

# **Introductory Networked Audio Applications**

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NAMM 2019

# PRESENTED BY:

Bernie Farkus  
Sr. Technical Sales Engineer  
Audinate, Inc.



# SESSION TOPICS

Audio History Lesson



Why We Use It



Network vs Point-to-Point



Present Day Audio Technology

Real World Applications:



Live Performance



Broadcast/Production/Recording



Houses of Worship

# Audio History

**(Digital Audio Chapter)**

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# 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 43<sup>rd</sup> anniversary this year.

- The digital mixing console has been around for 32 years



# DIGITAL AUDIO – A BRIEF HISTORY

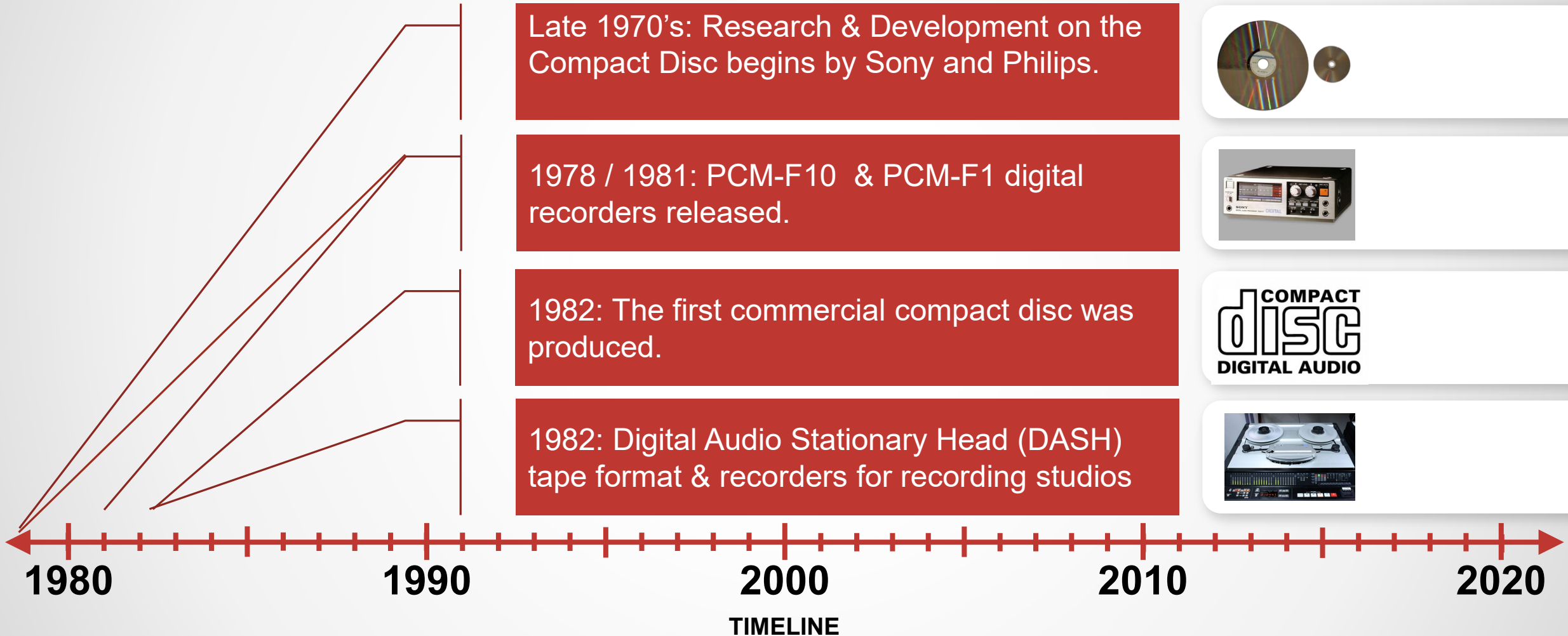
The adoption of digital audio was not widespread in all facets of the audio industry.

