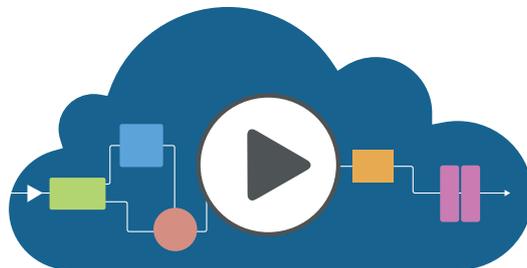




Virtualised Playout

Orca is Pebble Beach Systems' software-defined virtualised IP channel solution. Ideally suited to meet the needs of centralcast hubs, service providers, multi-channel operators and corporates, Orca enables you to deploy IP-based channels almost instantly, without the burden of racks of complicated hardware, and weeks or months of setup and provisioning, and with no need to compromise your production values.



The Evolution to IP-based Services

Broadcast businesses are increasingly looking to evolve IP-based services alongside more traditional delivery methods. Hosting technology within generic data centres or in the public cloud delivers service agility and saves cost, enabling the operator to be situated remotely in a standard office environment with all the cost savings that delivers.

Configurability and Flexibility

As a software-only virtual implementation of Pebble's Dolphin integrated channel device, Orca's software-defined channels are configurable to meet the exact requirements of each service. Dolphin and Orca share the same underlying architecture and operate under the control of the company's flagship Marina automation system, making it easy to mirror channel templates for simultaneous playout to traditional SDI as well as IP video distribution.

Rapid and Straightforward Channel Launches

Running in a virtual machine (VM) in a private or public cloud with IP inputs and outputs, Orca delivers all the functionality previously handled by discrete hardware servers, graphics and captioning systems within a pure software environment. New IP channels can be created from a series of templates at the touch of a button, and quickly deployed into a running system without having to restart or make configuration changes.



KEY FEATURES

- Leverages the full power of Marina automation's flexible playlist
 - Can handle dynamic changes to schedules
 - Full validation of media and play-out elements.
- Simple to use channel design and editing tools with drag and drop.
- Ultra-fast channel deployment tools (minutes vs weeks / months).
- Comprehensive graphics functionality (2D or optional 3D).
- Complex audio management.
- Uses optional Grid GPU for high efficiency H.264 encoding & advanced graphics.
- Hypervisors supported include Xen/Citrix and VMWare.
- Flexible IP inputs and outputs; supports MPEG2-TS and SMPTE 2022-6.

KEY BENEFITS

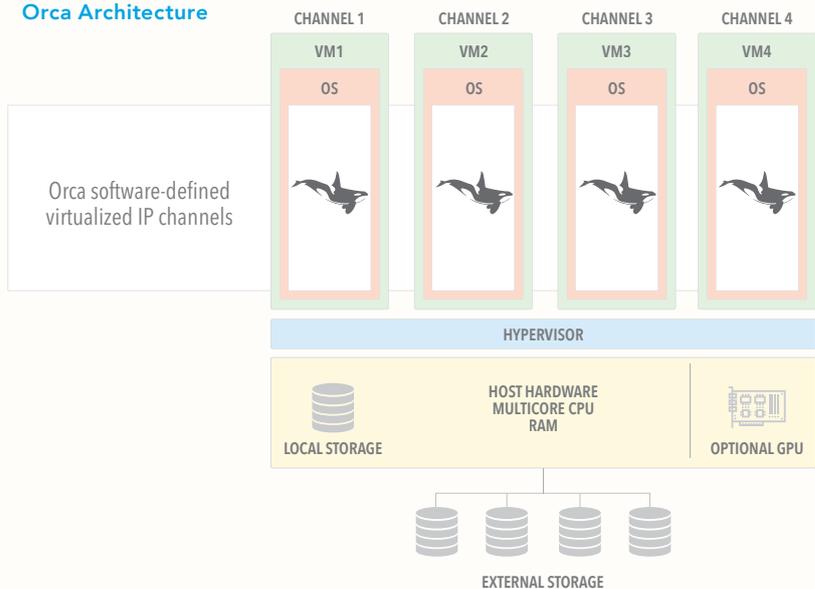
- Enables migration to an IP and virtualised environment without compromising your channel design or playout operations.
- Makes the launch and decommissioning of temporary event-based channels cost-effective.
- Delivers cost savings by isolating the operator from the technology, as Marina operators can be located within a standard office environment rather than a purpose-built broadcast facility.
- Offers a proven solution with multi-channel deployments.
- Meets the exact requirements of each service thanks to its highly configurable architecture.
- Enhances your service agility thanks to its speed of deployment.



