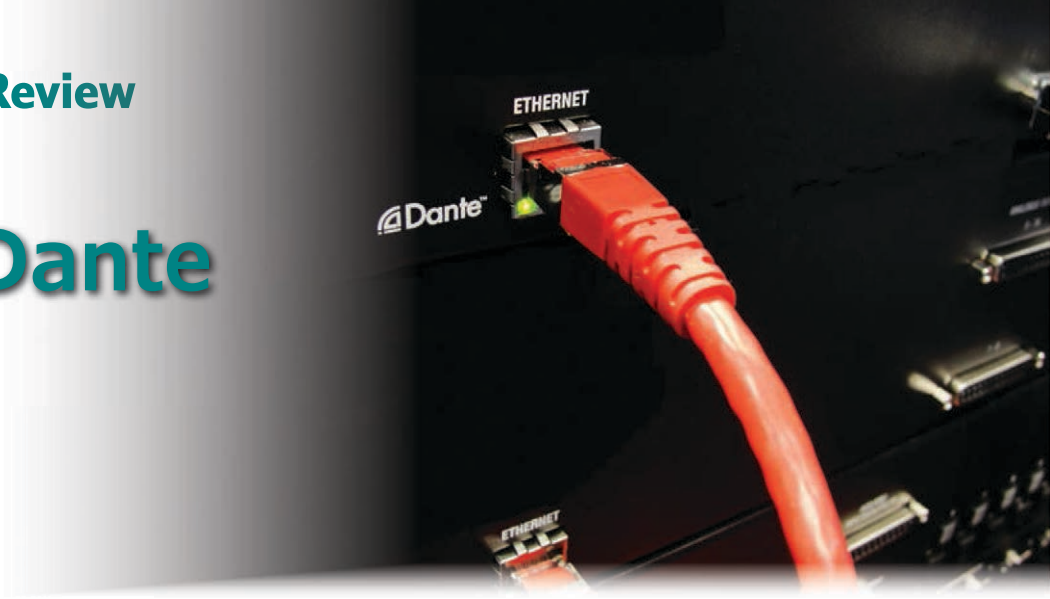

Audinate Dante (Part 2)

Audio Networks Fast to Market

The story of Audinate and the Dante audio networking implementation is one of the most interesting examples of perseverance and focus in the industry. It demonstrates that the evolution to an industry standard comes from having a clear vision of the market's needs and fulfilling those necessities with practical implementations of converging technologies. In the second part of this article series, we address how Audinate managed existing industry efforts and commercial requirements to achieve marketing success.

By
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"We are not driven by what we think is right but what our customers want. At the end of day, that's what drives the market."
—Lee Ellison, Audinate CEO

Founded and based in Sydney, Australia, Audinate was recognized as one of the 50 fastest growing technology companies by the Deloitte Technology Fast 50, Australia 2013. Deloitte Technology Fast 50 ranks the fastest growing public or private technology companies based on their percentage revenue growth over the previous two years.

As David Myers, COO of Audinate, explains, "The strength of Audinate's technology offering continues to grow along with our customer base. Our wide portfolio of solutions allows our customers to maximize the interoperability of their products and realize revenue potential from the latest network innovations—making Audinate the solution provider of choice for pioneering Audio/Video equipment manufacturers."

Built on existing networking protocols and standards, Audinate's Dante technology became a "plug-and-play" networking solution for OEMs, integrators, and the audio industry in general.

Audinate's Dante solution has been licensed by some of the largest pro audio industry players. The company is starting to leverage the technology to make inroads in the A/V market and the broader commercial installation space.

Audinate was founded in 2006. After more than three years of intensive research and development by the company's founders—who are all leading computer networking experts—they found a solution to the problem of transporting high-quality audio and media over standard TCP/IP computer networks. Their discovery helped solve the problem of long, variable delays through the network and provided a way to tightly synchronize multiple audio

outputs. Audinate also took a novel approach to simplifying network setup and management, integrating conventional network routers and using simple network configuration concepts.

The Dante patent was filed in 2003, but the technology has been continuously evolving with new networking standards. Basically, as Audinate states: "If a piece of audio equipment is Dante-enabled, this means that it is capable of transmitting and/or receiving audio channels to/from other Dante-enabled equipment over a standard local area network running Internet protocols (TCP/IP, UDP/IP etc.)."

In addition to providing basic synchronization and transport protocols over Ethernet Layer 3, Dante provides simple plug-and-play operation, PC sound card interfacing via software or hardware, glitch-free redundancy, and support for routed IP networks. Dante implementations use the Institute of Electrical and Electronics Engineers (IEEE) 1588-2002 standard for synchronization, UDP/IP for audio transport, and are designed to exploit standard gigabit Ethernet switches and VoIP-style QoS technology (e.g., Diffserv model architecture).

