allows traffic system integration to be extremely straightforward, taking care of all main and secondary events from a single playlist file through the use of a format rules engine.

When an asset is either created in the database via schedule import or via the drop folder's file-import process, it will appear in the appropriate asset type list within K2 TX/MAM. This occurs under a folder structure so that if asset ABCDEFG.MPG is dropped into the subfolder "Program" for a channel, the media info is extracted and written to the database and the External Reference field is populated with ABCDEFG. For subtitles, an asset is dropped into the subfolder "Subtitle" for a channel and it is named ABCDEFG.stl or .srt. This subtitle data will then be automatically associated within the K2 TX/MAM database to the main asset already created. This simplified ingest model ensures mistakes in data entry are easily detected, and secondary media delivery is clearly traceable throughout the entire system.

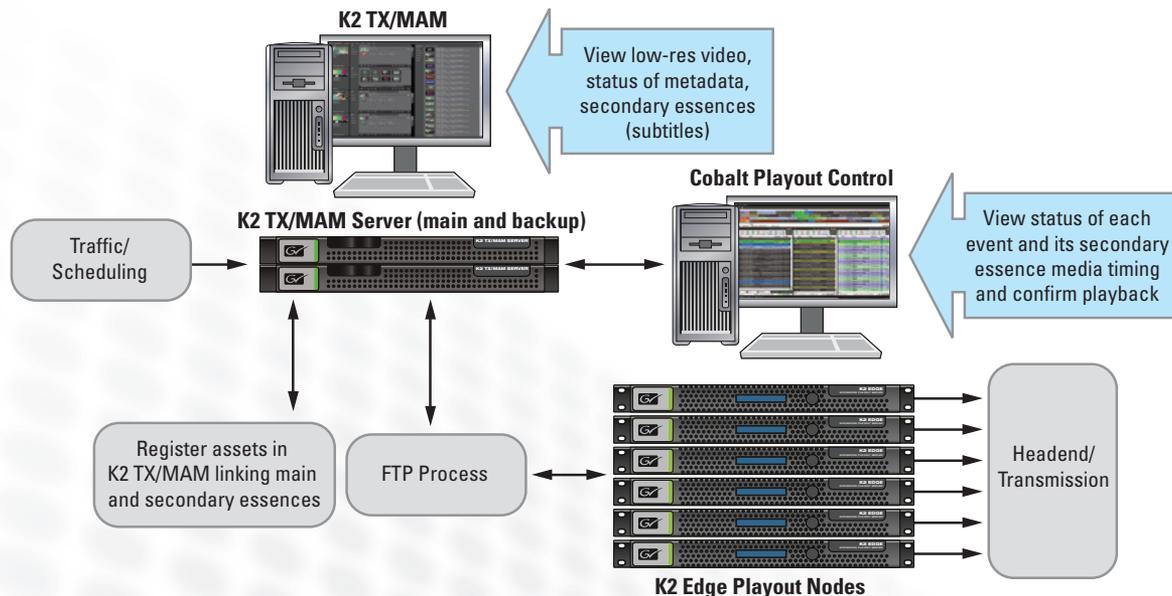


Figure 3 – Grass Valley Smart Playout Center Subtitle Workflow.

Introducing The Smart Playout Center Subtitling Playout Workflow (cont.)

It is possible to configure certain asset types to contain and require secondary asset types to be included and tracked as part of the main asset.

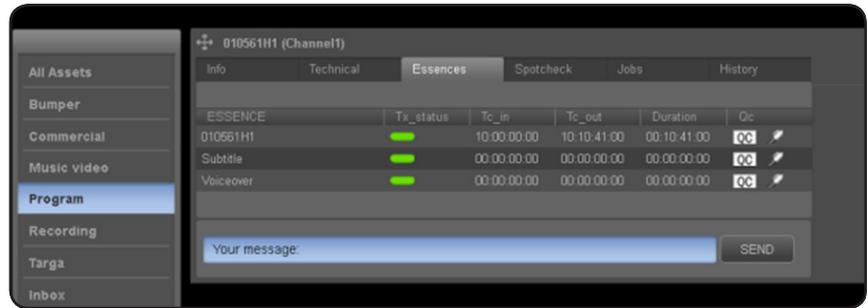


Figure 4 – K2 TX/MAM Secondary Essences.

