![grass valley]

ICE

Flexible, Scalable, Reliable Integrated Playout Solution

Best-in-class software solution for the entire SDI or IP broadcast chain.

In today's market, you're likely to be under pressure to reduce the cost and complexity of your operations while finding new ways to increase revenue and protect business continuity.

To meet these challenges, you need a flexible, scalable, and highly efficient system that provides automated channel playout, enables rapid deployment of new revenue-generating services, and facilitates disaster recovery.

Above all, you need a no-compromise solution that delivers proven reliability, reduces complexity and cost, enables future-proof expansion and is backed up by world-class service and support.

The solution is ICE. The integrated playout solution from Grass Valley.

Grass Valley understands that broadcast master control and playout is a complex operation where a large number of sophisticated systems must all work together flawlessly.

When we designed an integrated playout solution, we focused on what it takes to make a great channel, not just a set of features, so we created ICE.

ICE delivers the operational, technical, regulatory and commercial functionality required for broadcast playout environments.

ICE dramatically increases efficiency while reducing complexity. It is a proven system that helps you lower your costs, rapidly launch new revenue-generating services and grow your business.

Best of all, Grass Valley designed ICE to deliver "5 nines" reliability, and we back it up with the best customer support in the business.

ICE was designed from the ground up to meet the demands of a wide variety of applications:

- Single-channel playout
- Channel expansion — multichannel playout
- Multiplatform playout — simulcast/delayed (+1,+3, etc.)/OTT
- Disaster recovery/back-up
- Centralization
- Migration to IP playout
- Software-defined channels

KEY FEATURES

- Reduces your CapEx for new projects compared to discrete hardware devices
- Eliminates broadcast chain integration headaches
- Choose between the 2 RU appliance with unsurpassed feature set, or the software-only solution
- Scales to any size of system
- Uses proven automation technology from the world's premier playout automation provider
- Reduces your carbon footprint
- Delivers IT efficiency without losing broadcast resilience
- ICE systems have resilience at the core of every design, capable of achieving up-times in excess of 99.999%
- Grass Valley systems evolve with our users' needs, ensuring a long life and maximum ROI
- ICE is built around inherent flexibility. Flexicore ensures you can use the internal device the way you want, and can easily reconfigure as requirements change
- All functions conform to the relevant SMPTE and EBU standards

- Options for SDI, uncompressed IP (SMPTE ST 2022-6, SMPTE ST 2110), and compressed IP (H.264 over RTP)
- Hardware ICE appliances offer up to 4 channels from a single unit
- Minimizes the need to transcode. ICE supports a multitude of codec and wrapper formats
- Play out multiple file formats back-to-back
- Full master control functionality
- Make playlist changes 2 seconds before air with confidence
- Multiple DSKs and DVEs
- RSS/XML text crawls
- Still and animated logos
- Audio overs. Live from AES3, SMPTE ST 2110-30 inputs or pre-recorded from internal file players
- Dolby E decode and encode
- Loudness assessment and adjustment
- Closed captions and subtitles in multiple formats and languages

- Up/downscaling of closed captions and subtitles
- Advanced 3D graphics for premium quality broadcast branding
- Automatic HD upscaling and SD downscaling that respect source AFDs
- ARCing and AFD insertion
- V-Chip and XDS insertion
- Audience measurement from Nielsen or Kantar Media
- Fixed latency from input to output
- Mix transitions between any sources, including live inputs
- Ancillary data: Preserve, pass-through, insert, and up/downscale
- Hardware appliances include up to 3.6 TB of local storage, plus ability to add Quantum's SAN storage
- Media optimized file system is StorNext from Quantum on the 2 RU ICE appliance

RELIABILITY AND FLEXIBILITY

ICE reliably meets the needs of *your* business, today and into the future.

Whether you operate a single channel, or work in a complex, multichannel environment, ICE is designed to accommodate your current requirements, provide complete scalability for the future and the peace of mind that comes with proven "5 nines" reliability.

Proven to Deliver "5 Nines" Reliability

Grass Valley understands how critically important reliability is to your business. Failures cost you money, or worse. That's why we engineered ICE to deliver "5 nines" reliability, and we back it up with the best customer support in the business.

ICE is a proven system that is used rigorously by some of the world's largest and most demanding media organizations every day to deliver high-value premium content.

Dramatic Savings on CapEx and OpEx

By combining dozens of formerly standalone products into a single system, ICE significantly lowers your capital expenditure.

As a single integrated system, ICE eliminates multiple maintenance contracts, it also requires less rack space, less power and less cooling than traditional systems.

Built-in flexibility ensures ICE can adapt easily to meet changing requirements.

Scalable and Flexible Operations

ICE is designed to integrate seamlessly with your existing environment, giving you the flexibility to work the way you want to work. Totally scalable, ICE can grow from a single channel to 100+ channels while maintaining the same user interface.

ICE does not force you to change your workflows, it can act as a replacement or a complement to your existing systems.

Unique FlexiCore architecture lets ICE dynamically adapt to the requirements of virtually any operational environment, giving you high performance and peace of mind.

Unrivaled Feature Set Provides Further Savings

ICE delivers more than just the basic features such as automation, storage and graphics. It includes extensive tools to help you manage your playout operations, including single-channel, multichannel, multiregion and multiplatform environments.

ICE can be deployed for every type of channel playout, disaster recovery, and live application.

Rapid Deployment of New Channels and Services

ICE lets you get new revenue generating services launched quickly and cost-effectively.

Because it's an integrated system, ICE requires less wiring, less integration, and less commissioning and training time.

Furthermore, ICE SDC is a software-only product which allows automated, rapid deployment on COTS hardware for optimal scalability — up or down.

Whether your strategy calls for launching new broadcast channels, sub-channels, or TV Everywhere services, ICE can get you up and running quickly, and keep you on the air.

WHAT MAKES ICE UNIQUE?

ICE more accurately emulates a master control environment than any other channel-in-a-box solution.

When developing ICE, Grass Valley combined the best of IT technology with our extensive advanced media know-how to deliver a uniquely flexible multifunction building block, capable of managing the widest range of programming and event types.

FlexiCore

ICE more accurately emulates a master control environment than any other channel-in-a-box solution, thanks to its unique FlexiCore architecture.

FlexiCore is a software-based "virtual router" that allows all resources in the playout workflow to be flexibly allocated to the signal path based on where they are required. Other products with fixed signal paths will inherently limit flexibility and may not be suitable for some applications.

Content Pre-validation Ensures Error-Free Transmission

In a fast-paced playout environment, content is delivered to broadcasters in multiple formats from a wide variety of providers. Whether content is delivered on tape or file, it must be error-free and conform to technical standards.

Traditional QC processes can be time-consuming and expensive, but ICE makes it easy through Grass Valley's unique content pre-validation technology, which automatically checks the integrity of source material as soon as it is available to make sure the incoming content is playable.

Local or Centralized SAN Storage

When sold as an appliance, ICE provides integrated RAID storage with and uses Quantum's media optimized StorNext file system.

ICE systems can be expanded with a large scale, high bandwidth shared SAN from Quantum. This allows fast turn-around recording material to be instantly played back by any other attached ICE.

For added flexibility, ICE has also been integrated with a wide variety of generic storage technologies, as well as the industry's leading archive management solutions, all managed by our comprehensive media management tools.

Unparalleled Live Event Handling

Manual intervention could not be simpler or more reactive. By using hardware or software control panels any manual functionality can be achieved from taking the next event to adding live graphics on the fly which can be populated using RSS feeds or web content.

Live audio overs can be made using ICE's discrete audio functionality for live or prerecorded audio content.

Powerful Graphics Capabilities

Full 3D CG playout. Areas of the graphic can be built to accept text inputs from operators and external data inputs such as RSS feeds, websites or text files.

But if you prefer to keep your existing graphics devices and workflows, just feed the signal into ICE's key and fill inputs and let ICE adapt to the way you want to work.

Integration with Hundreds of External Devices

ICE has been integrated to hundreds of third-party systems including storage, video servers, graphics devices and subtitlers.

Full BXF support enables integration with traffic, automation, MAM, etc.

Scalability

ICE is the only channel-in-a-box system that can truly scale from a single channel to 100+ channels while maintaining the same user interface. It enables you to bring new revenue-generating channels and services online quickly, without disrupting your operations.

