

Eight 24bit / LPCM Digital Channels From a PC?

By Bohdan Raczynski

Implementation of a WAV Player into Ultimate Equalizer enables new HDMI output from the motherboard to be used as 8-channel LPCM digital output.

Motherboard

Contemporary motherboards are indeed packed with features. Gigabyte GA-Z97X-UD5H motherboard provides a good mixture of PCI/PCIe expansion slots, it has a HDMI output, it has ALC1150 audio codec and support for SPDIF output. This is also for future support of full-digital audio processing.

<http://www.gigabyte.com/products/product-page.aspx?pid=4950#ov>

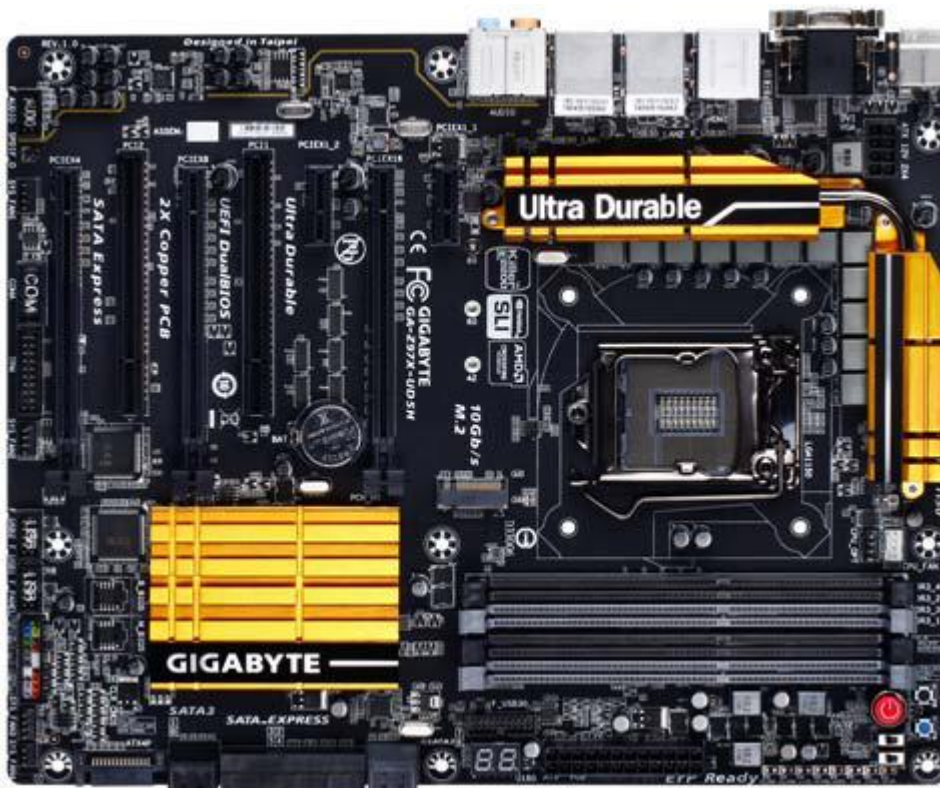


Figure 1. GA-Z97X-UD5H motherboard and output ports.

Once a suitable HDMI device is plugged into the motherboard, it becomes visible in the Windows Sound Manager – see below.