It is also possible to configure and view the status of the secondary essences within the TX/MAM in traffic light form:

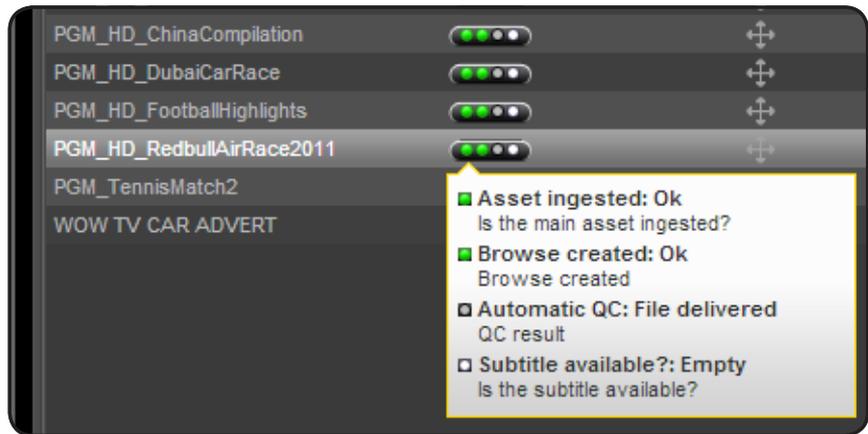


Figure 5 – K2 TX/MAM Secondary Asset Status.

This allows operators to get a very quick high-level overview of the asset's overall essence status.

Cobalt playlist management is used to manage a particular playlist of a channel. Once an event is scheduled on a channel, all of the assets required to playout those events are automatically copied to the K2 Edge playout node prior to transmission time. As an operator, customized flags for specific secondary essence management can be exposed within the playout interface for confidence monitoring.



Figure 6 – POC Clear Flags showing playout status of secondary media.

All essences within the entire system are managed utilizing the external reference (house ID) received from the traffic and scheduling system. This reduces the integration effort between different databases and simplifies the solution. Once an external reference is scheduled in an event, the appropriate formats/timing for that event are exposed within the Cobalt interface. All of the timing and trigger information is automatically populated.

Within closed captioning and DVB formats, multi-language subtitles are becoming widely used. With the K2 TX/MAM environment, it is possible—via an applet (small customized program)—to schedule and deliver multiple subtitle files with different languages to the system in a manner which allows for automatic insertion (i.e., ABCDEFG_ENG.stl for English Subtitles and ABCDEFG_FRA.stl for French).

Introducing The Smart Playout Center Subtitling Playout Workflow (cont.)

Subtitles in Channel Composer

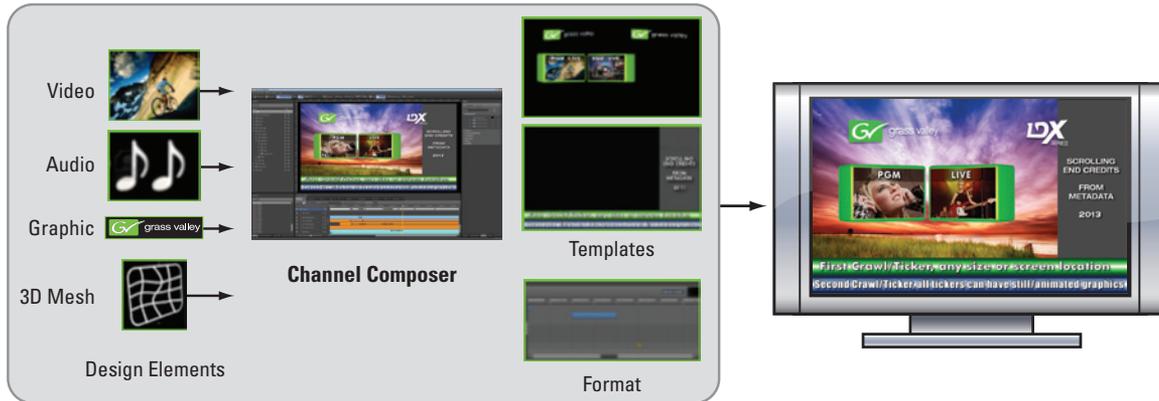


Figure 7 – Channel Composer Workflow.

Channel Composer offers an off-line channel graphics and branding layout tool for Mac and Windows. It is used for presenting the look and feel of a channel.