99.999% Reliability

ICE is designed for real-world broadcast playout environments. It delivers high quality, superior performance, and above all, reliable operation. Our customers constantly tell us it delivers greater than "5 nines" reliability.
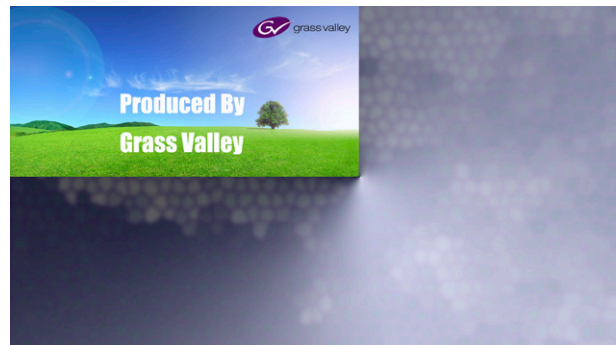
Backed by Dedicated Support from Grass Valley

We take customer service seriously. We recognize that playout is a mission-critical environment, so we've created a dedicated support function for ICE customers.
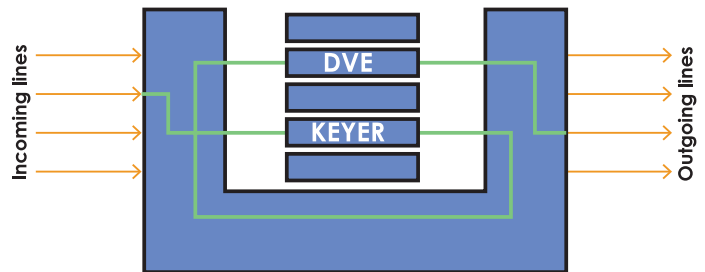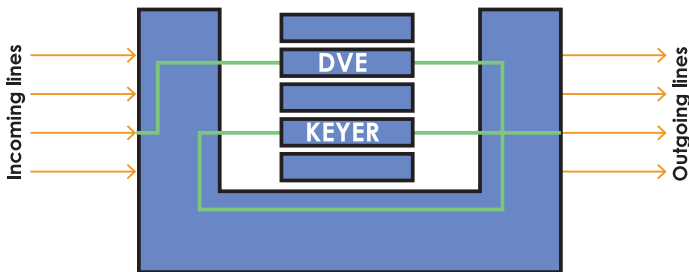
Our professional services team is committed to providing the expertise and timely support your business needs.

DVE → Keyer = Logo not squeezed

Keyer→ DVE = Logo squeezed

ICE provides all the tools you need to manage your playout operations.

ICE is suitable for the widest range of applications, from simple, single-channel start-up operations to complex multichannel, multiplatform and prime-time broadcasts.

Single Channel Playout

ICE provides all the operational, technical, regulatory and commercial functionality required to facilitate single-channel playout applications, or to get new channels on the air quickly.

Channel Expansion

When you are ready to expand your channel line-up through subchannels or new revenue generating services, ICE has the tools you need to launch new services quickly and cost-effectively. A single ICE appliance can play out up to four separate SD or HD broadcast channels, and the systems massive scalability lets you seamlessly add hundreds of new channels and services.

Centralization or Edge Playout

ICE gives media organizations the choice of local or centralized deployment, with full control at either the center or the edge. This lets local broadcasters remain in control of their branding and breaking/live events, while providing efficiencies at the center.

Centralized control lets media organizations process content once before sending it out to local stations, thereby eliminating duplication of effort and increasing operational efficiencies.

Multichannel Playout

ICE can scale from a single channel to hundreds of channels, using the same underlying automation architecture and user interface. For multichannel environments, ICE provides all the tools needed for fully automated playout and delivery of file-based content, as well as the ability to add live channels, and breaking news.

Multiplatform Playout

ICE supports a wide variety of content distribution business models for multiplatform services. Comprehensive format, codec and wrapper support lets broadcasters add mobile and web delivery platforms to their playout strategies.

Interfaces to your preferred OTT streaming service allow you to optimize your revenues by tailoring the content on a personal, local or platform level. ICE has a variety of integration strategies, with signaling both embedded in the outgoing signals, or direct http messaging to your preferred OTT stream encoder.

Simulcasting and Delayed Services

ICE includes the ability to simulcast HD, SD, clean outputs and delayed program feeds, all from a single playout automation schedule.

Disaster Recovery

Traditionally, disaster recovery was unaffordable for many broadcasters, but with ICE this is now a viable option. In the event of technical failures, weather event or natural disaster, ICE lets you maintain your business continuity and deliver valuable information to your viewers. Mirrored playback, automated switch-over, hybrid store and forward topologies, and tight integration between systems means that ICE will keep you on the air without interruption or loss of revenue.
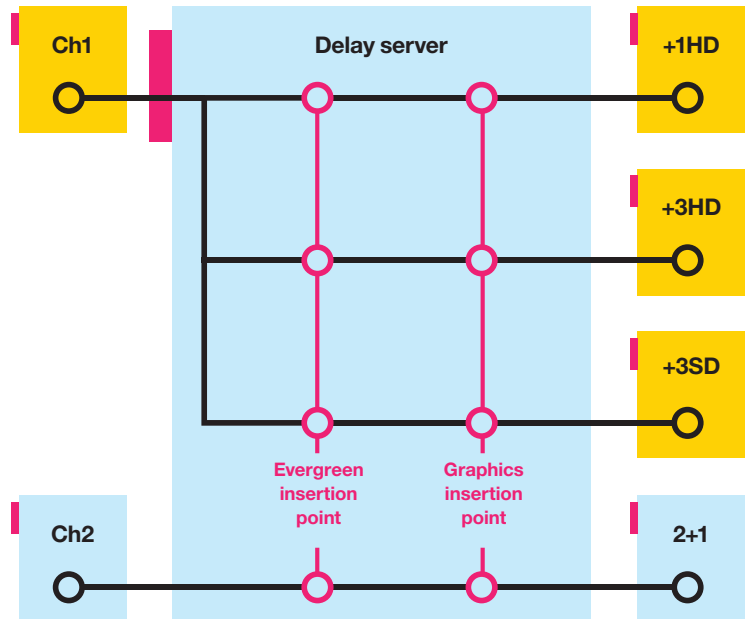
Delay Server

If you have requirement to delay one or more of your channels, ICE can provide any amount of delay from 15 minutes to 12 hours. Typical implementations are for +1 hour catch up service, or +3 hour delays for US East/West coast differences.

The number of simultaneous Delay Channels will depend on the hardware option selected.

ICE can either be a standalone Delay Server or it can delay an internally generated channel.

ICE's unique internal architecture allows for different branding on the +n delay, and this branding can be simultaneously controlled from the same master playlist that controls your main channel.

Automatic failure detection is used to insert a pre-defined Evergreen standby material for the amount of time the unit is offline, and this can be different for each channel.

Automatic recovery failure means frame accurately rejoining the delayed playout with no manual intervention required to record and play the delay feed.

Ancillary data is preserved from input to output of each delay.

Master Control

ICE supports all the secondary functions you would expect from tradtional master control, including DVEs, DSKs and audio overs. These can all be fed by any internal or external source.

All master control functions can be manually triggered from configurable hardware or software panels as well as from the automated playlist.

ICE allows you to simultaneously output clean, fully branded or even partially branded channels from a single playlist.

Operators can replace the next event in a playlist two seconds before it airs with complete confidence that the new event will play.