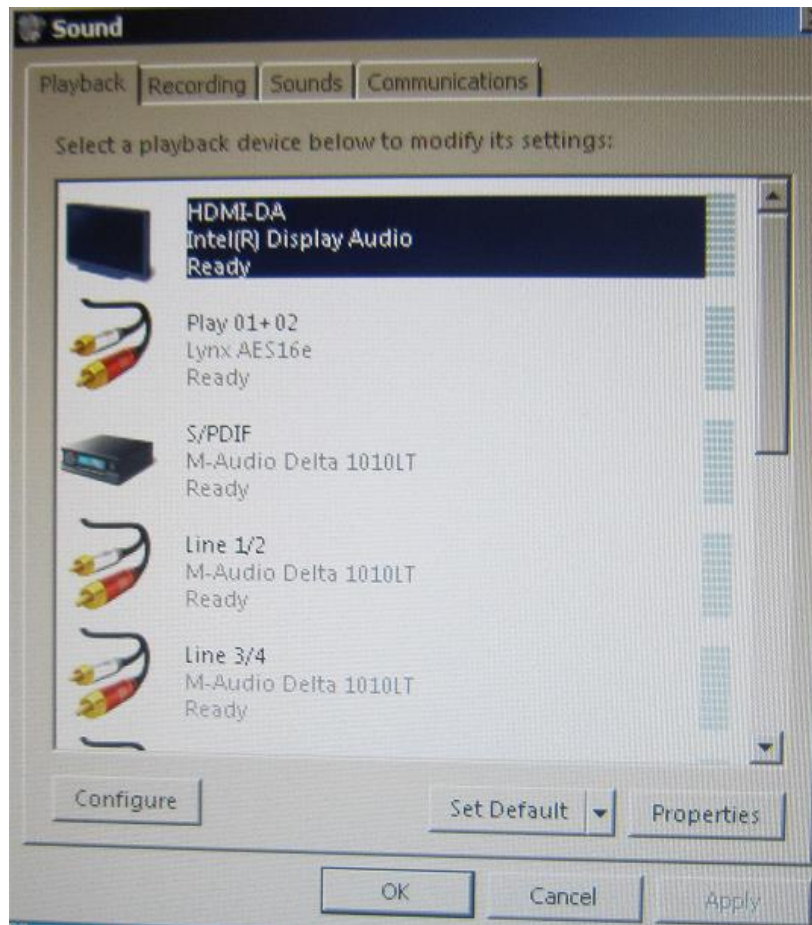


Figure 2. Windows Sound manager with HDMI enabled.

HDMI Playback port is set up to 44.1kHz/24bits in the Windows Sound Manager, and is basically ready for usage with Ultimate Equalizer WAV Player.

Please note, that “Recording” function is NOT used by the WAV Player. Therefore, the UE is able to synchronize to the HDMI playback device ONLY – the HDMI output port and does not need any other clock signaling.

Ultimate Equalizer implement WASAPI exclusive mode, and this configuration was tested as follows. A standard 2x4-way stereo configuration was selected in the System Design screen. Preferences screen was set to 44.1kHz/24bit and Buffer set to 1024.

To test the process, I have used AU-HDMICP audio extractor from Ambery.
<http://www.ambery.com/2hddotdsdihd.html>

HDMI Input + HDMI Audio Input Mode Selection



Amplified HDMI Output + Digital Audio Out



Figure 3. AU-HDMICP audio extractor

HDMI from the PC was connected to the AU-HDMICP audio extractor and the analogue outputs from the extractor were monitored via small speakers and a CRO – see below.