IP INPUTS & OUTPUTS

Orca can support optional DVB IP outputs with MPEG2 or H.264 compressed video and compressed audio. Quarter resolution IP outputs can be used for monitoring purposes either in the Marina Smart Panel or alternative IP stream player. The ability to optionally deploy grid-based GPU for H.264 encoding frees up CPU power so that Orca channel counts can be increased cost-effectively for the end user. The pipeline multiplexer outputs a fully compliant DVB stream.

Orca Architecture



LIGHTHOUSE

Orca's channel deployment, editing and design tools are offered via a series of 'Widgets' within Lighthouse, Pebble's powerful remote management and monitoring tool for the Marina automation environment.

Channel Designer

Offers offline editing of Orca pipelines and enables the end user to create and edit templates for different types of software-defined channels using drag and drop graphical tools.

Channel Launcher

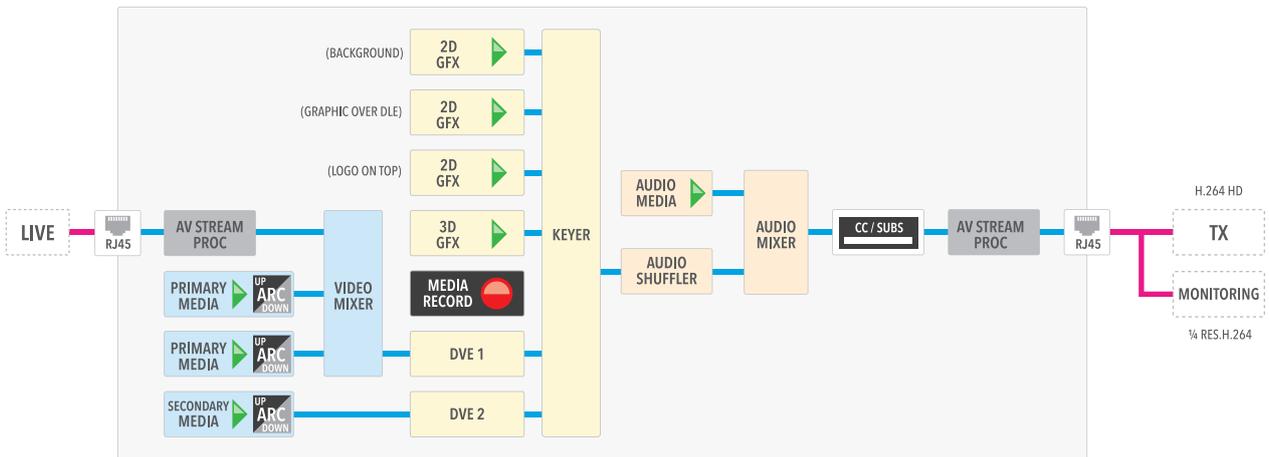
Enables IP channels to be fired up at the touch of a button. Multicast ID, port, PID and IP stream can be specified. It also handles the removal of channels, freeing up virtualised resources.

ORCA SOFTWARE-DEFINED PIPELINE

Orca replicates, in software, a playout chain that would traditionally comprise multiple discrete hardware devices. This software pipeline can be configured to deliver the required video and audio workflows, making it easy to specify the order in which processes such as graphics overlay, DVE and Aspect Ratio Conversion are handled within the playout chain.

A flexible pipeline editor enables the logical devices of the pipeline to be configured to meet the exact channel requirements. Configurations can be edited at any time should the channel requirements change.

Editing the Software-defined Pipeline



Video



VIDEO PLAYER

The Video Player is able to decode and play back video from any of the supported SD or HD codecs. Each pipeline can support up to 5 video players depending on the complexity of the codec and therefore the amount of CPU resource required. Video player features include,

- Seamless back to back HD and SD video clips playback.
- Plays clips of single frame duration.
- Plays clips whilst the file is transferring.

The table below lists some of the wide range of supported file wrappers and codecs for playback.

SD Video Formats	DVCPRO25, DVCPRO50 & DVCPRO55 DV IMX 30, 40, 40 MPEG2 I Frame & Long GOP	AVI, MOV, MXFOPAtom, MXFOP1a, GXF, LXF AVI, MOV, GXF, LXF AVI, MXFOP1a AVI, MOV, MXFOP1a, GXF, MPG
HD Video Formats	XDCAM HD, XDCAM EX, XDCAM 422 DVCPRO HD AVC-Intra DNxHD H264/AVC MPEG2 I Frame & Long GOP XAVC AVC-Ultra AS-11/DPP ProRes	MXFOP1a AVI, MOV, MXFOP1a, MXFOPAtom, GXF, LXF MXFOP1a, LXF MOV, MXFOP1a, MXFOPAtom MP4.MOV AVI, MOV, MXFOP1a, GXF, MPG MXF MOV MXFOP1b MXF AVI, MOV, MXF

Note:

- Representative files should be supplied to Pebble Beach Systems for testing.
- Supports MOV QuickTime self-contained or reference files.
- Up to 32 audio channels/tracks of stored audio per ID.
- Up to 16 audio output channels depending on wrapper & codec.
- Audio sample size can be 16 and 24 bit PCM @ 48KHz depending on codec.