Transition durations from 1 – 99 frames

VFade

Fade & Take

Cross Fade (Mix)

Take & Fade

Cut

UFade

Both A and B inputs to a transition may be fed from any internal or external sources, allowing mixing between two live sources.
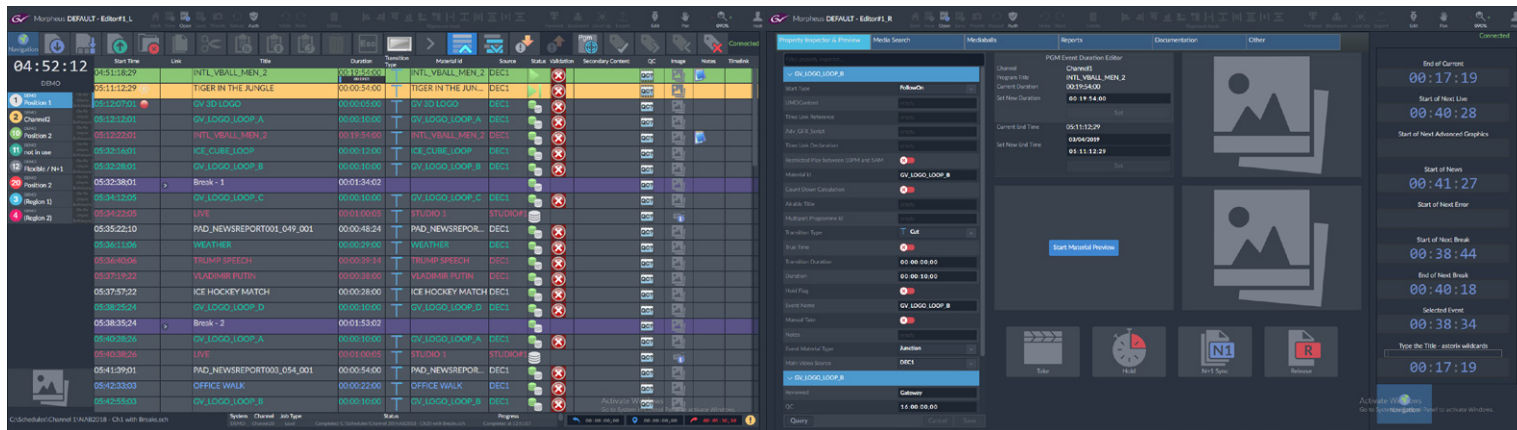
Up to six internal master control switchers per ICE and ability to daisy chain these switchers for ultimate flexibility.

Audio is supported between program and preset events.
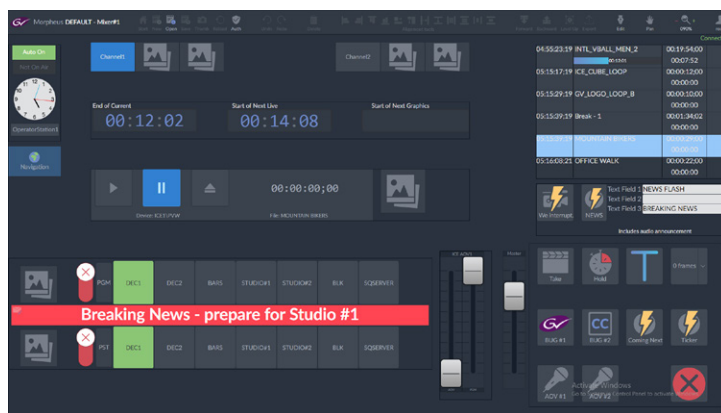
Morpheus UX Master control layout.

MAP Morpheus automation access panel.

User Interface

The system includes advanced functions such as Join In Progress and Commercial Hotlist to optimize the operator's ability to handle live situations.

For more information on all the control and interface options, please refer to Grass Valley's Morpheus datasheet.

Sources

ICE has multiple internal sources to feed the secondary DSKs, DVEs and AOVs. Sources include graphics, text and audio players.

DSKs can either be scheduled with a duration, or separate on and off trigger events, or manually put to air by the operator.

The Native Graphics Players can play any of the video formats listed earlier, but without audio.

This is in addition to the compressed MGF format for logos and MMGF format for animated logos.

Text Players

Support for up to eight Text Players per ICE.

Each Text Player can provide still or crawling text, with size, color and opacity fully configurable.

- Text crawls can be supplied from XML or RSS feeds with speed and direction fully configurable
- Text Players support Unicode character sets
- Interstitial graphics can also be inserted between strings of text
- For more complex CG requirements please refer to our Advanced Graphics datasheet for options

Clocks

Integrate real-time clocks into your text players.

Dynamic clocks can be very flexibly produced by ICE and added within text to produce time of day clocks and count up/downs.

These can include or exclude days, hours, minutes, seconds, frames, as required.

Examples:
- The time is now 12:02
- It is 3 days, 5 hours until New Years Day

Text Player being keyed over a graphics layer.

Text Player using Arabic characters and scrolling from right to left.

GRAPHICS SUPPORT

Native Graphics

Native Graphics ICE supports up to four animated graphics players and four still logo players per ICE.

Native Graphics File Support

Grass Valley recommends: PNG or 32-bit TGA as these support alpha channel. Any of these file types can also be converted to a compressed MGF file (native ICE format).
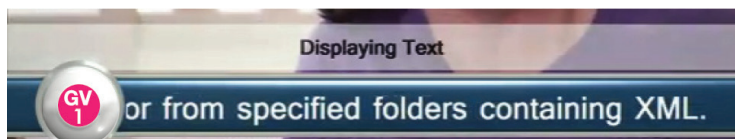
Advanced Graphics

With the Advanced Graphics options, ICE offers full 3D and 2D CG playout.

Areas of the graphic can be built to accept text inputs from operators and external data inputs such as RSS feeds, websites or text files.

Two 2D or one 3D advanced graphics plug-ins are supported on each 2 RU ICE appliance, allowing two separate channels to have this premium level branding.

Further details are available in the separate ICE Advanced Graphics datasheet.

Advanced Graphics: Dual input 3D DVE End Credits Squeeze with dynamic text.

Advanced Graphics: 2D Lower Third with dynamic text fields.

Audio

ICE has audio support that is as flexible and comprehensive as its video handling capabilities. Pre-recorded, live, secondary or primary events are supported with a comprehensive track shuffling function.

When using Track Tagging, a maximum of 64 separate audio channels can be associated with the main video asset and selected from at time of playout.

ICE also supports AES67 for very high audio channel counts.

Comprehensive Audio Functionality

ICE supports two methods for rearranging the audio of your material: either by using the common Track Tagging method where language tracks are tagged using metadata in the file's header, or with ICE's comprehensive Audio Expressions. With Audio Expressions you can define the desired audio arrangement at any point within the internal transmission path including the input and output points, allowing any material, whether live or recorded to conform to your preferred configuration.

Audio Expressions can be set as a default, or modified on an event by event basis, with a hierarchy of alternatives in case the first choice of audio is not available. The values can either be manually entered, set by metadata from the database, or set by your traffic system.

Audio Expressions can be combined with the Continuity functions described below to ensure any voice overs are only mixed into the main program audio tracks that you require.

Pre-Recorded Continuity

Support for up to four Audio Players per ICE. Audio Players, when used with audio overs, can be used for automated voiceover announcements.

Audio – File Support for Audio Overs

Audio files must be 16 or 24 bit PCM data sampled at 48 kHz
- BWAV files allow cue to timecode for functions such as Audio Description (Europe) / Video Description (Americas)
- Multilingual audio overs from separate audio files are supported. In this instance, WAVs only are supported
- Shuffle, duplicate and mask audio over channels so the final PGM mix is suitable for your audience

Audio Secondary Playback Formats		
WAV/BWAV	16/16, 24/24, 24/32	Sampled at 48 kHz
AIFF	16/16, 24/24, 24/32	Sampled at 48 kHz

Live Continuity

External Audio Sources

Live voiceovers are supported either with dedicated unbalanced AES inputs, or by using an SDI external input with embedded audio.

Please discuss with Grass Valley if your project requires live voiceovers on ICE SDC.

Audio – AES3 / SMPTE ST 2110-30 Support for Live Audio Overs
- ICE's audio inputs allow live continuity announcements to be mixed into the program audio
- Eight inputs are available for 8 stereo pairs, or 16 mono channels
- Dolby 5.1 can be downmixed to stereo using either Lo/Ro or Lt/Rt

Dolby E

ICE can play your Dolby E encoded files or live content without the need for external devices. Decode internally to add your continuity voice overs and re-encode back to Dolby E on the output. Combine with ICE's Audio Expressions to define which audio channels should have audio overs added or ignored.

When the optional Surcode for Dolby E is not used, all tiers of ICE still support the pass-through of Dolby E audio.

