First Steps With Digital Audio Networking
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SESSION TOPICS

Digital Audio Becomes Reality
- Computers Enter the Music Industry
- Audio Networking History
- Present Day Audio Technology

Real World Applications:
- Bar Band – Part Time “Weekend Warriors”
- Home Project Studio
- House of Worship
Digital Audio Becomes Reality
DIGITAL AUDIO – A BRIEF HISTORY

Digital audio became reality for professionals and consumers alike in the early 1980’s

- Some early digital recorders are celebrating their 40th anniversary this year.
- The digital mixing console will be turning 30!
The adoption of digital audio was not widespread in all facets of the audio industry. 

- Recording studios were the first to use the technology

- The Compact Disc and CD players quickly became the format of choice for consumers.
Late 1970's: Research & Development on the Compact Disc begins by Sony and Philips.


1982: The first commercial compact disc was produced.

1982: Digital Audio Stationary Head (DASH) tape format & recorders for recording studios.

1988: TOA develops the SAORI, the first DSP for installed audio systems.

The software DAW, or Digital Audio Workstation revolution begins during the 80’s.

Digital reverb and effects became common place in both pro and home studios as well.
1992: The Alesis ADAT begins shipping

1994: The Fraunhofer Society released the first software MP3 encoder

1996: Audio networking begins with CobraNet, developed by Boulder, Colorado-based Peak Audio.

1997:
• Microsoft incorporates MP3 support into Windows Media Player.
• Pro Tools reached 24-bit, 48 tracks.
DIGITAL AUDIO – PRODUCT TIMELINE

2006:
USB & Firewire audio interfaces become the “go-to” interfaces, as laptop computers begin replacing the traditional desktop computer and soundcard.

2003:
Audinate is formed in Sydney, AU and begins development on Dante.

2001:
• Yamaha introduces the PM1D digital live sound console.
• Apple introduces the iPod.


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DIGITAL AUDIO – PRODUCT TIMELINE

1980

1990

2000

2010

2020

1000!

2017:
Over 1000 audio devices are available with Dante audio networking.

2012:
Yamaha introduces the CL series mixing consoles using Dante for the audio transport

1999 - 2011:
Other audio networking protocols are introduced through the years.
DIGITAL AUDIO BECOMES REALITY

Digital audio has been around for awhile

● Digital audio networks: Only for the second half

● What is the differences between digital audio and a digital audio network?

● Let’s take a closer look.
DIGITAL AUDIO – “POINT-TO-POINT”

Until the existence of audio networking, digital audio connections between devices were “point-to-point”.

- In many ways, similar to analog connections.
- Distribution of signals required extra hardware.
DIGITAL AUDIO – “POINT-TO-POINT”

Analog System

Hybrid System
(Digital devices with analog interconnectivity)
DIGITAL AUDIO – “POINT-TO-POINT”
DIGITAL AUDIO – “POINT-TO-POINT”
DIGITAL AUDIO – “POINT-TO-POINT”
DIGITAL AUDIO NETWORK – SCALABLE

Remote / OB Truck

- Mixing Console
- Intercom
- Remote I/O
- Broadcast Booth
  - Commentary System
  - Remote I/O
- Wireless Mic System
- Playing Field

- FOH Mixing Console
- Intercom
- Wireless Mic System
- Band IEM System
- Monitor Mixing Console
- Stage Box I/O
- Wireless Mic System
- Amplifiers & Speakers
- Remote I/O

Television Broadcast Facility

- Television Broadcast Facility
- Radio Broadcast Facility

- Production Mixer
- Remote I/O
- Intercom
- On-Air Processing
- Signal Processing
- Confidence Monitoring

- Production Switcher
- Confidence Monitoring
- Remote I/O
- Intercom
- On-Air Processing
- Fiber
- Copper
Computers Enter The Music Industry
They began the transition from front office business management devices to content creation and recording tools.