VIDEO RECORDER



The Orca pipeline can be configured with Video Recorders which are controlled by Marina ingest operations. These include VTR dubbing, scheduled recording or crash record. The Video Recorder can also be controlled by Marina secondary record events and used for clean recording of live programs. The following features are supported,

- Encoding profiles allow Marina users to easily change format and codec.
- Clips can be exported as they are being recorded.
- Inbuilt low resolution proxy browse transcoding.
- Key frame generation.

The table below lists some of the wide range of supported file wrappers and codecs for encoding.

SD Video Formats	DVCPRO25, DVCPRO50, DVCAM DV IMX 30, 40, 40 MPEG2 I Frame & Long GOP	MOV, MXFOP1a, MXFOPAtom MOV MXFOP1a MOV, MXFOP1a
HD Video Formats	XDCAM HD, XDCAM EX, XDCAM 422 DVCPRO HD AVC-Intra DNxHD H264/AVC MPEG2 I Frame & Long GOP XAVC ProRes	MXFOP1a MOV, MXFOP1a, MXFOPAtom MXFOP1a, MXFOPAtom MXFOP1a, MXFOPAtom MP4, MOV MXFOP1a, MOV MXF MOV AVI, MOV, MXF



VIDEO CONFORMER

The Orca Video Conformer is a configurable module that provides Aspect Ratio and Up/Down conversion. Operations can be applied to both live and clip based video. The video conformer will up or down convert video if the resolution of the input video does not match that configured for its output. For example, the Aspect Ratio Converter included with the Video Player ensures that the output video resolution will always match that of the channel. Additional conformers can be positioned anywhere in the pipeline – for example

to generate down-converted video for a simulcast output.

The Video Conformer is configurable for each received AFD code and will aspect ratio convert video depending upon the AFD code present on its input video. The AFD code inserted into the Conformer output video will change with aspect ratio conversion. If the video into the conformer does not have an AFD value Orca will apply a default AFD and ARC. Orca complies with SMPTE-2016.



AFD INSERTER

The AFD (Active Format Descriptor) inserter will overwrite the AFD data on incoming video with a value from the Marina automation playlist, otherwise AFD will pass through unchanged. When

positioned upstream of the Conformer the AFD values in the playlist are able to change the aspect ratio of the output video.



DELAY SERVICE

If there is a requirement to delay a channel, perhaps for a +1 hour catch up service or to delay for time zone variations, the optional +hr delay can be configured into pipelines hosted on a standalone server dedicated to delay services or included within the channel pipeline. It is also possible to uniquely brand a delay service with a continuous graphic or one that is controlled from the master playlist.

There are two modes of time delay available within Orca, one is designed for baseband delay and the second mode is for compressed MPEG2 transport streams (TS). The benefit of using the TS delay is there is only a single encode instead of multiple steps of encode->decode->encode required for a typical baseband and compressed time delay.



MASTER CONTROL

Each Orca pipeline has an internal video/audio router. The pipeline editor connects together logical devices and routes video to external inputs and outputs. The router also includes master control functionality with several transition types including V-fade, cut-fade, fade-cut and mix.

A second Alpha Router connects video and key sources to the keyers. Router tielines are available for passing video from the main router to the alpha router.

Graphics

KEYER

KEYER

The pipeline can be configured with up to 3 Keyers to enable outputs to multiple platforms, each with unique branding. For example, both an SD simulcast and a streaming web service could be output from the pipeline, each with different graphics. Each Keyer has 10 input layers

which can be fed video and key from any of the Alpha Router sources. Sources include the Orca graphics players, 2D DVE's, optional 3D graphics, external graphics devices and the Tieline video sources from the main router.

2D
GFX

2D GRAPHICS PLAYER

Each Orca pipeline supports up to 10 graphics players that are controlled by Marina secondary playlist events, or manually from the Marina Smart Panel. Static graphic formats include TGA, GIF, JPEG, PNG, SVG and SWF. Animated graphics are supported through sequential TGA and GIF or SWF (Adobe) files, and graphics can be sized and positioned from within the Marina playlist.

receive dynamic textual data from the Marina playlist. The data can be included in the traffic schedule or manually entered by the Marina operator. Data for text crawls can be supplied from XML or RSS feeds.

