UNIVERSAL DRIVER TECHNOLOGY

Aggregation and Low Latency in USB and FireWire for Audio Interfaces

A CEntrance Innovation

The Universal Driver is an ASIO/GSIF audio driver for Windows XP and Vista that offers high stability, multiple device aggregation, low latency, and supports up to 32-bit/192kHz performance. CEntrance products are also compatible with Mac 10.4+ and above, and distributions of LINUX that include the USB Class Audio Device driver (class-compliant) – all without needing the Universal Driver.

The technology behind the Universal Driver is unique because it was originally designed to aggregate a variety of FireWire audio products from leading manufacturers. The Universal Driver works with a number of FireWire chip sets, and supported 25 different audio devices prior to its being discontinued. As product versions kept changing, updating the Universal Driver for every revision of every product eventually became too difficult to manage, so we have chosen to discontinue the freestanding FireWire Universal Driver product and have instead incorporated this technology on a complimentary basis into our *MicPort Pro USB Mic Preamp* and *AxePort Pro USB Direct Box*, as well as future products from CEntrance.

Aggregation

We define "aggregation" as the ability to use *multiple* audio interfaces simultaneously. With MicPort Pro, our single-channel 24-bit/96kHz USB mic preamp, you can record in stereo with two MicPort Pro units, which will be aggregated into a single stereo device by the Universal Driver. In fact, we've been able to aggregate up to four *MicPort Pro* units simultaneously.

MicPort Pro 24/96 USB Mic Preamp

In Windows, you only get one driver per device – there is no concept of one driver being used for multiple devices. For standard (class-compliant) audio interfaces, Windows will use its own audio driver, which does not support using multiple audio devices simultaneously. Universal Driver technology from CEntrance makes multiple devices appear like one device to Windows, where the combined input from these devices is mixed within the driver.

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Once Mac OS 10.4 (Tiger) was released, its CoreAudio functionality was expanded to allow aggregation of multiple audio input devices via USB, FireWire and PCI, *natively*, so there is no need for a separate audio driver. Aggregation is selected via the Audio MIDI control panel for Mac OS X users.

Most audio interfaces do not support PC aggregation via USB with Windows. Some vendors offer a FireWire driver that claims to aggregate, but users experience pops and clicks – the telltale sign of a poorly written driver – or the driver may max out at 48kHz, even when used with a 96kHz device.

AxePort Pro 24/96 USB Direct Box

We have successfully recorded with up to four MicPort Pro units successfully, for two stereo input channels. The Universal Driver synchronizes the units via the PC/Mac internal clock.

Because computers have limited "extra" USB ports, we suggest using a high–quality, four-port hub for every two MicPort Pro units you wish to record with. Why four ports for only two MicPort Pro units? Because most hubs are designed for low power devices like mice and keyboards, while MicPort Pro draws up to 500mA, particularly when powering condenser microphones that require 48V phantom power. From our experience, the only reliable USB hub we've found is the Belkin 4-port, powered USB hub ($30 each), which can supply 500mA to two MicPort Pro units per hub.

The Universal Driver minimizes digital delay for low-latency monitoring. According to our research, pro audio users need <8ms of latency ***round trip*** to prevent the delay from being a distraction or causing listener fatigue. Why have we put ***round trip*** in bold and italics? Because the audio signal needs to travel a long way – from the A/D converter in the audio device to the driver, to the operating system, to the audio application, then back to the operating system, driver, D/A converter, and out the headphone jack on the audio device.

Universal Driver technology was written to comply with the ASIO standard created by Steinberg and to reduce latency to less than 6ms *round trip* – it is important to note here that actual latency for your application will vary somewhat based on your computer's operating system, processing speed and memory. Many other audio vendors list latency of less than 10ms, but only measure buffer or "one-way" latency for artificially low numbers. This is only half of the story. CEntrance always lists the full round-trip latency to give you the most accurate latency measurement. How is CEntrance able to minimize latency so dramatically?…

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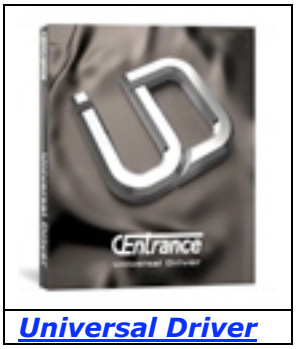
Programming Craftsmanship



Universal Driver

With the Universal Driver, we have re-written the Windows kernel mode driver also known as USB and FireWire "stacks," replacing the Windows audio subsystem. This alone eliminates up to 40-60ms of latency inherent to the Windows audio subsystem. Why does the Windows audio subsystem have so much latency? Because it was written for playing movies, where sometimes the audio needs to be artificially delayed in order to synchronize with video or other audio inputs. Other vendors simply write their audio driver on top of the Windows stack, so no efficiencies are gained. In addition, an audio driver defines the audio buffers, which are then allocated in memory within the PC. The Universal Driver works more efficiently by defining fewer, very small buffers and, because of highly optimized code, can fill up the buffers more quickly (audio transfer is only possible when the buffer is full). Other drivers will crash the operating system if speed is lacking. Want to know how much latency is present in your audio system? Click here for our complimentary Latency Test Utility. For more information on latency, please read the CEntrance white paper, How to Get Your Groove Back: How Recording Delay Affects Playing.

Additional Benefits

The Universal Driver's highly optimized code is responsible for its low latency and actually frees up more CPU power so that you can run more plug-ins. Universal Driver offers high stability so that you will never experience a crash in a mission-critical application.

Why People Love Universal Driver Technology

With the CEntrance Universal Driver, you get:

- ***High Stability***: no Blue Screen of Death
- ***Aggregation***: ideal for recording in stereo with MicPort Pro or using up to four MicPort Pro and AxePort Pro units
- ***Low Latency***: <6ms round-trip
- ***Less CPU utilization***: you can use more plug-ins

Click here to download the Universal Driver for use with MicPort Pro

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