- In 1979 Fairlight developed the “Computer Musical Instrument”
- Through the 80’s and 90’s what we now know as a DAW took shape.
COMPUTERS – Audio Interfaces

Dedicated soundcards were the first computer audio interfaces.

- Technological advances in external computer interfaces allow for the creation of new audio interfaces.

- The soundcard is largely replaced with Firewire, USB, and Thunderbolt interfaces.
COMPUTER AUDIO INTERFACES

**Pros**

- Inexpensive
- Portable
- Offer excellent audio quality

**Cons**

- Latency (for use in live performances)
- Major distance limitations
- Point-to-point only
COMPUTER BASED AUDIO: SUMMARY

Computers played a huge part in the development of digital audio

- And are the dominant method for recording and playback of multichannel audio.

- Computers networks themselves, and the standards they are built on (Ethernet, TCP/IP) have allowed for the creation of Digital Audio Networking
Audio Networking

History
In the beginning there was…

- MediaLink by a company called Lone Wolf
- Proprietary protocol
- Several manufacturers signed on including: Rane, QSC, & Bose
- Soon abandoned by the manufacturers in favor of Ethernet based networking.

1989 - 1995
CobraNet was introduced in ‘96

- Developed by Peak Audio in Boulder, CO
- Initially was a point-to-point network with limited channel capacity
- Upgraded to “fast-Ethernet” (100Mbps)
- Was the first widely adopted audio networking protocol.
EtherSound was introduced in 2001

- Developed by Digigram in France
- A maker of high-performance computer sound cards.
- Much lower latency than CobraNet
- It is not full duplex (It can only send signals in one direction).

2001 - ????
Dante was introduced in 2006

- Developed by Audinate in Australia
- Considered a second-generation audio network with many advantages of CobraNet and EtherSound.
- Over 300 OEM Dante licensees
- Over 1,000 Dante-enabled products available
Present Day Digital Audio Technology
PRESENT DAY – DIGITAL AUDIO

The most widely used AES Digital audio standards:

- AES3: 2 channels
- MADI: 56 or 64 channels
“DIGITAL SNAKE” vs AUDIO NETWORKING

Know that “digital snakes” are point-to-point connections.

- The distribution of these signals requires extra hardware.

- An audio network allows you to distribute signals to any devices on the network.

Point “A”

Point “B”
DIGITAL AUDIO NETWORKING - BENEFITS

- Lower cabling costs
  - Well designed network provides enhanced flexibility for future changes to the system
  - Audio routing can be changed on the fly, and does not require any rewiring
  - Glitch free redundancy
  - Audio quality
BENIFITS OF DANTE AUDIO NETWORKING

Vast ecosystem of Dante-enabled products allows for maximum choice of products across the entire audio signal chain.

- Amplifiers
- Audio Embedders & De-Embedders
- Audio Monitors
- Audio Routing Matrix Switchers
- Commentary Systems
- Conference Systems
- Dante Interface Cards
- DAW Systems
- Digital Recorders & Players
- Media Servers
- Video Recorders & Players
- DSP’s

- I/O Interfaces
- Wall Plates
- Intercoms
- Microphone Preamps
- Microphones
- Mixers
- Personal Mixing & Monitoring
- Soundcards – physical/virtual
- Speaker Management Processors
- Speakers
- Stageboxes
OVER 1,000 DANTE-ENABLED PRODUCTS

Amplifiers 173
Commentary Systems 10
Conference Systems 28
Dante Interface Cards 53
Digital Recorders & Players 15
DSPs (Digital Signal Processors) 89
I/O Interfaces 180
Intercoms 17
Loudspeakers 12
Microphones 31
Mixers 106
Other 35
Personal Mixing & Monitoring 19
Speakers 119
Stageboxes 14
Wall Plates 27
WHICH PROTOCOLS ARE USED IN PROJECTS?

79% of networked audio projects using Dante in 2016

Actual number of Dante projects up 400% over 2015 total

About 75% of respondents reported Dante as “Easy” or “Very easy” to use.

