



Hylton Memorial Chapel, with its \$1.5 million systems upgrade, becomes one of the first facilities to include Audinate Dante digital networking technology.

by Dan Garcia

Network Trailblazers

Hylton Memorial Chapel is a non-denominational Christian event center situated 24 miles south of Washington, D.C., in Woodbridge, VA. A full-scale renovation, completed in late 2008, included a \$1.5 million sound system upgrade. With an eye firmly on concert technical riders for this large-scale event center, Technical Director J. Michael Viljoen, consultant Acoustic Dimensions and systems integrator Washington Professional Systems relied on known industry brands. But they also planned for the future, and became the first facility in the world to use the Audinate Dante digital networking technology as part of a permanent installation.

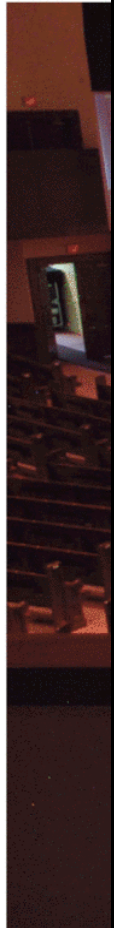
The rewards of this seemingly risky move included time and cost savings, detailed control of the sound system during commissioning and a comprehensive network that maximizes Hylton Chapel's flexibility.

Versatility is central to this facility, which hosts a wide range of public, private and ticketed events. The main venues are the 3,500-seat Sanctuary and 190-seat Wedding Chapel: a reception room, nursery, multipurpose room, green room and foyer are also available.

Down to the Wire with 2,000 Terminations

The job of turning the drawings from Acoustic Dimensions into functioning systems was awarded to Washington Professional Systems (WPS) of Wheaton, Md. WPS Vice President Greg Lukens counts himself lucky to have been involved in this project. "We are fortunate to have that rare situation where the consultant, the contractor and the client all got along extremely well and worked together with one goal — to make this the best-sounding concert sound system in the area," Lukens says.

"WPS went to extraordinary lengths to install each system separately," says Viljoen. "The original sound system was used for the last time on a Sunday, and



the soffit-mounted M'elodie arrays and balcony fills went into operation the following Thursday."

The Chapel has plenty of 1-ton motor points installed, which made things a little easier. Still, Lukens had to recommend a modification of the original wiring scheme. "Acoustic Dimensions had specified the industry standard — pre-wired racks and termination panels," he explains. "Unfortunately, the only place for those termination panels was in the ceiling of the electronics room, at least 12 feet above the floor. Not only was it going to be a challenge to climb up there to make the 2,000 connections involved in the installation, but any service calls would have been extremely laborious." Acoustic Dimensions signed off on

the change to a hard-wired system.

Two thousand terminations? Where are all those wires going? Well, let's start in the Sanctuary, where not one, but two complete sound systems are installed.

The first is a permanently installed multi-zone full-range system with subwoofers, operated from a Yamaha M7CL-48 console installed in the balcony. The second provides supplemental coverage.

The event center's owners did not want to alter the appearance of the Sanctuary. So, the main floor is covered by seven line arrays in soffits on the proscenium wall. Each has three or four Meyer Sound M'elodie Ultra-Compact High-Power Curvilinear Array loudspeakers. Supplemental coverage is provided by 14 Meyer UPM-1Ps under

The Front of House Yamaha M7CL mixing console on its balcony perch above the pews of Hylton Memorial Chapel.



Sacred Sound



These equipment racks house Dolby Lake processors, Yamaha digital input boxes and Whirlwind E Desk and E Snake devices.

the balcony, with 10 UPJ-1P's flown over the balcony. Four Meyer HF600 subwoofers are installed for low-end support.

There's plenty of horsepower on tap as well — this system is capable of producing 108 dB full-range at all seats. That should be enough for most events, but if you really want to rock the house, Viljoen and his staff can fly two Meyer MILO line arrays (18 total, 9 per side) from the designated 2-ton rated motor points.

The two MILO arrays are supported by eight Meyer HF700 subs, and they are capable of concert-level performance up to 130 dB. Twelve of the 24 M'elodies are used for center fill, along with hard left and right coverage. Ten Meyer M1Ds can be used for front fill as needed for either system configuration.

Viljoen worked closely with Acoustic Dimensions to choose the loudspeakers. "We have to integrate many different speakers and line arrays," he explains. "Some are in soffits, some on walls or ceilings. And there are portable line arrays, subwoofers and front fills that are used about 40 percent of the time. I wanted all the horns to sound similar so that we had a good starting point."

