Riding the wave of innovation

Audio processing innovator sets a new standard and supports customer goals with new Intel® technology-based platform

CHALLENGES

• **Meeting ambitions.** Ensure sound engineer customers have the tools they need to achieve their professional goals
• **Get Moore.** Tap into processing power enhancements presented by Moore’s Law by migrating to Intel® architecture
• **Prepare for change.** Enable use of audio over Ethernet to meet growing industry demand

SOLUTIONS

• **Careful testing.** Waves evaluated a range of Intel technologies to find the best platform for its SoundGrid® solution
• **Optimize.** It used a suite of Intel technologies to optimize the performance of SoundGrid software on Intel architecture
• **Great connections.** Ethernet connectivity through Intel® Ethernet Server Adapter i210 completes the new computing platform

TECHNOLOGY RESULTS

• **Performance boost.** The Intel® Xeon® processor E5 family has delivered a 200-fold performance increase compared to the previous server platform
• **Lower latency.** Latency was cut to just 0.8 milliseconds

BUSINESS VALUE

• **Debut release.** Waves SoundGrid is the first Intel architecture-based audio processing platform, offering customers the benefits of Moore’s Law for ongoing development. This creates a competitive advantage for Waves
• **Greater flexibility.** Application programming interfaces (APIs) can now be made available to third-party plug-in developers thanks to the increased versatility of Intel architecture. Being able to tailor the solution more specifically helps open new revenue opportunities for Waves

Driving revolutions

Waves is one of the professional audio industry’s most notable success stories. Since its foundation in Israel in 1992, it has become the world’s leading developer and supplier of software-based audio signal processing tools, while expanding to meet demand for Waves processing in hardware-based products as well. Its products are used in both live and studio environments by sound engineers working on some of the biggest-name movies, music acts and video games. These sound engineers have high standards for the work they produce and the tools they use to do it. The most exciting audio experiences are often the most innovative – whether it’s a new type of sound effect in a movie or a mind-blowing live concert – so engineers are constantly looking for ways to do more, creating a need for increasingly complex algorithms in their audio processing applications.

This means that solution providers like Waves are tasked with ensuring the hardware and applications they develop can keep up. However, the industry’s standard computing platform for the last decade has been based on DSP servers which have evolved little. Gilad Keren, Waves co-founder and CEO, explains: “We’ve seen Moore’s Law enable the server industry as a whole to make enormous leaps forward, but as DSP servers aren’t based on Intel architecture, our part of the industry has missed out on these advancements in processing power. With such a demanding user base for our offerings, we wanted to tap into these enhanced computing capabilities to give our customers an audio processing platform that really stood out from the competition. We could see that Intel technology was the only viable solution for meeting such complex and fast-evolving requirements.”
Leading audio technology specialist upgrades its core product with Intel technology

Keren was also interested in making use of other new technologies to support Waves’ next product release. “We believe that there’s another revolution in audio processing on the horizon,” he says. “The first was the shift from using hardware to computer-based processing, and we expect the next to be the move towards audio-over-Ethernet in the next few years.” Waves believes that Ethernet technology’s increased efficiency and ability to handle larger processing loads than other networking technologies will make it the perfect accompaniment to the company’s new Intel technology-based server. It decided to make use of Ethernet as a part of its standard offering from the outset.

Technical rehearsal

“We’d worked with Intel on a number of projects in the past,” continues Keren. “For example, last year we worked together to optimize our Waves Maxx™ suite to run on Ultrabook™ devices.” Knowing the two organizations had a successful track record of collaboration, Waves was excited to begin finding the right Intel technology to underpin its SoundGrid® networking and processing platform for real-time professional audio applications.

The organization tested the hardware and software elements of the SoundGrid platform, powered by variations of the Intel® Core™ processor family and Intel Xeon processor E5 family. It worked closely with Intel to optimize the SoundGrid software to run on the Intel Xeon processor E5 family-based platform. It used a range of technologies and features of the Intel platform including memory optimization, Intel® Integrated Performance Primitives (Intel® IPP), Intel® Hyper-Threading Technology (Intel® HT Technology), Intel® Streaming SIMD Extensions (Intel® SSE), Intel® Compilers, and Intel® Advanced Vector Extensions (Intel® AVX).

Waves also implemented Intel® Ethernet Server Adapter i210 to provide SoundGrid users with unmatched features for virtualization, flexibility for LAN and SAN networking, and proven, reliable performance. Testing showed that when the SoundGrid platform was powered by the Intel Xeon processor E5 family, it provided a 200-fold performance improvement for audio sampling compared to the previous DSP server running at the same frequency.

“We were impressed with the price-performance of the Intel platform,” recalls Keren. “The testing showed us that we could replace multiple DSP cards with just one Intel processor, which will enable us to get more performance for less money. And that’s a saving we can pass directly on to our customers, which makes Waves SoundGrid significantly better value and more competitive than other offerings they may be considering.”

The other key consideration during the testing was latency, since the team needed to avoid any time lapse between a processor receiving a signal and sending it out again. “When you’re in a live environment such as a stadium gig, you can’t afford any delay in the audio processing or it will ruin the experience for the audience,” says Keren. “We were therefore pleased to see that the Intel technology delivered latency levels of less than 0.8 milliseconds, which is much better than we’d been able to achieve previously.”

Sounding good

The Intel technology-based SoundGrid offering has been well received by Waves’ customers. For example, Monty Carlo, a monitor engineer for Bruce Springsteen and Ringo Starr, appreciated the more compact but just as powerful solution when on the road, saying: “With WavesLive™ and the SoundGrid compact server, life has become much easier. I can bring my FX rack to any gig and it fits in the overhead compartment on the flight.”

Having more powerful processing capabilities built in to the SoundGrid platform means that Waves can also offer a richer product to its customers. Algorithms previously considered too processor-hungry for DSP servers can now be made available for live sound applications, having been re-engineered to take advantage of Intel technology’s low-latency capabilities. Keren believes that Waves’ customers see this as a significant step forward. “Many of our customers are very influential in their fields,” he says. “The fact that they’re recognizing the advantages of the Intel technology-based platform is great for us. They see it as a compelling differentiating factor that’s going to help them create better audio in both live and studio environments.”

Another benefit of the more versatile Intel technology-based platform is that Waves can also now offer APIs to third-party application plug-in developers, enabling them to create applications and tools tailored to specific requirements. This extra level of compatibility is expected to help Waves tap in to a wider market segment for its SoundGrid offering. Jon Lemon, a front-of-house (FOH) engineer for the likes of Beck, The Cure, and Smashing Pumpkins, reflects the importance of these plug-ins for his day job: “Waves SoundGrid has completely changed my approach to live mixing on a DiGiCo® console. Waves plug-ins are superb, whether live or in the studio.”

Keren concludes: “Waves is proud to be spearheading this DSP revolution, together with Intel. The integration of audio and video processing via the latest AVB standards is a real game changer. Waves SoundGrid DSP servers, powered by Intel architecture, are at the forefront, delivering performance benchmarks that were virtually unimaginable until now.”

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