In line with its commitment to be AVB compatible, Audinate has produced versions of Dante that use the new Ethernet Audio Video Bridging (AVB) protocols, including IEEE 802.1AS for synchronization and RTP transport protocols. It is committed to supporting both IEEE 1733 and IEEE 1722.

Existing Dante hardware devices can be firmware upgraded as Dante evolves, providing a migration path from existing equipment to new AVB capable Ethernet equipment. Recent developments include announced support for routing audio signals between IP subnets and the demonstration of low latency video.

The Licensing Approach

Since its early days, Audinate has concentrated on the distribution and licensing of Dante, helping OEMs minimize audio network implementation with ready to use solutions, including chip-level and hardware reference-designs in conjunction with technology partners such as Xilinx and Dayang OMS.

A simple example of Dante implementation is the A820-NIC-DANTE card for the Shure SCM820 automatic mixer, offering multichannel audio networking over a single Ethernet connection and computer-based playback, recording, and signal routing via Dante Virtual Soundcard and Dante Controller software.

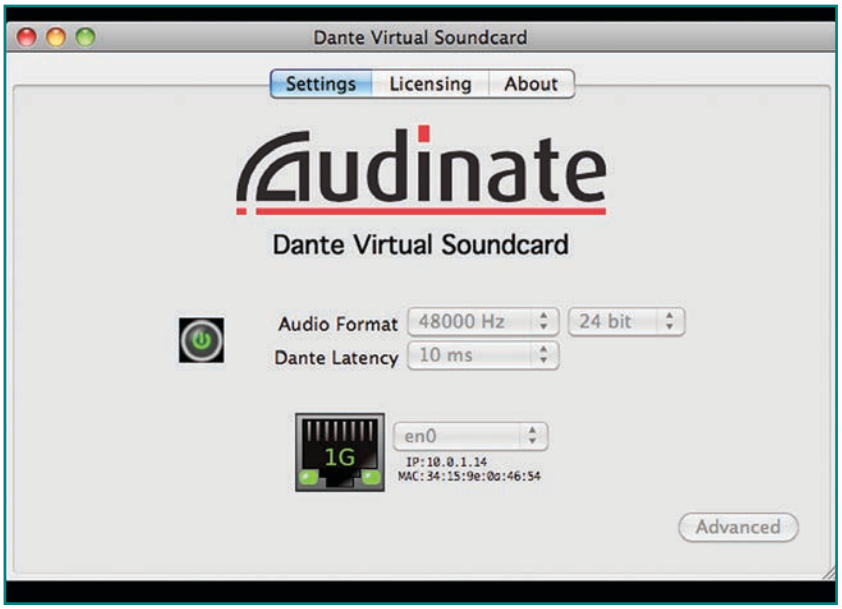
Independent of the complexity level of the implementation, Audinate provides all the essential implementation tools in terms of hardware, software APIs, and licensed applications (e.g., Dante Controller and Dante Virtual Soundcard) and support components.

Hardware-reference designs and implementation tools include the Dante Core Module (DCM) and the Dante Brooklyn II modules with support for 64 × 64 audio channels and the Dante PCIe Soundcard for PC or Mac, with support for up to 256 channels of uncompressed, 24-bit digital audio and/or up to 192-kHz sampling frequency on a Gigabit Ethernet interface.

A recent example of Audinate's commitment to easy implementation was the launching of the Dante Ultimo solution, a fully featured, ready-to-use Dante interface for networked audio products that is integrated into a single chip. Ultimo provides a cost-effective networked audio solution over a 100-Mbps Ethernet interface to a new range of audio devices with low channel count and high audio quality.

Ultimo also enables low-jitter clocks with ±1-µs time alignment between networked devices. The solution does not require specialized switches. It works with existing network infrastructure and offers all the well-established Dante features (e.g., automatic device discovery, plug-and-play networking, network-based firmware updates,

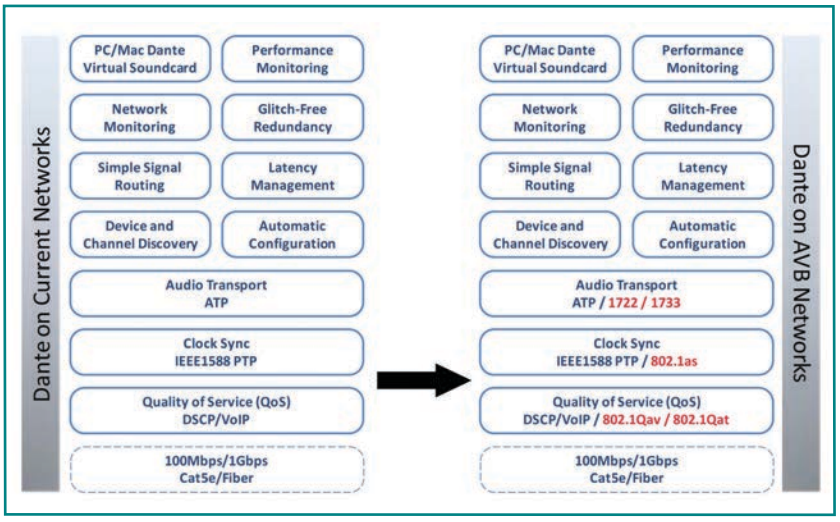
Audinate Dante is the first IP over Ethernet networking solution for the professional industry, capable of transmitting many channels of high bandwidth, uncompressed sample accurate digital audio with imperceptible latency, and high synchronization performance. When Solid State Logic started providing a Dante-MADI bridge to the studio market, it became clear the technology is now a "de facto" standard.