- Recording studios were the first to use the technology

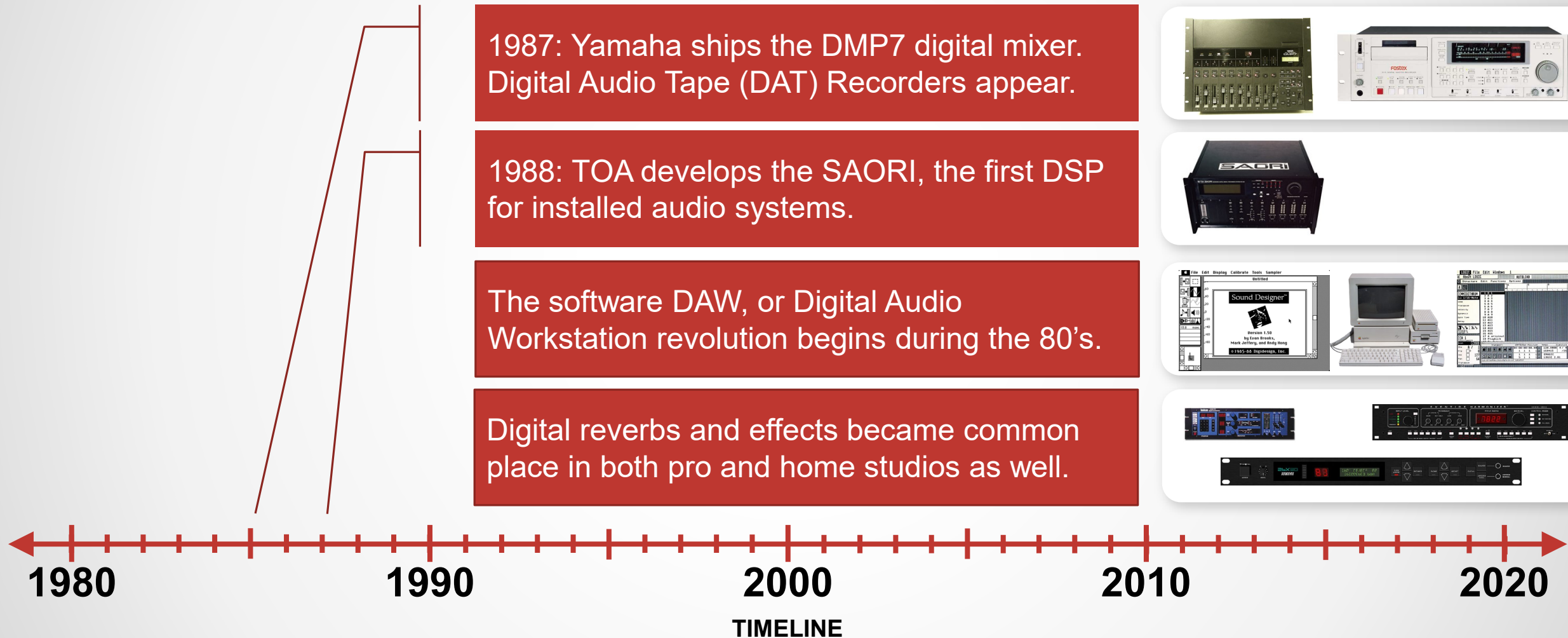
- The Compact Disc and CD players quickly became the format of choice for consumers.



# DIGITAL AUDIO – PRODUCT TIMELINE



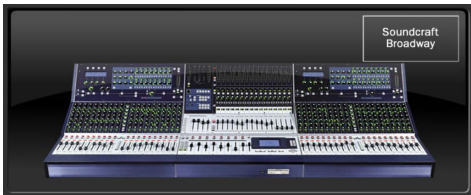
# DIGITAL AUDIO – PRODUCT TIMELINE





# DIGITAL AUDIO – PRODUCT TIMELINE

1992: The Alesis ADAT begins shipping. Soundcraft begins work on the Broadway Console



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.



TIMELINE

# DIGITAL AUDIO – PRODUCT TIMELINE

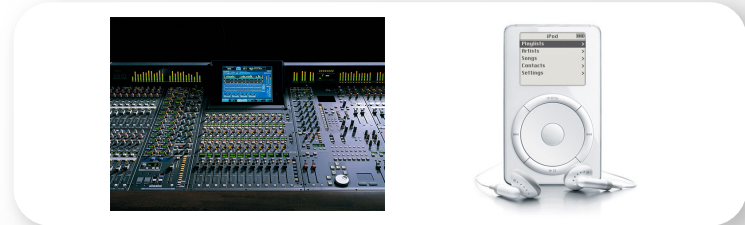
2006:  
USB & Firewire audio interfaces become the “go-to” interfaces, as laptop computers begin replacing the traditional desktop computer and soundcard