Dolby E – Decode and Encode
- Decode Dolby E encoded files
- Decode Dolby E encoded live sources
- Dolby E supported for program or secondary content
- Mix your video sources, add PCM audio overs and then re-encode back to Dolby E on your output
- Any internal delay is compensated for to ensure all channels have a fixed delay from input to output, whether Dolby E is used or not
- No lip sync issues – video and audio are always synchronized
- Validated and authorized by Dolby Labs
- ICE uses SurCode for Dolby E to encode and decode content

Audio Extras

Please also see the Ancillary Data section for details of ICE's audio cue tone support for remote triggering.

Upmixing

Stereo can be upmixed to simulate 5.1 surround sound.

Loudness

Automatically assess and adjust your entire channel's output to conform to Loudness standards.

Common international standards have prebuilt templates that can easily be recalled.

Loudness Assessment and Adjustment
- Flexible configuration to define exactly the Loudness adjustment and criteria to suit varying international standards
- Dynamically adjust the channel output on the fly without modifying the original source content
- Entire channel output, including live feeds, all adjusted
- Easily switch your channel output between the loudness adjusted and original version at any time
- Loudness adjustment is done on the live signal and introduces a delay of only a few frames
- Adjust the loudness for each audio channel separately on each mixer in your ICE

Audience Measurement

ICE has integrated both Nielsen's and Kantar Media's (Civolution) audio watermarking technologies into ICE so that your channel's viewing figures can be monitored.

Psychoacoustic Audio Signals

For Both Nielsen and Kantar Media ICE inserts signals that are inaudible to the human ear into the output streams which are then picked up by measurement equipment.

Suitable for both live channel broadcast and later catchup viewing (C3/C7).

Nielsen
- Supports both content and network identifiers
- Supports both versions of Nielsen algorithm – Naes2 (NW), Naes6 (N6)
- Validated by Nielsen for compliance to their specifications
- If ICE is being used as a multichannel device, each channel output can have its own separate identifier

Kantar Media

Validated by Kantar Media for compliance to their specification. Please ensure you discuss your Kantar Media requirement with Kantar before purchasing the license option from Grass Valley.

Closed Captioning & Subtitles

ICE allows pass-through of embedded captions, insertion from caption files and up/down conversion to match the final output standard.

ICE supports both the insertion and passing through of caption data in the same system. For example, passing through commercial caption data, but inserting program captions from files.

Live caption and subtitle insertion is possible using Ctrl-A (USA) and NewFor (UK) protocols.

Please also refer to the Timecode section for more details about driving captions files in ICE.

Management Utilities

An ICE system can be provided with useful content management tools such as Subtitle/CC synchronization to ensure your secondary files are always pulled onto the playout server in time for TX. Grass Valley's Sales Engineers can advise on the best system design on all aspects of your workflows.

Closed Caption Formats
- File insertion: .scc Scenarist Closed Captions version 1.0 .cap NCI National Captioning Institute (via optional conversion process)
- Pass-through of embedded Closed Captions, inserting from files, and HD/SD up/downconversion is supported
- Live data feed. Ctrl-A protocol from VITAC device via serial connection

Multiple languages can be inserted into four data channels on Line 21 from separate caption files:
- Field 1 – CC1 or CC2
- Field 2 – CC3 or CC4
- SD closed captions conforms to the CEA-608
- HD closed captions use CEA-608 captions encapsulated within CEA-708 packets
- Where video files are supplied with both SMPTE ST 436 and A/53 MPEG caption data, the SMPTE ST 436 data will take priority

Subtitle Formats
- File insertion: .stl World Standard Teletext (WST/OP42) subtitles
- Pass-through of embedded subtitles, inserting from files, and HD/SD up/downconversion is supported
- Live data feed. NewFor protocol over IP
- Multiple languages from separate stl files can be inserted into configurable VBI lines and Teletext pages
- ICE supports .stl files that conform to EBU Tech. 3264-E
- All ASCII and non-ASCII characters are supported including non-Western characters, for example Japanese or Arabic
- Open subtitles for rendering text onto the output video
- Multiple open subtitles can be rendered simultaneously
- ICE's support for subtitles conforms to WST, OP42 and OP47 standards
- SMPTE ST 428-7 support for complex characters used in Asian languages
- Insert looping apology subtitles when subtitles are not delivered on time

Open subtitles being inserted from an STL file, driven by the video file's timecode.

Audio Description

Audio description can be provided internally from the separate narration and control signals to ensure legal obligations to provide access services are met without the costs of additional equipment.

• Insert at playout time and avoid needing to pre-process your media
• Provide a suitable WAV file and ICE will mix the audio description track as instructed
• Provides a fully mixed "broadcaster mix," aka SkyMix
• Use audio expressions to place the audio description on the required audio channels

EAS — Emergency Alert System

The US Emergency Alert System is supported in ICE by using dedicated third-party encoder/decoders that receive CAP messages. ICE supports a range of protocols used by EAS devices and these can be used to trigger user definable actions in ICE.

Supported EAS devices:
• DASDEC II – Monroe Electronics
• EASyCAP – Trilithic
• Digital ENDEC – Sage

Respond to National or other alerts with text and audio from the EAS device and put to air on your ICE unit.

Immediate air and delayed air modes both supported.

If you would like to enhance your EAS announcements above the normal options (additional animated weather graphics, for example), please contact Grass Valley.

ICE Local Storage

The ICE hardware appliances include local storage of up to 3.6 TB. Grass Valley's media management tools ensure that material required for playout is transferred in time required order.

ICE supports integration to NAS devices that support passive FTP. When integrated to Grass Valley media management system, files are automatically transferred as requested by the playlist.

If you select ICE SDC, the hardware specification is decided by the customer. Please contact Grass Valley for more details.

Local Storage
• The hardware ICE appliance includes multiple disks for RAID protected playout. The listed storage amount is the usable amount after the RAID
• RAID-10 (sometimes referred to as RAID-1+0) provides better throughput and latency than other RAID configurations and is the most suitable configuration for situations requiring high disk performance
• ICE is supplied with 8x 1 TB SAS disks
• ICE supports up to 60 MB/s of FTP transfer bandwidth (meaning that to transfer a 1-hour, 50 Mb/s file takes approximately 10 minutes), although exact transfer rates can be adjusted based on what bandwidth is required for playout. Please discuss with a Grass Valley Sales Engineer
• Grass Valley's Media Management tools will automatically transfer content from other video servers and archives and automatically manage the free space levels on the disks

ICE SAN (Storage Area Network)

SAN Storage

Grass Valley is proud to partner with Quantum to offer a SAN solution for ICE. SANs, (as opposed to nearline NASs) offer the advantage of providing a single large, shared storage system.

Multiple ICE systems can record and playback the same files simultaneously.

SPECIFICATIONS

Multiformat File Support – Play

Any of the supported SD or HD video files can be played back to back; removing the need for transcoding systems and allowing easy migration from legacy video servers. Grass Valley provides a full service to verify your files are supported so you can enter a project with confidence.

ICE supports the following resolutions and frame rates:

- PAL 4:3 720x576 25 fps
- PAL 16:9 720x576 25 fps
- 720p 50 1280x720 50 fps
- 1080i 50 1920x1080 25 fps
- NTSC 720x486 29.97 fps
- 720p 59.94 1280x720 59.94 fps
- 1080i 59.94 1920x1080 29.97 fps

PAL and 1080i50 or NTSC and 1080i59 formats can be played back-to-back on the same decoder.

Grass Valley Recommends: ICE has industry-leading file format support, but every new project should have its playout content validated early on to ensure compatibility.

ICE supports the official SMPTE format standards, however where leading server manufacturers have developed nonstandard implementations, ICE can be configured to match, ensuring files can be exchanged for interoperability.

Supports standard and nonstandard implementation of Long GOP pre-charge values.

Supports the selection of which type of timecode to use where a file is delivered with inconsistent header and timecode tracks (refer to the Ancillary data section).

Supports some types of proprietary Seachange MXF and MPEG files.

In addition to main playback, ICE supports preview functions such as Jog / Shuffle.

DPP – ICE supports AS-11 format files, as recommended by the UK DPP organization

MXF – These options are supported: OP1a, AS-02/OP1b (mastering format), AS-03 (distribution format), AS11 (UK DPP Shim).

MOV – Internal and external essence formats are supported. An odd number of audios can be supported with external essence MOVs, up to 64.

