auraliti

High Resolution File Playback – Simplified

Or why you want to be able to play high resolution files

How we got here

Historically, recordings have been made with the best technology available. In the analog days, it was essential to use the best technology because every stage in the process added a little noise and reduced the overall quality. The advent of digital recording brought the promise of "perfect sound forever", in that the original recording would not be degraded in the process of preparing and duplicating it. While the compact disk does a good job of preserving and reproducing the bits encoded in it, the recording industry discovered that to be able to edit a recording, especially on a Digital Audio Workstation, they needed more in the original recording than the 44.1 KHz 16 bit redbook CD format provided. On the recording side as technology improved it permitted both an increase in the bit depth (and associated dynamic range) and the sampling rate increased as much as four fold to get more information in the recording. This provided the improved source material necessary for quality editing. At the same time those in the industry immediately recognized that the higher resolution masters sounded much better than the released disks.

The failure of the old approach to new formats

There have been several efforts over the years to create new formats to make the higher quality recordings available to the public. These have all been unsuccessful in the market due to the huge change required from end to end to support the new formats. DVDA and SACD both have required new hardware at each end to work with a new disk requiring new machinery to manufacture and a major investment on the part of artists and producers to support a new and unproven market.

Moore's Law to the rescue

Digital audio recording creates a lot of data. One minute of 44.1 KHz 16 bit audio will generate over 80 Megabits of data. High resolution recording can generate as much as 500 megabits in the same 60 seconds. In 1965 Gordon Moore of Intel described the rapid growth of the capabilities of an IC, essentially predicting a doubling of its capability every two years. This exponential growth of computing capability has fuelled many changed in our modern society. As integrated circuits improved dramatically and the computers built from them evolved into much higher powered devices they became very capable of managing the large quantities of data necessary for high resolution digital audio. With these developments the music industry moved from traditional dedicated recording and editing machines to personal computers to capture, edit and playback high resolution audio files. Hardware and software optimized for playing high resolution files has become much more common. It is now practical to use the same systems (Recordable CD's, DVD's and USB storage) used for passing data from computer to computer to make high resolution audio files accessible to the general public. The biggest virtue of this new approach is that it doesn't require a new infrastructure, manufacturing process (like SACD or BluRay), or exotic new playback hardware like an SACD transport. The content can be distributed on ordinary data disks or even over the internet via downloadable files. And most important musicians and record producers can create and distribute the files easier and with less investment, which should make the much improved content available to more specific and narrow audiences.

Where adaptation fails

While the process of playback via a computer is not too complex getting the best playback with the least compromise and distortion of the data by the playback system has not been easy. The systems offered until now have originated as ways to either use a PC as a movie playback system (like Windows media Center) or a digital audio workstation for editing audio recordings like Digidesign or Sonic Solutions. They both bring a clumsiness and complexity to what should be a very simple task. You are either using an interface best suited to watch TV or a system designed to load and edit a file, not play it.

What Auraliti brings to the experience

Auraliti started with the goal of maximizing the performance of the playback hardware and software. In the process of stripping out anything that compromised the sound, the overall system got simpler and more focused. Eventually we discovered that the approach also made the process of interacting with the Auraliti player and playing the files much simpler. By moving the user interface out of the playback system we removed the heat and noise-generating components that were used to support the interface. This simplification helped us toward a goal of a reliable fanless system. Removing cataloging and ripping software and the associated hardware also removed the background processes necessary to support those capabilities. We discovered playing back from a USB source or a dedicated network drive gave superb results and allowed us the make the operating system run from read only flash memory increasing the reliability of the system and further reducing the power requirements. Moving the user interface over to commonly available platforms like the iPod Touch, iPhone and Android phone gave a better more convenient experience and removed both the cost of the display and the inconvenience of having the display physically connected to the player. The end result demonstrates that sometimes the single minded pursuit of performance can make the overall experience better.

Why not rip in the box?