Channel Composer includes the concept of objects. Objects are pre-fabricated elements which provide

additional functionality to a template. The Subtitle Object contains a player of subtitle files such as STL and SRT.

Creating and modifying a subtitle template (used for the placement and behavior of the subtitle object) within Channel Composer is extremely straightforward.

Parameters defined in Channel Composer:

- In-Point**—Defines the time of the first subtitle text that must be shown when the playback of the subtitle is started. It therefore allows functionality such as restarting in the middle of a clip, after a commercial break, and also corresponding TCIn (timecode in) values such as 10:00:00:00 or 00:00:00:00. This value can have a dynamic “scene parameter” used during playout to extract the TCIn value from the main event.
- Styling**—For in-vision (open/always visible) and DVB subtitles, a text style must be defined such as font type, font color, font size, font styling (normal/bold/italic).

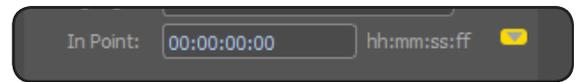


Figure 8 – Subtitle inpoint referenced to the primary asset.

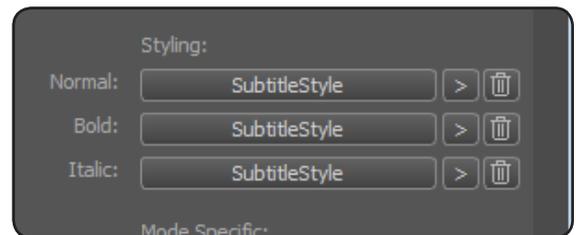


Figure 9 – Flexible subtitle display characteristics in Channel Composer.

- Subtitle Mode**—Selection of subtitle mode such as in-vision (open/always visible), closed, teletext, or DVB.

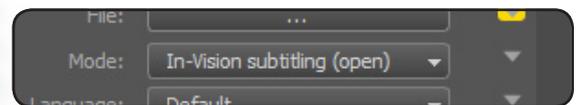


Figure 10 – Easy drop-down selection of Subtitle Mode.

Introducing The Smart Playout Center Subtitling Playout Workflow (cont.)

- **Grid**—For in-vision (open/always visible) and DVB subtitles, a grid is defined consisting of a number of slots (lines), slot dimension, and the position of the grid on screen. This is totally flexible and refers to the STL input file vertical position field.



Figure 11 – Subtitle grid definition in Channel Composer.

Mode Specific:

- **Fade Duration**—Used for in-vision (open/always visible) subtitles to define the number of fields or frames used to fade in the subtitle text on-screen.
- **Teletext Page**—Used to define the teletext page number of the subtitle
- **DVB PID**—Used to define the Packet ID of the subtitles in the output transport stream

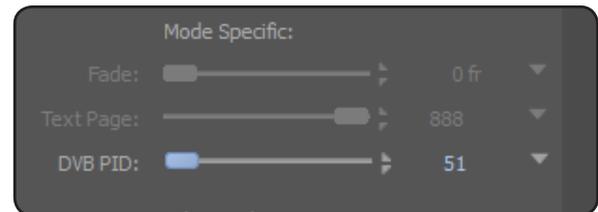


Figure 12 – Subtitle technical settings in Channel Composer.

Conclusion

Today, broadcasters and playout providers have the flexibility to choose their subtitle platform to be either independent of or inclusive in their playout solution.

Integrated playout within high-pressured broadcast and playout environments offers significant business benefits such as:

- Unified solution to deploy and maintain
- Smaller footprint: size, power, cooling
- Lower TCO (total cost of ownership)
- Scalable and resilient implementation
- Secure and reliable revenue streams

The extensible subtitle functionality of the Grass Valley Smart Playout Center offers a simple and flexible workflow which can readily fit into current environments.

ABOUT GRASS VALLEY

With a rich history serving the broadcast and professional video industries, the Grass Valley name is synonymous with innovation, leadership, and performance. With a full range of products and services supporting many of the world's most high-profile live events, Grass Valley offers the most comprehensive portfolio of software, services and IT infrastructure. Customers deploying Grass Valley solutions include most of the world's leading broadcast and teleproduction IT facilities, independent video professionals, as well

as emerging content creators and distributors providers of broadband, telecommunications, and transmission services. When you're watching news, sports, or entertainment programming, whether on a TV, the web, or a mobile phone, you're watching Grass Valley at work in the connected world.

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