WHICH PROTOCOL WILL DOMINATE IN 2021?

Dante usage is seen as the most-likely protocol to increase over the next 5 years.

Net difference of % of respondents who predicted increase vs decrease in use of each protocol.

Audio Networking: Key Takeaways

Understand the difference between a Digital Audio Snake and a Digital Audio Distribution System

- Know that networked audio systems are extremely easy to configure
- That they can scale easily to extremely sophisticated designs
- Glitch-free redundancy is available for mission-critical systems
- The “price-of-entry” keeps getting lower for Dante-enabled equipment
Real World Applications

1. BAR BAND – PART TIME “WEEKEND WARRIORS”
2. HOME/PROJECT STUDIO
3. HOUSE OF WORSHIP
APPLICATION 1 – BAR BAND SYSTEM

You’ll need…

● A mixing console (at least one)

● A single large mixer for both mains and monitors

● Or could be made up of several smaller mixers (keyboard sub-mixer, drums, etc.)
APPLICATION 1 – BAR BAND SYSTEM

Snakes!

- At least one or more snakes and fan-out cables
- To connect the sources on-stage to the mixing console(s)
- Heavy and expensive

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APPLICATION 1 – BAR BAND

Analog System

Sources

Mixer

Signal Processing

Amplifiers

Computer

DAW

USB

Mixer

Computer

DAW

USB

Signal Processing

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APPLICATION 1 – BAR BAND

Analog System

Sources

FOH Mixer

Signal Processing

Computer

USB

DAW

Multi-Chan. Splitter

Amplifiers

Monitor Mixer
APPLICATION 1 – BAR BAND

Dante System

Sources

FOH Mixer

Signal Processing

Computer

DAW

Computer

DAW

Stage Box I/O

Gigabit Switch

Stage Box I/O

Gigabit Switch

Up to 100m/328feet

Amplifiers

Monitor Mixer

Stage Box I/O

Gigabit Switch

Computer
What defines a home/project studio can vary greatly amongst individuals

- If your studio consists of a computer, a single audio interface, and some form of controller…
- Audio networking may not do much for you.
APPLICATION 2 – HOME/PROJECT STUDIO

But if your studio is larger in both size and equipment...

● And some of the gear does double-duty as part of your live setup

● Then audio networking can offer you some real advantages.
APPLICATION 2 – HOME/PROJECT STUDIO

Dante System

Sources

Mixer (I/O Device)

Amplifiers

I/O Device

I/O Device

Gigabit Switch

Computer

DAW

Computer

Via

USB

Computer

Via

USB

Mixer

(I/O Device)
APPLICATION 2 – HOME/PROJECT STUDIO

Dante-enabled devices easily go from stage to studio

- Mixers, stage-boxes, etc., can become I/O devices into your DAW
- Dante Virtual Soundcard allows for up to 64x64 channels of audio for recording and playback from your favorite DAW.
- Dante Via running on a second computer can bring in to the network any existing USB, Firewire, or Thunderbolt audio devices you may have.
APPLICATION 3 – HOUSE OF WORSHIP

Analog System

Sources → Multi Ch Snake → Amplifiers

Mixer → Signal Processing

Computer → DAW via USB

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APPLICATION 3 – HOUSE OF WORSHIP

Dante System

Sources

FOH Mixer

Signal Processing

Computer

DAW

Amplifiers

Stage Box I/O

Monitor Mixer

Stage Box I/O

Gigabit Switch

Up to 100m/328 feet

Computer

DAW

FOH Mixer
APPLICATION: SUMMARY

Analog signal distribution may be initially less expensive, but as system channel count and complexity increases

●

But as system channel count and complexity increases, the equipment costs well exceed a digital audio network solution.

●

Any manufactures’ Dante-enabled products can share audio with any other manufactures’ Dante products.

●

Any source can go to any (or multiple) destinations.
Questions & Answers
THANK YOU