

ProSoundWeb EXPERT SERIES



PELTRIX TAKES DANTE OVER DISTANCE FOR BROADCAST-QUALITY REMOTE COLLABORATION

Chapter 4 of 4 in the Networking Expert Series

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Amit Peleg of Peltrix

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**“The sound is so clear. It’s eerie on how clear mics were as it on the same stage. You know it, but it hits you when you hear it”
—Amit Peleg**

Amit Peleg of Peltrix, a leading audio video design and integration firm, set out to build a system that would let musicians in different locations collaborate in real time. He envisioned a seamless connection for technicians, with full access to all sources across properties for professional production. He wanted latency low enough for musical collaboration. He also wanted to avoid relying on a cloud service with something that could be managed directly.

For seven years, Peltrix has been implementing IP based solutions for AV using a Local Area Network, so why not do it on a Wide Area Network?

Such a system could be offered to corporate and entertainment clients and provide a new way to integrate multiple sites for rehearsals, performances and special events. Amit was receiving requests for systems like this before the pandemic. So, he felt if it was built right, it would have life after the pandemic, as well. It would also minimize the need for everyone to travel to a single location, enabling faster, more spontaneous collaboration.

Peltrix partnered with the Blue Note Group to create four live events linking three locations spanning 750 miles. Sony Hall in New York City, the Howard Theater in Washington D.C. and SIR Production Studios in Nashville. All locations were connected using 1Gbps shared fiber, enabling a transparent production environment. Anything on any property could connect to anything on any other property.

Amit turned to Dante and Dante AV to connect as one unified network. Dante Domain Manager broke down the barriers between the sites. It makes Layer 3 networking seamless for Dante devices. Techs could use Dante Controller to patch any signal anywhere, just as they would on a local network.

Since this used existing product with existing firmware, much of which was already installed on the sites, this seemed like a natural fit.

Dante is a complete media networking solution and the de facto standard for digital media networking. Dante distributes uncompressed, multi-channel digital media via standard Ethernet networks, with near-zero latency and perfect synchronization. It enables digital audio distribution via standard Ethernet networks — the same networks used for home or office data networking. In fact, Dante is designed to allow audio, control, and all other data to coexist effectively on the same network.

The problem to solve:

Amit knew the production quality needed to be high quality. “Customer expectations are high, and we won’t be excused for technical challenges or failures,” Amit said. “Dante and Dante AV were the only solutions that could achieve this. Other solutions either couldn’t operate over distance, or couldn’t deliver the latency performance we required. They were really

EQUIPMENT LIST:

Borrowed for the latency test:

- » Audio Technica AT4050SDT and BP4025 microphones
- » Focusrite Pro AM2 Headphone Amps
- » BSS London DSP

For the live events:

- » Yamaha PM7 mixing desk w/ RIO and RPIO stageboxes (New York)
- » Yamaha CL5 w/ RIO and RIO-D2 stageboxes (Nashville and Washington, DC)
- » Yamaha RSio64D Dante Cardcages w/ Dante-MY16-AUD2 cards
- » Presonus HP2 analog Headphone Amps (for performers)
- » Sennheiser EW IEM G4 Wireless Headphone System (for local audience)
- » Focusrite AM2 and Klang Quelle Headphone Amps (for technicians)
- » Bolin D220 Dante AV 1080p PTZ camera
- » Bolin D10H Dante AV Decode
- » Bolin KBD-1010-RNV PTZ Controller
- » Patton FPX6000T Dante AV Encoders
- » Patton FPX6000D Dante AV Decoders
- » VMix Vision Mixing Software
- » Netgear M4250 network switches for local network
- » Sonifex AVN-GMCS IEEE1588 PTP Grandmaster Clock with GPS Receiver (one per city)



intended for one-way communication only. No application is more time sensitive than music.”

For the artists, the technology needed to be transparent. They need to feel they’re in the same room or on the same stage. “If technology gets in the way of creativity, then we failed,” said Amit.

And of course, the cost of the network and administration could not eat up the profits. This needed to fit production budgets.

To start with, the team devised a test. So many distant network projects begin by building the network, but they failed because the latency was too high.

This team decided to create a test that isolated for latency. Musicians were placed in different rooms, sonically and visually isolated from each other. Using a monitor mix system and a matrix of delays, we were able to experiment with different delays between musicians. (They would hear themselves instantly, but they would hear the other musicians delayed.)