GXF – Support conforms to SMPTE ST 360.

AVI – Wrapper formats support video only with no audio.

MPG – Wrapper supports MPEG Main and High levels.

Play while transfer is supported for MXF OP1a and MOV external essence files.

Multiformat File Support – Record

Any files marked with TDIR can be played back within seconds of the recording starting.

For shared storage for our ICE and ICE LE appliances please refer to the SAN section.

Secondary Master Control Functions

Up to 8 DSKs per mixer
Up to 4 DVE tiles per ICE unit
Up to 4 Audio overs per mixer

Video Playback Formats

Format	Codec	Bit Rate Mb/s	Audio Channels	Supported Wrappers	Ancillary Data
DV25	DV25	25	2,4,8,16	AVI, MOV, MXF, GXF, LXF	MOV, MXF, GXF
DVCPRO 25	DVCPRO25	25	8,16	AVI, MOV, MXF, LXF	MOV, MXF
DVCPRO 50	DVCPRO50	50	8,16	AVI, MOV, MXF, LXF	MOV, MXF
DVCPRO HD	DVCPRO100	100	8,16	AVI, MOV, MXF, LXF	MOV, MXF
IMX	D10	range	4,8	AVI, MXF, LXF	MXF
XDCAM HD 420/422	XDCAM	50	4,8	MXF, LXF	MXF
XDCAM EX 35	XDCAM	35	4,8	MXF, LXF	MXF
MPEG-2 420/422 (SD/HD)	MPEG-2	range	2,4,8,16	AVI, MPG, MXF, GXF, MOV	MOV, MXF, GXF
SD MPEG with alpha	MPEG-2	40	0	AVI, LXF	x
HD MPEG with alpha	MPEG-2	60	0	AVI, LXF	x
Pro-Res 422 HD	Apple Pro-Res	147	2,4,8,16	MOV	MOV
DNxHD	Avid DNxHD	36,145	2,4,8,16	MOV, MXF	MOV, MXF
AS-11	AVC-Intra100	114	1 – 16	MXF	MXF
WMV	WMV9, 10 ,11	range	2	WMV	x

SPECIFICATIONS (CONT.)

Video Record Formats

Format	Codec	Bit Rate Mb/s	Audio Channels	Supported Wrappers	Ancillary Data	TDIR
DV25	DV25	25	2, 4	MXF, GXF, MOV	x	MXF
DV50	DV50	50	2, 4	MXF, GXF, MOV	x	MXF
DV100	DV100	100	4	MXF, MOV	x	MXF
IMX	D10	30	4, 8	MXF	MXF	MXF
IMX	D10	40	4, 8	MXF	MXF	MXF
IMX	D10	50	4, 8	MXF	MXF	MXF
XDCAM HD 422	XDCAM	50	8	MXF	MXF	MXF
MPEG-2 420	MPEG-2	12	2, 4	MXF, GXF, MPG	MXF	MXF
MPEG-2 422	MPEG-2	15	2, 4	MXF, GXF, MPG	MXF	MXF
HD MPEG 420	MPEG-2	40	2, 4, 8	MXF, GXF, MOV	MXF, GXF	MXF
HD MPEG 420 40	MPEG-2	40	2, 4, 8	MXF, GXF, MOV	MXF, GXF	MXF
HD MPEG 422 35	MPEG-2	35	2, 4, 8,16	MXF, GXF, MOV	MXF, GXF	MXF
HD MPEG 422 50	MPEG-2	50	2, 4, 8,16	MXF, GXF, MOV	MXF, GXF	MXF
HD MPEG 422 100	MPEG-2	100	2, 4, 8,16	MXF, GXF, MOV	MXF, GXF	MXF
SD MPEG with alpha	MPEG-2	40	0	AVI	x	x
HD MPEG with alpha	MPEG-2	60	0	AVI	x	x
AS-11	AVC-Intra100	114	2, 4, 8,16	MXF	MXF	x
Pro-Res	Apple Pro-Res	147,102,45	2, 4, 8,16	MOV	MOV	x
Avid DNxHD	Avid DNxHD	145,200	2, 4, 8,16	TBC	TBC	TBC

SNMP

ICE can be monitored from a suitable monitoring solution using SNMP. Grass Valley's Orbit solution can go beyond this by also offering functions such as schedule aware exception monitoring to provide context aware alarms to your playout operators.

Timecode

Timecode is provided into the system either over the network from a central source or the hardware ICE appliance has the option to receive a direct timecode feed on the BNC shown below.

ICE also supports PTP for IP video-based systems. Please discuss your requirements with Grass Valley.

SPECIFICATIONS (CONT.)

ARC & AFDs

ICE allows AFDs to pass through, or for the system to insert specific scheduled AFD codes from the playlist. Individual decoders may also have default AFDs set.

ICE reacts to an AFD by comparing the value and the destination frame size and ARCing appropriately. One possibility this offers is allowing HD and SD simulcasting of the same channel with correct aspect ratio on both outputs.

AFDs can be read from both files and live incoming sources.

Grass Valley has also helped customers who needed custom non-SMPTE codes. These are now available to be scheduled in exactly the same way as standard codes.

Read:

- AFD values are used to correctly ARC the video on output
- For PAL systems ICE can be configured to prefer WSS or RP186
- ICE can read Ancillary Data Packets that conform to SMPTE ST 291
- ICE can read VANC data from SMPTE ST 436 compliant MXF files

Record: By selecting the relevant codec and wrapper, all ancillary data can be encoded as a SMPTE ST 436 compliant MXF track.
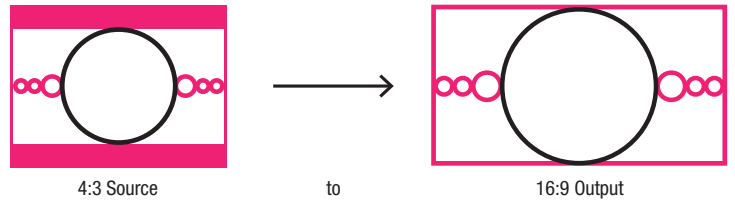
Play:

