

# RenderWare Audio

## Introduction

**RenderWare Audio v3.7** is the only comprehensive solution developers need to deliver out-standing real-time audio for multi-platform titles. It simplifies the process of generating rich, immersive multi-channel audio and further enables developers to invest even greater resources in the crucial creative elements of the game, ensuring that the entire experience for the player is as close to reality as possible.

## RenderWare Audio 3.7 Features

- **Supports Dolby**

RenderWare Audio fully supports all Dolby Surround Sound features including interactive Dolby Digital (where available in hardware) and interactive Dolby Surround Pro Logic 1 & 2.

- **Multi-Platform**

RenderWare Audio is fully multi-platform, using the same API for PlayStation®2, Xbox™, NINTENDO GAMECUBE™ and PC, enabling developers an accelerated learning curve whilst empowering them to leverage the unique strengths of each platform.

- **Feature Rich**

RenderWare Audio provides you with everything you need to introduce outstanding, real-time audio for your cutting-edge game, including high performance streaming, 2D/3D voice support, virtual voice management, DSP effects and sound bank management.

- **Totally Integrated With RenderWare Platform**

The memory / IO / file systems of RenderWare Platform modules are shared to ensure that CPU time is conserved and performance is optimized. Of course, it is possible to override both memory and file systems with your own system if you would prefer.

- **Very Efficient**

RenderWare Audio has a small memory footprint (typically around 135k EE side and 165k IOP side for PlayStation 2) and is extremely fast (e.g. typically <1% EE usage on PlayStation 2). It is modular in design and its effective memory management allows the application total control over the memory system.

- **'Voices' in 2D/3D**

Create global spot effects like voice-overs or commentary, positioned within the 2D field and attach sounds to objects with full Doppler Effects for 3D spatialized audio in your game world.

- **High Performance Audio Streaming**

Including stereo and mono, multiple stream, multi-channel playback with native compression, substream interleaving and support for segments.

- **Comprehensive Sound Bank Management**

RenderWare Audio provides a comprehensive wave dictionary and stream editor, allowing the import, editing (of parameters such as bit-rate, frequency, target format etc) and export of sound samples and streams. This results in the creation of a file containing audio that can be loaded into RenderWare Audio. Data contained within wave dictionaries can be converted to any supported format when the wave dictionary is either loaded or exported (wave conversions can be performed when loading a wave dictionary at run-time). RenderWare Audio supports PCM, all platform-specific ADPCM implementations and WMA for Xbox.

- **Wave Conversions**

Wave conversions, used to convert between sample data formats, are utilized by the exporter application for off-line asset preparation can also be used at run-time on your target platform. This enables cross platform assets to be prepared for e.g. prototyping purposes.

- **Virtual Voice Management**

Virtual Voices enable 1000's of voices within a game. Voice management assigns hardware voice channels to virtual voice instances – 1000's of virtual voices with only 48 hardware voices on PlayStation 2.

- **DSP Effects / Reverb**

Hardware effects are supported on each platform.

- **Audio Event Toolkit**

Audio events define extended parameters for wave and stream playback including volume and pitch variation. Using this toolkit, audio events authored in the audio management tool can be retrieved and applied at run-time.

- **RenderWare Audio Management Tool**

Includes asset management for waves, streams and audio event authoring. Projects stored in XML with command line exporter provided. Has an ActiveX interface for scripting, plus hosts VBScript to give easy access to project items. Scripts can be automatically triggered both pre & post export for e.g. validation and custom header generation.

# PlayStation®2

## RenderWare Audio – PlayStation 2 Key Features

**In addition to the core features, RenderWare Audio features on PlayStation 2 include:**

- Streaming system on the PlayStation 2 efficiently uses the IOP.
- Hardware volume ramping / de-clicking to remove artifacts produced by large volume changes (which would typically be produced by fast moving 3D sound sources).
- DMA manager provides high IOP ↔ SPU2 transfer throughput, to achieve high quality, high performance audio for your game.
- Supports I3DL2 compatible environment settings mapped to hardware effects.
- Dolby Pro Logic and Pro Logic 2 surround encoding.

**PlayStation 2 hardware features supported by RenderWare Audio:**

- Real-time hardware VAG decompression and playback by SPU2.
- Maximum 48 hardware voices (24 voices per processing unit).
- Digital output enabling pre-rendered Dolby Digital 5.1 playback.
- Potential for signal processing using the PCM inputs and outputs of each processing unit. This allows developers to use compressed, ADPCM playback and apply signal processing to the uncompressed, PCM audio generated by SPU2.
- Reverb effects on each processing unit. Nine pre-set reverb algorithms with some algorithms exposing simple parameters.



## **RenderWare Audio – Xbox Key Features**

**In addition to the core features, RenderWare Audio features on Xbox include:**

- Support for native I3DL2 environmental effect settings.
- Support for WMA format streaming.

**Xbox hardware features supported by RenderWare Audio:**

- Real-time hardware ADPCM decompression and playback.
- Maximum 256 hardware voices (64 voices with HRTF processing).
- Interactive Dolby Digital 5.1 and Pro Logic surround encoding.
- Voice sub-mixing and effects routing (access to audio process pipelines).
- Gives standardized access to all DSP reverb, filtering and processing algorithms.



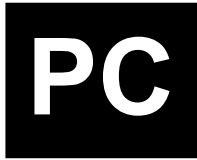
## **RenderWare Audio – Nintendo GameCube Key Features**

**In addition to the core features, RenderWare Audio features on Nintendo GameCube include:**

- DSP volume ramping/de-clicking to remove artifacts produced by large volume changes (which would typically be produced by fast moving 3D sound sources).
- Supports I3DL2-compatible environment settings mapped to AX DSP effects.
- Dolby Pro Logic and Pro Logic 2 surround encoding.

**Nintendo GameCube audio DSP features supported by RenderWare Audio:**

- Real-time DSP hardware ADPCM decompression and playback for audio streams and voices, saving precious optical disk space.
- Management of ARAM using fast and efficient memory partitioning. DMA's are multiplexed so that the game developer can use ARAM for other game data as well as audio.
- Provides direct access to the DSP's auxiliary busses so that custom signal processing may be carried out on the main CPU.
- Gives standardized access to all AXFX reverb processing algorithms, so that the developer can choose to scale the amount of main CPU bandwidth used to their specific requirements whilst maintaining full compatibility across multiple platforms.



## **RenderWare Audio – PC Key Features**

**In addition to the core features, RenderWare Audio features on PC include:**

- Software volume ramping/de-clicking to remove artifacts produced by some soundcard drivers, when large volume changes occur (which would typically be produced by fast moving 3D sound source).
- Supports I3DL2 compatible environment settings mapped to soundcard effects (Creative EAX 1.0 + 2.0 and drivers supporting I3DL2 property sets).
- High quality software mixing and effects processing for consistent audio performance across all PC audio hardware.
- Supports IMA ADPCM format for audio streaming.

**PC soundcard features supported (where available) by RenderWare Audio:**

- Hardware accelerated voice mixing.
- HRTF spatialization processing.
- Environmental effects processing.