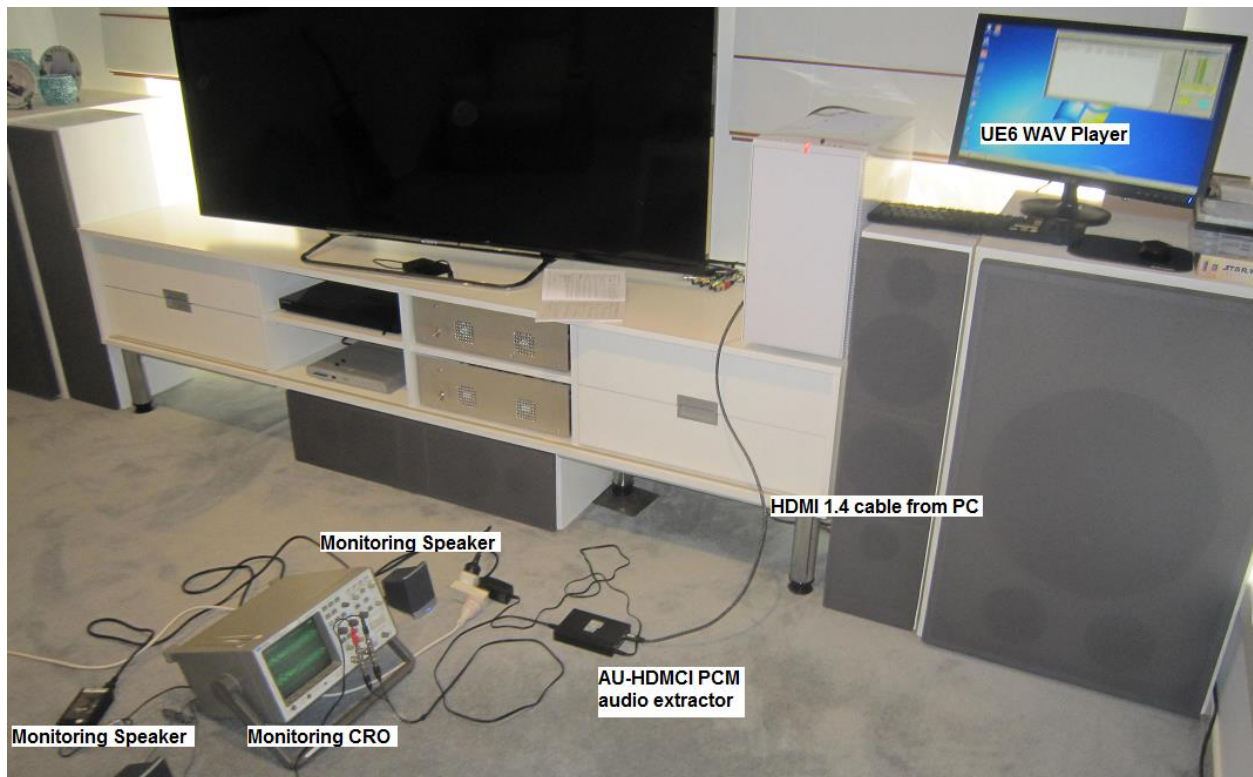


Figure 4. Basic test setup for HDMI audio.



Figure 5. WAV Player in action.

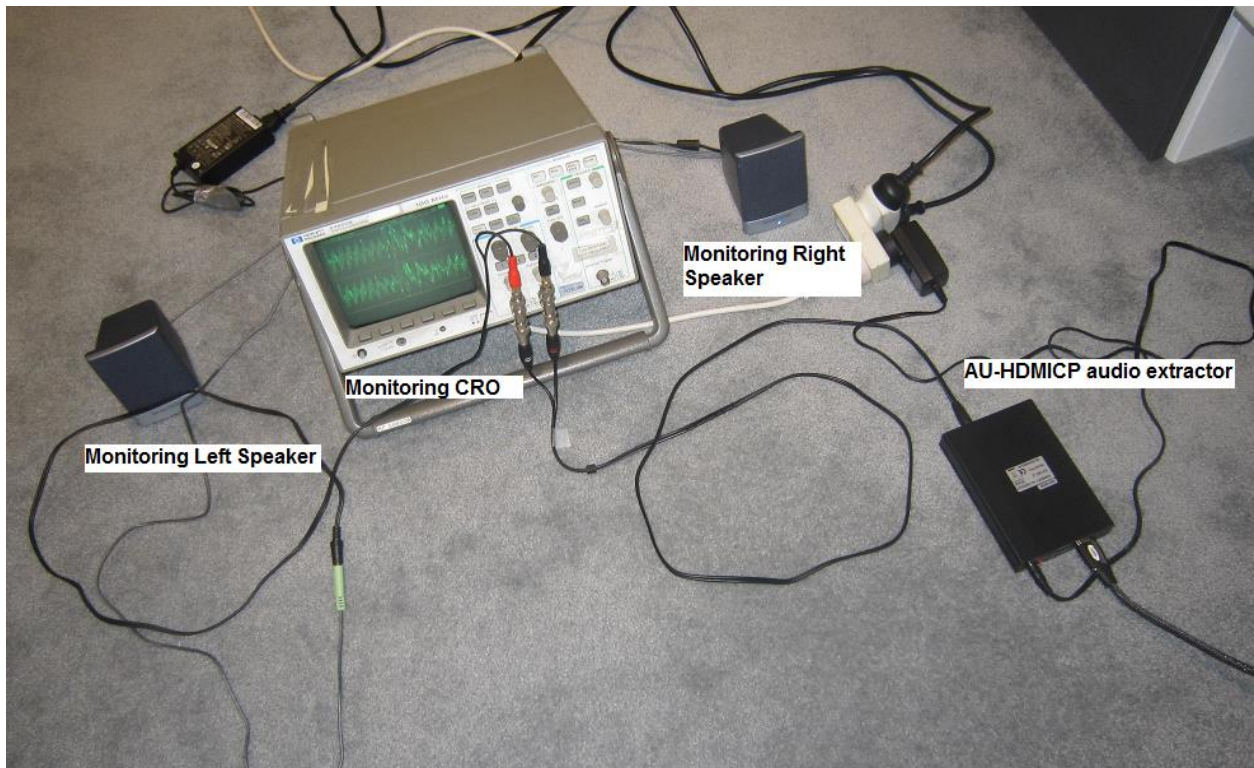


Figure 6. AU-HDMICP device and monitoring gear.