- AFD metadata contained in valid files will be read and regenerated as VANC data in the SDI output
- These signals can be from external live sources or internal decoders. The data can be passed through or inserted by the system
- These signals can be from external live sources or internal decoders. The data can be passed through or inserted by the system
- Please discuss with Grass Valley if your project involves the transport of ancillary data into IP streams so we can confirm this is possible in your preferred format
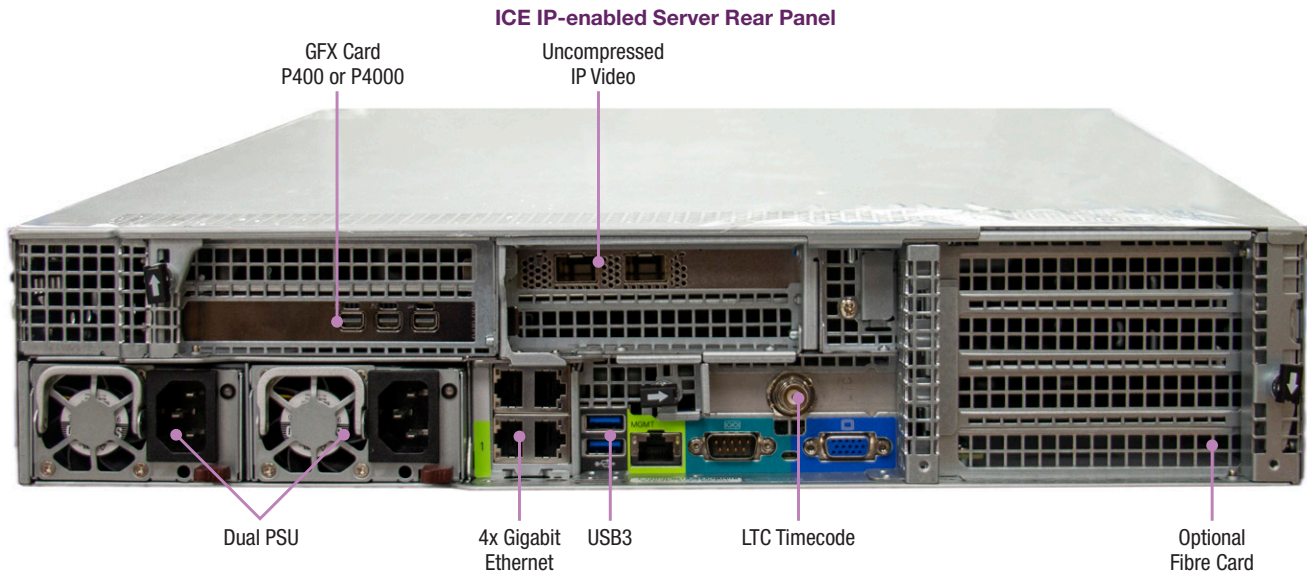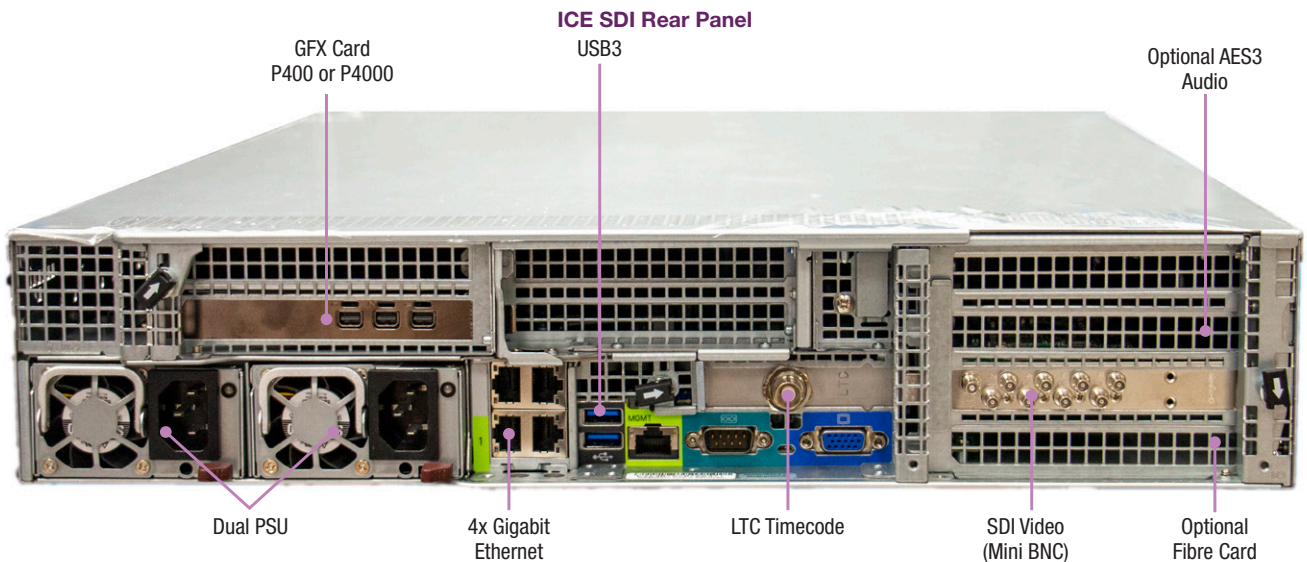
AFD Support

59.94 Hz Systems	SD/HD	Location	Standard
Video Index/ARD	SD	Line 11	RP186
AFD	HD	VANC	SMPTE ST 2016
50 Hz Systems	**SD/HD**	**Location**	**Standard**
Wide Screen Signaling	SD	Line 23	WSS
AFD	HD	VANC	SMPTE ST 2016

ARC Support Table

4:3 Source   to   16:9 Output

One of the 20 conversion options illustrated in the ICE manual.

ICE SDI Rear Panel

GFX Card P400 or P4000 — USB3 — Optional AES3 Audio — Dual PSU — 4x Gigabit Ethernet — LTC Timecode — SDI Video (Mini BNC) — Optional Fibre Card

ICE IP-enabled Server Rear Panel

GFX Card P400 or P4000 — Uncompressed IP Video — Dual PSU — 4x Gigabit Ethernet — USB3 — LTC Timecode — Optional Fibre Card

SPECIFICATIONS (CONT.)

Ancillary Data Timecode

ICE supports a wide range of timecode types:

Video files can often be delivered with more than one type of timecode track which may not match. ICE has six timecode reading options to ensure the system performs as you want it to.

Timecode is a complex area that Grass Valley can provide support to customers on if required.

Grass Valley also provides a free file validation service to customers to ensure that the functionality you require can be provided. Please contact Grass Valley to discuss your precise requirements.

For information about encoding timecode please refer to the Video Recording Formats section earlier in the document.

Grass Valley Recommends:

If you wish to insert closed captions SCC files or subtitle STL files, you should ensure your video files contain valid timecode tracks. Grass Valley's Validation Team will confirm that your files are suitable before starting a project.

Please discuss with Grass Valley if your project involves the transport of ancillary data into IP streams so we can confirm this is possible in your preferred streaming format.

Ancillary Data Reading

Where ICE is downstream of signaling equipment, it can read encoded user bit data to trigger virtual GPIs and carry out a wide range of functions as a result.

Ancillary Data Support – Reading User Bits

- Trigger a commercial insertion playlist at the exact time the break starts
- Trigger insertion of any type of secondary event
- Trigger insertion of highly complex multiple secondary events using Grass Valley MediaBall concept
- Read data generated from an upstream ICE, or third-party device
- Use ICE as a remote insertion device with frame accurate file or live content insertion

Ancillary Data Extended

ICE provides more in depth Ancillary Data support than any other channel-in-a-box.

Please contact Grass Valley for any ancillary data requirements not covered in this data sheet.

For information about encoding ancillary data please refer to the Video Recording Formats section earlier in the document.

Ancillary Data Support — Timecode

Playback 59.94 Hz & 50 Hz

Name	SD/HD	Source	Standard	Detail
VITC	SD	External input	SMPTE ST 12-1	Pass-through: Embedded live signal
ATC (Ancillary Timecode)	HD	External input	SMPTE ST 12-2 (RP188)	Pass-through: Embedded live signal
VITC (D-VITC)	SD	ICE	SMPTE ST 266	Insert: An arbitrary timecode value on specified lines of the output
ATC (Ancillary Timecode)	HD	ICE	SMPTE ST 12-2 (RP188)	Insert: An arbitrary LTC or VITC timecode value in HANC space of the output
Track from File	SD	Video File	SMPTE ST 436 to SMPTE ST 266	Regenerate: A file's MXF or MOV timecode track is embedded in configurable VITC lines of the output
Track from File	HD	Video File	SMPTE ST 436 to SMPTE ST 12-2 (RP188)	Regenerate: A file's MXF or MOV timecode track is embedded in output HANC data space
User Bits	SD/HD	ICE	SMPTE ST 12-2 (RP188) / SMPTE ST 266	Insert: Specify User Bit values to insert on output

Ancillary Data Extended

Name	Source	Standard	Detail
Generic VANC Inserter	ICE	SMPTE ST 291	Insert: VANC payloads in DID and SDID packets on specified lines of the SDI output
XDS	ICE	CEA-608-E	Insert: Program Name, Rating, Call Letters, Network Name. Pass-through, or insert XDS packets, across single or multiple events
V-Chip	ICE	CEA-608-E	Insert: Ratings data in MPA, USA, Canadian E and Canadian F formats
SCTE 104	ICE	SMPTE ST 2010-2008	Insert: A wide range of information can be inserted and decoded by remote systems
Cue Tones	ICE	DTMF, or other audio trigger types	Insert: Audio tones inserted on specified audio channels with configurable durations and mutes

SPECIFICATIONS (CONT.)

Breakout Cables (SDI ICE)

Video Breakout Cable

Each video input and output may used in different ways to ensure ICE is as flexible as you need it to be.

Inputs may be used for live video, sources to be recorded, or for key and fill from external graphics devices.

Outputs may be configured in many different ways, including program outputs, preview outputs, clean feed outputs, simulcast HD/SD outputs, or to show any other source, such as graphics or text.

Audio Breakout Cable

ICE is provided with 2 identical audio breakout cables as shown below. For AES3 inputs 9/10 up to 15/16 the second cable should be used.

AES3 inputs may be used for live continuity voice overs.

ICE is available as a complete hardware appliance or as a software-only solution. The data in this section relates to the 2 RU hardware ICE.