Meyer Sound, Viljoen says, was one of the few manufacturers offering all the dif-

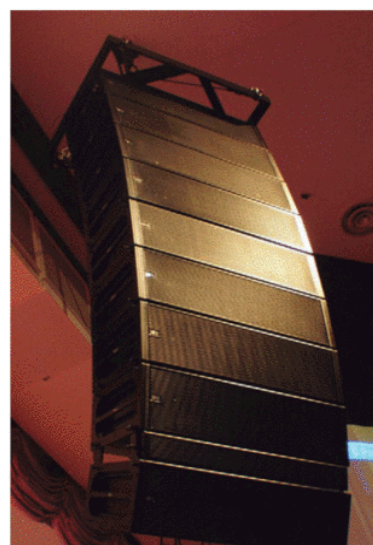
ferent types of loudspeakers they needed for the project. He adds, "They are very well accepted on technical riders by the Christian and Gospel acts we deal with."

Future-Proofing With Dante

Both of the project's large, complex systems are controlled by five Dolby Lake Processors. Networked using the Audinate Dante technology, the processors provide a signal routing matrix with 20 inputs and 60 outputs. Implementing Dante enabled the replacement of the originally specified MADI router.

The MADI router, Lukens say, would have routed a maximum eight channels. It would have also required cascading the inputs and outputs of the Dolby Lake processors, which, he explains, "might have created an audible amount of processing latency." Luckily, Dolby released the Version 5 firmware that includes Dante before the team installed the system. "WPS has a strong, long-standing relationship with the Dolby Live Sound Group," Lukens explains, "and with agreement from Acoustic Dimensions, we were happy to be one of the first to use Dante networking."

The Front of House PM5D is connected to the eight AES inputs on the primary Dolby Lake Processor in the amplifier



For supplemental sound, technical director J. Michael Viljoen can fly two Meyer MILO line arrays (18 total, 9 per side) from designated 2-ton rated motor points.

room. Four other processors are networked over standard Ethernet with Dante. Three are in the amp room, but No. 5 is at the end of a 300-foot CAT 5 run in the balcony. This unit interfaces the M7CL-48 with the network via its AES/EBU inputs.

Setting up the Dante network was "undaunting," Lukens reports. "We would not have tried this if not for the strong relationship with Dolby Live Sound." In the end, though, the installers didn't need all that much help. "All we did was turn the processors on and connect them," he says. "Network set-up was automatic — the processors just said, 'Thanks, we're done, we'll get out of the way now. What do you want to do next?' I think it took us longer to plug in the Cat 5 cables than it did to configure the network."

With Dante networking, Lukens was able to define 60 separate control zones. "We have direct control of each M'elodie and MILO in the line arrays," he explains. "That would not have been possible with AES/EBU signal routing."

During the commissioning process, WPS and Acoustic Dimensions aligned all of the 60 subsystems in the Sanctuary. Then, they locked their settings into the processors with password protection. Despite the scope and flexibility of this system, latency

is not an issue. "As someone who's worked with other digital audio networking systems," says Lukens, "I just don't feel any latency in this system."

Audio Anywhere

WPS ran CAT 5 cable throughout the building, using a pair of Linksys SRW2016 Gigabit Ethernet switches to network a variety of data traffic, including a firewalled Internet connection. Three 100MB VLANs (Virtual Local Area Networks) are running on the same physical infrastructure. VLAN 1 is the Dante network. VLAN 2 interfaces with the rest of the building via the Whirlwind E-Snake/E-Desk, which is used to route and adjust signals to other areas as well as to provide master paging announcements throughout the facility. VLAN 3 monitors 88 Meyer loudspeakers via three Meyer RMS-ILONs.

Hylton Chapel's digital audio network provides local mic and line inputs in each of the seven meeting areas. It also enables any of the audio systems to interface with other

systems for, say, auxiliary functions, such as using the reception and/or foyer spaces as overflow seating for the main auditorium. Smaller meeting rooms have their own local system control and microphones as well. There's almost no limit to the possible combinations of the Whirlwind and Dante VLANs — any integrated signal path (or combination of paths) can be programmed, stored and recalled later.

A rack-mounted PC in the control booth runs control software and can connect to any of the VLANs. This computer also runs DVS (Dante Virtual Sound Card for Windows). So, it can record multi-channel digital audio directly off the Ethernet network into Steinberg Nuendo.

There is also a wireless network connection for a wireless tablet PC that Viljoen has found extremely helpful — especially since 60 percent of the events at Hylton Chapel are run from the M7CL's permanent mix position in the balcony. "The balcony mix position is a stone's throw from the stage," Viljoen explains, "but you have to walk the

entire perimeter of the building to get down there. I have a wireless tablet PC running Yamaha Studio Manager software, along with Dolby Live Controller software and the Meyer RMS data. "With Remote Desktop, Viljoen can operate the M7CL from the stage." That saves a lot of time and travel when we're setting up monitors," he says.