The Dante Virtual Soundcard software enables any PC or Mac to connect to a Dante audio network, using only the computer's Ethernet port to communicate with a network of other Dante-enabled devices. No special hardware is required. Audio applications recognize the Dante Virtual Soundcard as they would any standard ASIO, WDM, or Core Audio interface.

and customization of device names and channel labels).

Applications targeted for Ultimo include powered speakers, microphones, speakerphones, amplifiers, paging stations, personal monitoring systems, AV wall plates, recording interfaces, analog/digital, break-in/break out, and even musical instruments. Product development kits, in partnership with IED, Attero Tech, and Stewart Audio are also available.



The Dante architecture includes Ethernet Audio Video Bridging (AVB–IEEE 802.1) support, according to Audinate.

About this recent initiative clearly aimed "more toward prosumer than consumer" applications, Audinate CEO Lee Ellison revealed the implementation will expand from the 2 × 2 channels currently supported. "The path to 4 × 4 channels will open the doors for a lot of different products, when you hit that target at a very low cost. If we look at a network it's the stuff at the edges that there is more than anything else."

The Good Thing About Standards

Another early strategy followed by Audinate was to join and contribute to the most relevant audio industry efforts within the Audio Engineering Society (AES) or the IEEE Audio Video Bridging Task Group (IEEE 802.1-AVB). Audinate has announced that Dante will be AVB compliant as these standards are ratified, and is a Promoter Member of AVnu, the industry group that seeks to promote and certify solutions based on the new AVB standards. In fact, within the AVnu Alliance Audinate already demonstrated Dante and AVB running side-by-side on the same network interface.

In our interview with Ellison, we discussed in detail the position of Audinate in regard to the "continuously moving" environment, as illustrated by the recent publication of the AES67 interoperability standard (*audioXpress,* January 2014) or the AES X-210 project promoted by the Open Control Architecture (OCA) Alliance, aiming to develop a media networking system control standard for professional applications.

Naturally, we started with the AVnu Alliance and the AVB developments to which Ellison confirms, Audinate is totally committed to support, but not necessarily embrace.

"AVB is a suite of standards and people like the concept of having a standards-based approach. It gives them a comfort level. There are products that I use everyday in my life that aren't totally 100% open, like setting up a meeting on my Mac and someone sends me something back on a Windows machine, talking on a iPhone and the other person on Android… It's not necessarily bad. There is a company that stands behind it, that completes it, and adds features and wraps that around it.

"Dante is just not a QoS or a time sync protocol. Dante is really the complete wrapper and tool kit around all of that. So an example I like to equate us to is Red Hat. They provide a Linux suite and tools in a complete solution so that companies don't have to fix all the things that exist in open source and can get to the market quickly. And they are already well over a $1 billion company now. Well, what we try to do is to give our customers a wrap around those

Four Audio was one of the first manufacturers to bring a two-channel Audinate Dante Breakout box to the market, based on the Ultimo chipset. It is a cost-effective solution for getting analog signals in or out of a Dante audio network without much infrastructure. It is also ideal for speech or music rooms or multiroom installations in buildings.

tools too. AVB is one of the tools that customers are requesting. We are not driven by what we think is right but what our customers want.

"At the end of day, that's what drives the market. AVB changes some things in terms of the network clock to the switches and as a result we have to work within an avenue to get those types of things tested. AVB, as a standard, has the potential to be interoperable but is not automatically interoperable. If we implement something in an island, there is a likelihood that things will not be quite compatible when they initially connect.

"The AVnu organization mission is to promote the interoperability and compliance testing so that the end-devices will be implemented. Initially there is an avenue in layer 3 and we also fully believe that, in the long run, routeability is going to see more and more user cases required. It's not an argument about layer 2 or layer 3... It's really about IP and that's what will be required in the market. That's precisely what drove AES67."

In reference to AES67, we asked Ellison, what this changes for Audinate.