Delay ICE has a fixed delay from input to output. Typical value will be 6 frames. Some systems can be optimized to 4 frame delay.

Genlock horizontal delay in microseconds or genlock vertical delay in lines can be introduced with reference to the analog blackburst reference input.

Bypass all the inputs (either 2 or 4) may be configured with a watchdog function so that if the unit is powered off the inputs will be connected directly to the output.

Power Supply: 100-240V, 50-60 Hz

Power Consumption: 546W (Allow 20% headroom for integration options)

Power Supply Rating: 920W

Operating Environment:

Operating temperature: 10-35°C (50 to 95°F)

Non-operating temperature: -40 to 60°C (-40 to 140°F)

Operating relative humidity: 8% to 90% (non-condensing)

Non-operating relative humidity: 5% to 95% (non-condensing)

Engineering Tools: ICE comes complete with essential engineering logging, diagnostic, and configuration utilities.

Logging: All system activities are logged to a local or network drive.

Subtitles: A Subtitle viewing utility is included to allow review of any files that do not perform as expected.

Bars and Tone Source: Insert 1 kHz tone to individual audio channels to check installation and correct functioning of audio shuffling features, for example.

Confidence Monitor: Software monitor to check any source when SDI is not available during testing and configuration.

Elegant Restart: If a unit needs to be restarted for any reason, the on-air material will be rejoined at the correct frame, and does not need to wait for the next event transition, reducing your outage times.
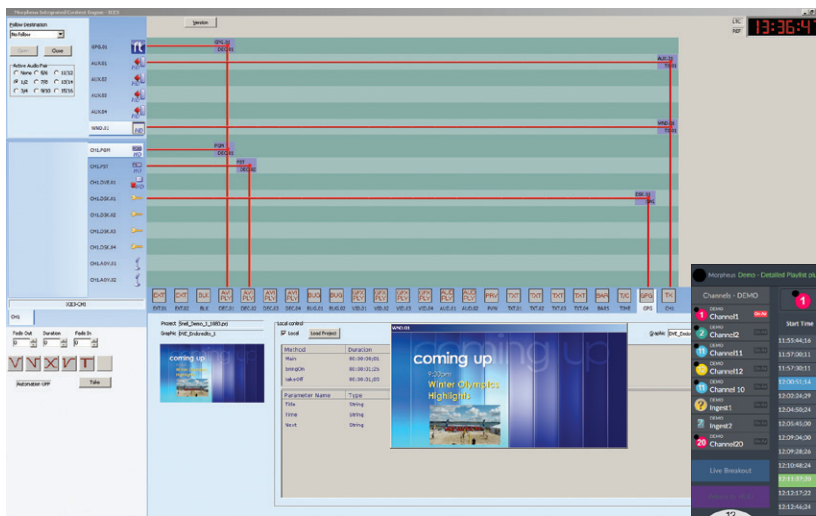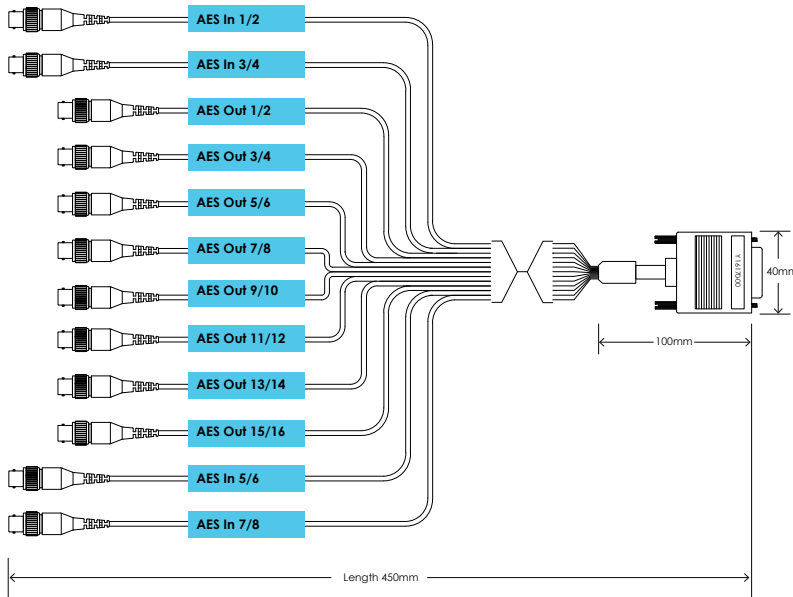
Example screen from Morpheus UX, the completely reconfigurable web user interface.

ICE Tiered Functionality

Select the level of ICE functionality that meets your needs and your budget.

Grass Valley's services include Sales Engineers who are on hand to ensure the system design you need will perform as expected. They will feed your required functionality into a Configurator to ensure effective resource usage, and can advise where a design can be optimized.

ICE — Quantities of SDI Inputs and Outputs

ICE Models and Input/Output Options for SDI and IP Streaming Versions

Model Number	SDI Functionality			Audio
	STD	Advanced	Enterprise	AES3 (AES/EBU)
ICE8STDXM3	0/8 up to 8/0	—	—	0/0
ICE8ADVXM3	—	0/8 up to 8/0	—	0/0
ICE8ENTXM3	—	—	0/8 up to 8/0	0/0

- The video I/O of these ICE versions are configurable at install time to any number of inputs and outputs split across the total 8. e.g., 7/1, 6/2, 5/3…
- If requirements change the software can be reinstalled to accommodate a different split

Model Number	SDI Functionality			Audio
	STD	Advanced	Enterprise	AES3 (AES/EBU)
ICE12ADVXM3	—	8/4 or 4/8	—	16/0
ICE12ENTXM3	—	—	8/4 or 4/8	16/0

- The video I/O of these ICE versions are configurable at install time to either 8 in/4 out, or 4 in/8 out
- If requirements change the software can be reinstalled to accommodate the other option

ICE SDC — Quantities of Uncompressed IP Streams*

Model Number	Functionality			
	LITE*	STD**	Advanced**	Enterprise**
ICESDCCELITE	1/1	—	—	—
ICESDCCESTD	—	Up to 6 I/O	—	—
ICESDCCEADV	—	—	Up to 6 I/O	—
ICESDCCEENT	—	—	—	Up to 6 I/O

The above grid is based on uncompressed SMPTE ST 2022-6 or SMPTE ST 2110, and using a suitable hardware specification. Please discuss with Grass Valley what hardware you are proposing for your project so we can share the latest guidance on the minimum specification.

* ICE SDC LITE is a license for use with record or preview only and not able to be used for channel playout.

**Quantity of inputs and outputs is dictated by the hardware platform provided by the customer for ICE SDC. Please contact Grass Valley for guidance on this.

Compressed H.264 is also available on ICE SDC. Please contact Grass Valley to discuss your bitrate and ancillary data requirements.

ICE-CHAS-CX5A – IP-enabled COTS Server

If you would like the benefits of our ICE SDC software, but without needing to specify the hardware to run it on, Grass Valley can provide a COTS server, pre-fitted with a Mellanox Connect X-5 network adapter, plus local storage and all the necessary licensing. This provides uncompressed IP video, either SMPTE ST 2022-6 or ST 2110.

If you would prefer to provide your own hardware systems, please contact Grass Valley to discuss in detail.

ORDERING (CONT.)