HDMI Audio

All 8 channels of LPCM audio can be extracted using products like this:
<http://www.mds.com/products/hsr--2>

It states: "...All MDS HDMI repeater products extract the audio (as four I2S lines along with a SPDIF line) for local processing...."

In the next step, I2S data can be fed into DACs like this:
<http://www.minidsp.com/products/minidspkits/curryman-i2s-dac>

So, the above devices would complete all-digital processing chain when using WAV Player.

HDMI Inputs

The following explanation on lack of HDMI inputs comes from:
<http://www.cnet.com/news/why-dont-video-recorders-have-hdmi-inputs-ask-the-editors/>

"...Not surprisingly, the dearth of HDMI inputs on recording devices is by design. The HDMI specification includes a copy-protection scheme known as [High-Definition Copy Protection](#). So to use HDMI (and get the snazzy HDMI certification logo on your device), manufacturers need to ensure that their products are HDCP-compliant. That pretty much means that HDMI inputs are limited to display devices (TVs) and repeaters (AV receivers and switchers). Those repeaters are so-called "passthrough" devices--they can do little more than pass the HD video signal onto the next device (invariably, the TV). But, by definition, that HDCP-encoded video signal is designed to be unrecordable. That's why there are no recorders with an HDMI input. (You won't find HDMI inputs on [Slingbox](#) products for the same reason.)...."

HDMI and Laptops

Many contemporary laptops have HDMI outputs. If your laptop HDMI port is capable of 24bit resolution up to 96/192kHz, then you should be able to put together a very simple and elegant UE system with an addition of a 7.1 HDMI receiver.

An example of a proposed system is shown below – see Figure 7.

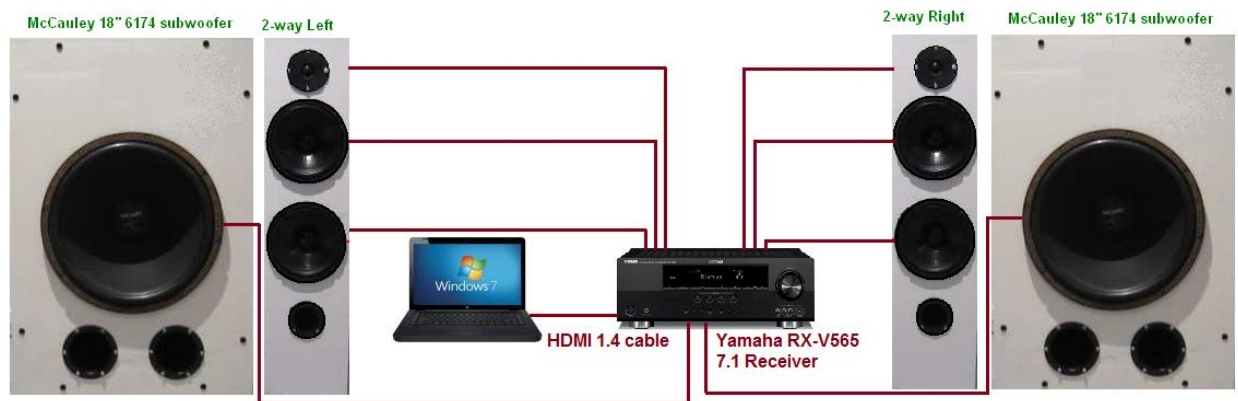


Figure 7. Very simple Laptop-based, audio server with UE6 WAV player.

The system shown on Figure 7 is a fully linear-phase, BBM system, with HBT equalization and room EQ.

UE6 will play 44.kHz / 16 bit / 2.0 standard CD music files.

UE7 will play 44.kHz / 16 bit / 2.0 standard CD music files,
 96 kHz / 24 bit / 2.0 Hi-Res music files and
 96 kHz / 24 bit / 5.1HT surround sound music files.

An example of a good quality Laptop with 1.4 HDMI output is Dell's Alienware line.
http://www.dell.com/au/p/alienware-13/pd?ref=PD_OC



Some of the HDMI issues are discussed on HP website:

http://h20564.www2.hp.com/hpsc/doc/public/display?docLocale=en_US&docId=emr_na-c01186408