The Blue Note provided Sony Hall in New York City as a venue along with three professional musicians for the test. The musicians had never played together before, so they wouldn’t be able to lean on established cues to overcome latency issues. Since they didn’t know each other, they would have to play with what they hear.



The test was very helpful in determining acceptable latency amounts. Any network technology that would not achieve the target simply wouldn't be built.

The requirements for a system like this are different than what the telecommunication providers are used to, and it was a challenge to pick the third and farthest location which was in Nashville. Amit chased every millisecond of latency. It doesn't just come from the network. He also streamlined it by eliminating devices that inherently added latency and where lower latency options were available. For example, wireless microphones and in-ear monitor packs were eliminated since each will typically require 3msec of latency in favor of Wired alternatives.

Dante Domain Manager enabled the system to seamlessly span the wide Layer 3 network, create the required GPS clocking zones for each site, as well as system tracking. The achieved synchronization variance between all devices on all sites was better than one microsecond.

The latency between long distance sites ranged from 6.5msec to a shade over 14msec, depending on the distance leg. But of course, local connections were made with low latency; we set them for 0.5msec. Dante supports different latencies for different connections at the same time, and the design allowed these to automatically be determined when routes were made.



“IF YOU THINK ABOUT IT, EVERY MILLISECOND OF LATENCY SAVED EXTENDS SYSTEM RANGE BY 120 MILES.”

—AMIT PELEG

Enabling real time video for natural collaboration

Just as they did for audio, they worked to streamline the latency for video, as well. Cameras incur latency, but so do displays. The measurement is called display lag, the time it takes from the input of a display until the image is shown. This varies dramatically between brands and models, and is not always a published spec. “You have to be careful; many manufacturers’ support teams confuse refresh rate with display lag,” Amit said.

Surprisingly, commercial displays typically have rather long latency without a way to bypass it. Consumer TVs with a “gamer mode” worked out the best. Game mode bypasses some image processing in the TV for quicker image display. This represented a significant improvement in display lag.

Positioning was also critical as they didn’t want musicians staring at screens like on a video call. Thus musicians were staged where they might be standing as if on the same stage and when they were composited it looked like they were natural. When looking at the displays it looked like they were looking at each other on the stage.

All vision mixing took place in New York, but images were sent between all locations so musicians could see each other. The displays were placed around the stage where the musician would be normally found.

Bolin D220 Dante AV 1080p PTZ cameras and Bolin D10H Dante AV decoders were used to capture video feed. A Bolin KBD-1010-RNV PTZ Controller was used for all cameras at all of the sites.

For additional feeds, Patton FPX6000 transmitters and receivers were used to provide more signal splits to different destinations. Of course, Dante AV makes it seamless to transmit signals between different brands.

In the end, the musicians were impressed with the ability to collaborate over distance as if they were all sharing the same stage. Some commented on how natural it all felt, “I can’t believe they’re not in the same room right now. It feels like a live recording.”

While telcos offer premium services with QoS packages, those “for-a-cost” features were actually detrimental. When we turned it all off, the performance was better than ever! Glenn Dickins, Audinate’s Dante Platform Architect, made a comment that “The LAN of 2003 is the WAN of today.”

Glenn explained, “Dante has had over 15 years of rigorous testing. They started out on challenging networks, and set the bar high for overcoming the toughest network challenges.

“We had to enable a few ‘not-released-yet’ features to make the distant video connection smooth, but these aren’t far away. Some features are now in testing for general release, others will be available towards the end of 2021.”

It’s this ability to work well across challenging network conditions that proved the commercial viability of the system. This event showed that it just works”

About Audinate

Audinate Group Limited (ASX:AD8) has a vision to pioneer the future of AV. Audinate’s award winning Dante AV over IP networking solution is the worldwide leader and used extensively in the professional live sound, commercial installation, broadcast, public address, and recording industries. Dante replaces traditional analogue cables by transmitting perfectly synchronized AV signals across large distances, to multiple locations at once, using nothing more than an Ethernet cable. Audinate is headquartered in Australia and has regional offices in the United States, United Kingdom and Hong Kong. Dante technology powers products available from hundreds of leading audio partners around the world. The company’s ordinary shares are traded on the Australian Securities Exchange (ASX) under the ticker code AD8.

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