What's On Your Tech Rider?

Choosing consoles was a little tougher. "We looked at a few different options," Viljoen recalls. "It really came down to rider compliance in the markets we serve, and Yamaha has a clear edge in that area." Hylton Chapel has two Yamaha PM5D-RHs, and each has its own separate DSP5D Expander, which interfaces with the rest of the system digitally via AES/EBU.

The monitor system can provide up to 24 separate monitoring mixes with multiple tailored monitor speakers, eight AVIOM-based IEM mixing systems and distributed mixing outputs for additional IEM systems.

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cert microphones, 20 Shure UHR wireless microphone systems are available. Each wireless bodypack can be connected to a lavalier microphone, a Countryman E6 headset, an instrument cable or an SM58 wireless microphone as needed.

A High-End Wedding Chapel

The wedding chapel has a permanently installed NEXO GEO S line array system controlled by a dbx ZonePro digital mixing

system. This 12 x 6 audio matrix controls line and mic level inputs to various outputs, including the speaker arrays. It also offers out-bound feeds to the Whirlwind E-Desk and Dolby Lake processors as well as local recording outputs. Two Shure ULX microphone systems are integrated into the mixing system in addition to four hardwired microphones.

A Lasting Investment

Old habits can be hard to break — Hylton

Chapel event sponsors have been renting outside production for a decade, despite the risk of damage by outside vendors. "I've had a hard time convincing people on the phone," says Viljoen. "But a walk-through seems to do the job. Since June, we haven't had a single outside vendor in the Chapel. So far, this has been a home run."

Dan Garcia is a freelance technical writer.

Who Is Audinate? What Is Dante?

Audinate was founded in mid-2006 by researchers at Australia's prestigious NICTA research institute to commercialize three years of pioneering R&D work. With a background firmly rooted in Internet Protocols (IP) and Ethernet, the Audinate team developed the low latency Dante networking system that has already been adopted by Dolby Laboratories, Lab.gruppen and Peavey Electronics. Other significant manufacturers have unannounced deals and are currently in serious negotiations regarding Dante.

Audinate supplies its partner hardware manufacturers with circuitry that allows Dante-enabled devices to handle the networking. If Dante reaches critical mass with manufacturers, expect it to be a serious threat to analog wiring and protocols, such as CobraNet and EtherSound.

How it Works

Dante is built on IP over Ethernet, the technology used by your computer to network with other computers, printers, etc. Dante appears to an Ethernet switch or an IP router exactly like any other standards-compliant data because it carries media data in UDP (User Datagram Protocol)/IP packets. All computers use IP and can be easily connected to Dante networks.

Because it works within the standards framework, Audinate is the pro audio industry's first supplier to fully leverage the price and performance benefits of both 100 Mbps and 1 Gbps switched Ethernet networks. Control data and media data can travel on the same network. In fact, Dante can deliver high-bandwidth, uncompressed digital media streams over existing networks that are also simultaneously carrying TCP (Transmission Control Protocol)/IP traffic, such as e-mail, Internet browsing and other office data.

Local clocks in each networked device are synchronized to a master clock. Dante clock synchronization is completely independent of the audio data and the sample rates being used on the network. The local clock is used to timestamp network packets and to control the rate at which audio samples are transmitted and received. Audinate's FPGA

Dante implementations achieve clock synchronization within 1 microsecond (or, one-millionth of a second), enabling sample-by-sample synchronization of audio coming out of different devices.

Audinate's approach has been to make Dante an extremely user-friendly technology for live, installation, recording and broadcast pros. With Audinate's trademarked "Zen" technology, which radically simplifies network set-up and configuration, all Dante-enabled devices on the network automatically discover each other and configure themselves as soon as they are connected to the network.

Each audio channel can be labeled with a logical, descriptive name instead of an incomprehensible number. Text labeling makes it easy to assign the correct signal to any mixer or signal processor input. Labels are stored in devices and persist when the power is turned off, making relocation easy and avoiding the need for reconfiguration. (Equipment comes with default channel labels that can be overwritten or augmented.)

Signal processing can be distributed throughout a true network rather than being concentrated at a central device. A direct connection to Apple Mac or Windows computers can be made via Dante Virtual Soundcard (DVS) software that makes your computer look or act like any other Dante-enabled device. The existing Ethernet network interface is used — so, no additional hardware is required.

The entire system makes networking plug-and-play so easy that there is no need for an IT specialist or special training. Inexpensive, off-the-shelf computer networking hardware is all that is needed to connect to Dante-enabled hardware.

Furthermore, Audinate's technology products have been designed with a future-proof migration path to support emerging networking standards—such as AVB (Audio Video Bridging)—when they arrive.

For more detailed info, visit www.audinate.com.

—Mark Herman