Adobe graphics can also control Orca DVE's. This provides a powerful method for coordinating graphics and DVE effects from a single secondary event.

Graphics are created using Adobe Animate CC and can be designed to



GRAPHICS PLUGIN

Multiple options exist for graphics plugins. Requires the optional grid GPU for graphics rendering. For more details contact your local representative.

KEY & FILL

KEY AND FILL

External graphics devices under the control of the Marina playlist can input their key and fill video directly into the pipeline. In this way Orca can cater for a

wide range of graphics requirements, and accommodate legacy graphics products and workflows.

2D
DVE

2D DVE

Orca Digital Video Effects are used to resize and position video on the screen. Five 2D box DVEs are available for squeeze back and picture in picture.

These can be controlled by playlist secondary events or from an Adobe graphic.

Audio

AUDIO
MEDIA

AUDIO
MIXER

AUDIO PLAYER

The pipeline can be configured with 5 Orca Audio Players that will play pre-recorded audio files under the control of playlist secondary events. In this way

multi-lingual Audio Overs from separate audio files can be supported. The audio level, program duck level, fade in/out time and track mixing are all configurable.

Audio Support

- Advanced audio shuffling and substitution using SMTPE 377-4 tagged tracks;
 - ISO639-2 Descriptor
 - RFC5646 Descriptor
 - Private sub tag support (RFC5646 only)
- Formats
 - WAV
 - BWF/BWAV
 - AIFF
- Bit Depths (16,24,32)
- Sample rate 48kHz
- Multi-lingual Audio overs upto 8, dynamic ducking for each language
- Dolby D Encoding, Dolby D Decoding, Dolby E Encoding, Dolby E Decoding
- Downmix & Upmix (2.0 -> 5.1) (5.1 -> 2.0)

AUDIO
SHUFFLER

AUDIO SHUFFLER

The Audio Shufflers are controlled by Marina automation and are able to change the arrangement of the audio tracks. The track shuffle for each event can be scheduled, or edited manually from the Marina playlist. It can also be automatically controlled from Marina by reading the audio

language tags of the source media and comparing these with the preconfigured channel output mapping. The channel can be configured with primary, secondary and tertiary output mappings to allow audio substitution if first or second choice languages are unavailable.



LOUDNESS

Optional loudness processing dynamically adjusts the loudness of audio in real-time to ensure that Orca output is in compliance with ITU-R.BS1770-4 based international loudness

recommendations including ATSC A/85, EBU R128, ARIB TR-B32, and FreeTV OP59. Loudness is adjusted on both clip and live feed playout based upon preconfigured profiles.



SUBTITLE / CC INSERTER

The Orca SUBTITLES/CC inserter is an optional plug-in and provides Closed Captions and Subtitle support. Multiple inserters can be configured for each pipeline. Each inserter will be driven from a separate subtitle/caption file stored on an Orca Media Drive, making it possible to output multiple subtitle or closed caption languages from Orca.

Supported Subtitle features include:

- Multi-language support with validation
- WST and OP47 subtitle insertion into configurable VBI lines and teletext pages.
- Inserts open subtitles into video
- Line 21, CEA-608 and CEA-708 closed caption insertion
- Supported file formats include EBU .stl, .pac, .chk, .890, .scr, .scc, .xml (tt)
- DVB Bitmap

Regional Insertion



SCTE INSERTER

The Orca pipeline can be configured to insert SCTE35 data into its IP transport stream output. The data instructs when downstream devices should switch away and re-join an Orca feed, typically to allow the insertion of local programming.

SCTE output data is controlled from the Marina playlist either through explicitly scheduled secondary start and stop events or automatically using a combination of appropriately tagged primary events and rules which determine the type and timing of SCTE messages to be sent.



SCTE MESSAGE EXTRACTION

SCTE 35 messages in the live IP transport streams fed into Orca can be read and used by the Marina to switch the local Orca output between the live feed and a regional playlist.



PACKET 31 INSERTION

The Orca pipeline can be configured to insert Packet 31 data into the teletext data PID of an IP transport stream output. The data instructs when downstream devices

should switch away and re-join a Orca feed, typically to allow the insertion of local programming.



DOLBY ENCODER & DECODER

Dolby Encoders and Decoders are optional logical devices that can be positioned anywhere in the pipeline. For example, it is possible to decode Dolby E or D to discrete PCM audio from either clip or live

sources, add audio voice over, and then encode to Dolby E or D.

WATERMARKING

Support for popular watermarking standards including:

- Nielsen
- Kantar Civolution

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