Resources

Audinate, "Evolving Networks to Audio Video Bridging (AVB)," White Paper, 2011, www.audinate.com.

———, "Analog to Digital Audio in the 21st Century," White Paper, www.audinate.com.

———, "Audio Networks Past, Present and Future" (CobraNet and Dante), White Paper, www.audinate.com.

———, "Dante: Digital Audio Networking Just Got Easy" 2.0US-09A09.pdf, White Paper, www.audinate.com.

Audio Engineering Society (AES), "AES Standard for Audio Applications of Networks—High-Performance Streaming Audio-over-IP (AoIP) Interoperability," AES67-2013.

J. Berryman, "OCA Alliance Open Control Architecture: The OCA Alliance Overview," www.oca-alliance.com.

Dayang OMS, www.dayang.com.

Four Audio, www.fouraudio.com.

A. Hildebrandt, "Networked Audio: Aktuelle Entwicklungen & Technologische Perspektiven für den Broadcast-Markt" (Networked Audio: Current Developments & Perspectives for the Broadcast Market), VDT International Convention, November 2010.

S. Schmitt and J. Cronemeyer, "Audio Over Ethernet: There are Many Solutions—But Which One is Best for You?" www.dspecialists.com/sites/default/files/publication/110126a_networking_paperembeddedworld2011_paperen_final_st_jc.pdf.

T. Shuttleworth, "Emerging Technology Trends Report," Audio Engineering Society (AES) Technical Committee on Network Audio Systems, 2011.

Sony-Oxford Technologies, "Oxford SuperMac/HyperMac AES50 Digital Audio Interconnection," 2005, www.philippe-lahaye.fr/IMG/pdf/xmac_brochure.pdf.

M. Johas Teener, A. Huotari, Y. Kim, R. Kreifeldt, and K. Stanton, "No Excuses Audio/Video Networking: The Technology Behind AVnu," AVnu Alliance White Paper, 2009.

M. Vest, "High-Quality, Low-Latency IP-Based Audio Routing via Ethernet," NTP Technology Presentation, 2013, www.ntp.dk/media/NTP_presentation_IP_Audio_2013.pdf.

Xilinx, Inc., www.xilinx.com.

Sources

Aspen DSPs
Lectrosonics, Inc. | www.lectroconics.com

OMNEO Media networking architecture
Bosch | www.bosch.com

SCM820 Automatic mixer
Shure, Inc. | www.shure.com

"AES67 is an interoperability standard that will use RTP transport. RTP is a common transport used in VoIP, in IPTV or in videoconferencing. Most of the video going forward will be RTP as well, for AVB and non-AVB. What this means is that to support AES67 in Dante we would have to modify the transport layer to do that. That's about it. As I said earlier, we are not trying to force anything on any customer. What we are trying to do is provide a solution that they know works. Not just a technology that isn't proven.

"By the way, we have been doing this for about 10 years already. This stuff isn't easy and, if you think about it, the AVB organization has been doing the standards for about nine years. It takes a while…and I think that will be true with AVB as well as with AES67. Our job is to make that robust for our customers. We are polling customers now and finding out which direction is going to go.

"I don't think networking technology is about being "all-in". It's a competing environment. There is a misperception on the market about Dante versus AVB. We are a supporter of AVB. Do we think it will be the dominant standard? It's very unclear. Maybe it will or it won't. We don't know. We think its going to have a lot of momentum in automotive. We thought it was in pro audio and we will have to see if that takes place or not. Now… with AES67 is that going to get momentum? We don't know. But if there is momentum and if our customers want us to provide a solution, we will implement those capabilities for our customers."

Discussing the Open Control Architecture (OCA) Alliance initiative (OCA came from the Audio Engineering Society's AES-24 protocol architecture), where Audinate is one of the founding members with Bosch Security Systems, we've learned that both companies worked in close cooperation. "We have been working with Bosch for over four years. Bosch has adopted Dante in their products and they have combined it by putting the Open Control Architecture on top of it. They call it Omneo, for Bosch products," Ellison said.

"So, Omneo has a foundation of Dante networking with an Open Control Architecture on top. The OCA Alliance is trying to define a suite of profiles that manufacturers can use so that, at least for basic functionalities, you can send control commands from one manufacturer to another. We are able to transport control information over Dante and that would be an example of a layer of control. If the OCA becomes implemented on a series of products, we will be able to use Dante to transmit that control information.

"In the past, control was not so much a technical problem. It was more a manufacturer specific problem and I think that some companies realized that there is something they do in how they manage their systems that is special, and that there are some basic functions, like mute and gain that aren't that special and that the gross of the industry would benefit from being able to have more interoperability at a control level."

From 2 × 2 channels to complete multichannel solutions for commercial installations, Lectrosonics also offers Dante network audio interfaces and breakout boxes for its range of ASPEN DSPs.