Ripping is the process of extracting the contents of a disk and storing them on a PC or other storage media. It usually entails two tasks, first getting the audio data off the disk in “bit-perfect” form and then matching it with the correct meta-data. Bit-perfect means that the copied content is a bit for bit perfect copy of the original. Meta-data is the information used to identify the track and its details, like artist, album, etc. Each process requires specialized software to do well, and the meta-data is not included with the disk so it needs to be fetched from somewhere else. There are good software solutions for transferring the data from the CD that we could employ but the meta-data will often require manual intervention to correct. These problems of accurate ripping, correct metadata and file management are best handled with a full interactive user interface. Ideally this would require a keyboard and a mouse to be particularly useable. The keyboard and mouse are intrinsic to desktop and laptop computers but not appropriate to an audio component in an equipment rack. Furthermore, desktop and laptop computers are located where they are easy to use, the noise they make is usually not an issue and user ergonomics have been handled. Large quantities of CD’s can be ripped by outside services that can do exceptional quality very economically directly to a hard disk and high resolution files are distributed on several media types that are easily handled by computers or as downloads and very problematic for dedicated hardware. Once the files are transferred to either a USB memory device, a USB hard disk or a linked server the process is done.

No display on the box?

Our solution allows remote control of the player via any network connected device with a web browser. These devices can include smart phones, tablet devices, laptops and even the venerable desktop. An important note is that these devices can be in the listening room or another room. In fact multiple devices can be used to control the player and a function executed on one is shown by any other control device in use. Furthermore the only time these devices are talking to the player is when the user has sent an instruction to the player from a controller or the player is feeding back play status to the network clients being used to control the player. Removing the display greatly reduces the amount of computer activity in the player There is a strong relationship between reduced activity and improved sound quality.

Did you write a lot of custom software for this?

We integrated software from several sources. We did not create the software that makes this system possible. The core software is all publicly available and widely maintained. All of this is made possible thanks to the enthusiastic work of the Open Source community. It is software system that everyone can and will support. Open Source software ensures compatibility with future formats and long term support and a viability that no proprietary system can provide. No matter our status going forward we know our customers have purchased a system with a long service life.

Can I use the system to watch movies, download bit torrents and check my bank balances?

Our music player starts up knowing that is what it is, a music player! That is all it knows how to do so the operator does not need to remember to tell the player what its function is. The read only operating system ensures that it will start up exactly the same even if you pull the plug without warning.

No PLL's

Finally we come to the hardware, chosen to provide the quiet background needed for optimal rendering and transmission of the precious bit-stream to your D/A converter. Digital audio needs several clock frequencies to run and these do not have simple relationships that allow a single crystal source to provide them all. Common practice is to use a phase locked loop to create multiple controlled clock frequencies from a single reference. While it is efficient, the noise and jitter performance of a PLL is limited by the nature of the loop function and is never as good as a crystal. Crystal oscillators are exceptionally good low noise, low jitter sources. To achieve correct low jitter data timing we have used a sound card with two dedicated crystal oscillators for the two sampling rate chains.

Simplicity, reliability and function

The Auraliti Player will remind you of using an audiophile component rather than the computer you use to create spreadsheets and presentations at work. Stripped down to the essentials, the Player, like all the best components, has a purity of purpose that allows users to get down to what this stuff is all about, enjoying the best playback of their favorite music in the best release format ever.

FEATURES:

- No moving Parts - boots from solid state drive knowing its purpose is to play music
- No onboard User Interface - eliminates background processes which induce jitter inducing interrupts and noise from the GPU supplying a graphic interface
- Flawless file playback - bit perfect, low jitter and always at the sample rate of the original file
- Automatically selects for correct sample rate of the music file, no user intervention required
- Built on Open source software ensuring long term viability
- Low noise power supply
- Transformer coupled AES/EBU output for low noise interface to DAC
- Remote control from a variety of software clients and devices allows versatility in use and ensures future compatibility with new technology

SPECS:

- File Types: FLAC - WAV - AIFF
- Output Sample Rates: 44.1K – 48K - 88.2K – 96K - 176.4K – 192K +/- 5 ppm or less.
- Jitter: Master Clock less than 20 picoseconds rms 10 Hz to 10 MHz
- Acoustic Noise: Silent