FEATURES	ICE			ICE SDC			
	STD	ADV	ENT	LITE	STD	ADV	ENT
FILE PLAYBACK							
Numbers of decoders	10	10	10	Y	Y	Y	Y
Numbers of native graphics players	4	4	4	Y	Y	Y	Y
Up/downconversion	Y	Y	Y	N	Y	Y	Y
ARC	N	N	Y	N	Y	Y	Y
MASTER CONTROL							
Master control transitions (video & audio)	Y	Y	Y	Y	Y	Y	Y
Number of keyers per channel mixer	8	8	8	4	4	4	4
Static or animated logos	Y	Y	Y	Y	Y	Y	Y
Text crawls from files	Y	Y	Y	N	Y	Y	Y
Number of DVEs	N	1	2	N	N	1	2
Text crawls from RSS or XML	N	Y	Y	N	N	Y	Y
AUDIO							
Dolby E pass-through	Y	Y	Y	Y	Y	Y	Y
4 audio overs & audio players per mixer	N	Y	Y	N	N	Y	Y
Audio Expressions for track shuffling	N	Y	Y	N	N	Y	Y
Discrete Dolby 5.1 downmix	N	N	Y	N	N	N	Y
Omneon Track Tag audio shuffling	N	N	Y	N	N	N	Y
Audio description (UK)	N	N	Y	N	N	N	Y
Dolby E decode/encode	OP	OP	OP	N	OP	OP	OP
CLOSED CAPTIONS & SUBTITLES							
Captioning (608/708) and subtitling pass-through	Y	Y	Y	Y	Y	Y	Y
File-based insertion of CC & subtitles	N	Y	Y	N	N	Y	Y
Up/downconversion of CC & subtitles	N	Y	Y	N	N	N	Y
Open subtitles	N	N	Y	N	N	N	Y
Live insertion of CC & subtitles	N	N	Y	N	Y	Y	Y
ANCILLARY							
XDS V-Chip insertion	N	Y	Y	N	N	Y	Y
TC User bit insertion	N	Y	Y	N	N	Y	Y
Generate DTMF tones	N	N	Y	N	N	N	Y
SCTE-104 generation	N	N	Y	N	N	N	Y
AFD-based scaling & data insertion	N	N	Y	N	N	N	Y

OP = Optional   * Please contact Grass Valley for all ancillary data requirements over compressed IP.

Codecs

All codecs except the following are included in all levels of ICE:

Apple ProRes

Avid DNxND

Certain functionality is available to all tiers of ICE, but requires a separate license. These include:

Dolby E encode

Dolby E decode

Loudness assessment and adjustment

Advanced graphics

Media Validation II

Nielsen/Kantar audience measurement

EAS

## ORDERING (CONT.)

| FEATURES	ICE			ICE SDC			
	STD	**ADV**	**ENT**	**LITE**	**STD**	**ADV**	**ENT**
MISCELLANEOUS							
Media Biometrics	Y	Y	Y	Y	Y	Y	Y
Delay server	N	Y	Y	N	Y	Y	Y
Horizontal and vertical line timing adjustment	Y	Y	Y	n/a	n/a	n/a	n/a
RAID	10	10	10	n/a	n/a	n/a	n/a
Number of media disks	8	8	8	n/a	n/a	n/a	n/a
Usable storage capacity	3.6 TB	3.6 TB	3.6 TB	n/a	n/a	n/a	n/a
Number of OS disks	2	2	2	n/a	n/a	n/a	n/a
FTP transfer speed (please discuss with Grass Valley)	60 MB/s	60 MB/s	60 MB/s	n/a	n/a	n/a	n/a
SDI video connectors	SMB	SMB	SMB	n/a	n/a	n/a	n/a
Timing – Trilevel or blackburst	Y	Y	Y	PTP	PTP	PTP	PTP
Dimensions	89 mm x 483 mm x 705 mm			n/a	n/a	n/a	n/a
Weight	23.6 kg			n/a	n/a	n/a	n/a
OS	Windows Server 2016			Windows Server 2016			
CHARGEABLE OPTIONS							
Apple Pro-Res	OP	OP	OP	OP	OP	OP	OP
Avid DNxHD	OP	OP	OP	OP	OP	OP	OP
Dolby E encode/decode	OP	OP	OP	OP	OP	OP	OP
Loudness assessment and adjustment	OP	OP	OP	OP	OP	OP	OP
Audio Upmix	OP	OP	OP	OP	OP	OP	OP
Advanced Graphics	OP	OP	OP	OP	OP	OP	OP
Nielsen/Civolution	OP	OP	OP	OP	OP	OP	OP
EAS	OP	OP	OP	OP	OP	OP	OP

OP = Optional   * Please contact Grass Valley for all ancillary data requirements over compressed IP.

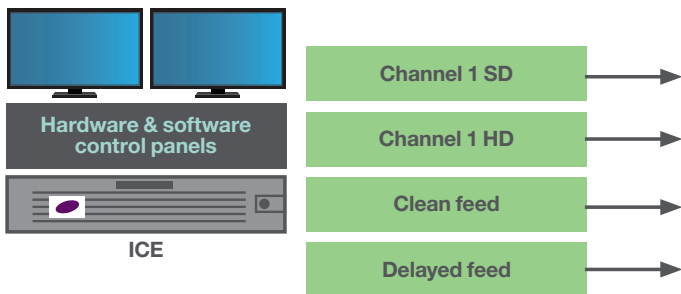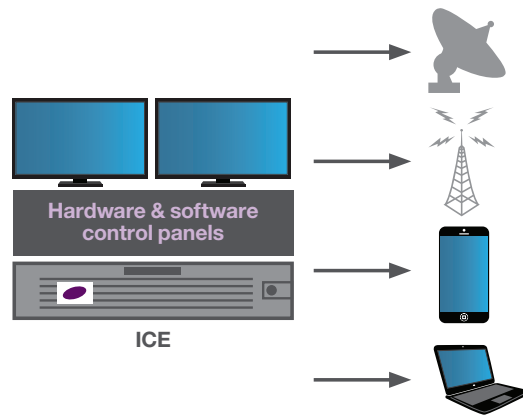## CENTRALIZATION OR EDGE PLAYOUT
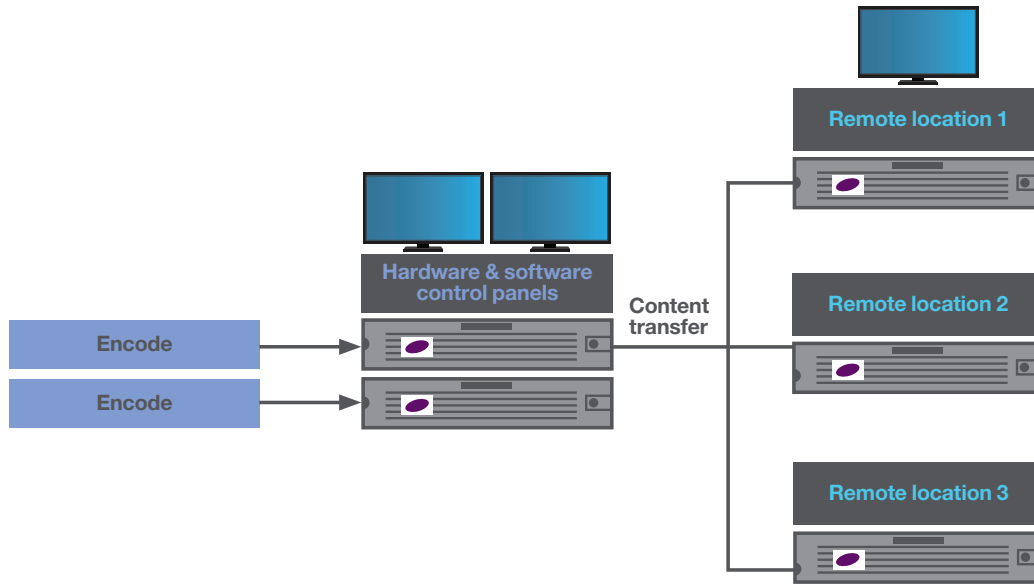
LOCAL STATION
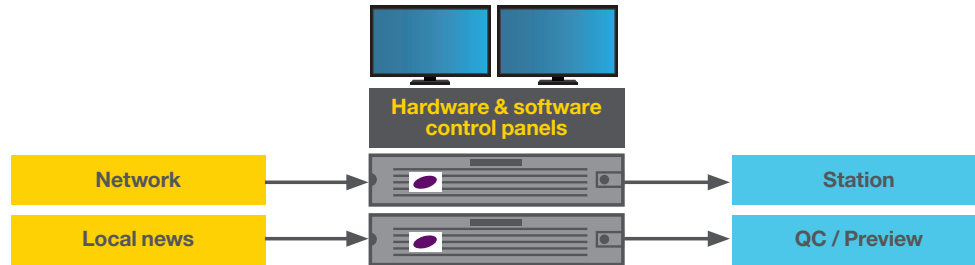
SIMULCAST AND DELAYED SERVICES

MULTIPLATFORM PLAYOUT

DS-PUB-2-0714C-EN

grass valley