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



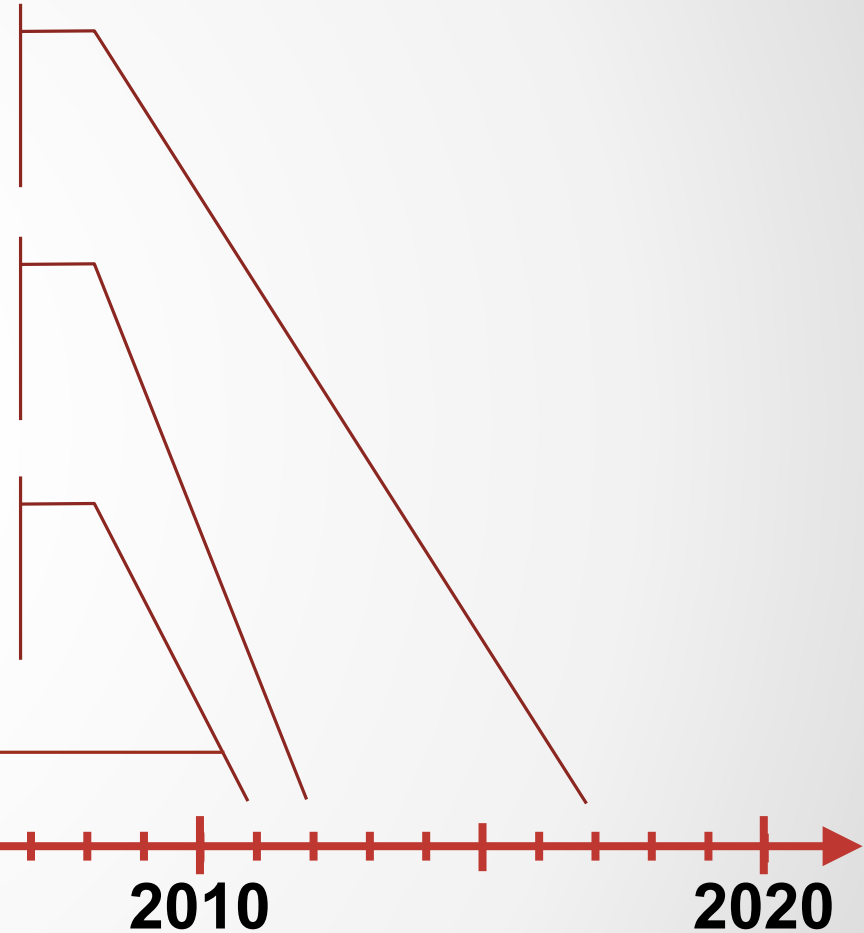
# DIGITAL AUDIO – PRODUCT TIMELINE

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.



TIMELINE

# Audio History

**(Network Audio Chapter)**

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# AUDIO NETWORKING – BRIEF 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

# AUDIO NETWORKING – BRIEF HISTORY

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.

## CobraNet®

# 1996 - ??????

# AUDIO NETWORKING – BRIEF HISTORY

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).

Ether  
**ES**  
Sound

2001 - ??????

# AUDIO NETWORKING – BRIEF HISTORY

Dante was introduced in 2006

- Developed by Audinate in Australia

- Considered a second-generation audio network with many advantages of CobraNet and EtherSound.

- Over 400 OEM Dante licensees

- Over 1,600 Dante-enabled products available

The logo for Dante, featuring a stylized 'D' icon with a red underline and the word 'Dante' in a bold, sans-serif font with a trademark symbol.

2006 - ??????



# AUDIO NETWORKING – BRIEF HISTORY

AVB (Audio Video Bridging) was introduced in 2011



A set of technical standards developed by the Institute of Electrical and Electronics Engineers (IEEE)



The AVB Task Group was rebranded TSN (Time-Sensitive Networking) in 2012



Requires an AVB compliant switch



2011 - ??????

# AUDIO NETWORKING – BRIEF HISTORY

AES67 standard was published in 2013



A layer 3 protocol (Internet Protocol) suite based on existing standards



Designed to allow interoperability between various IP-based audio networking systems such as Ravenna, Livewire, Q-LAN, WheatNet-IP and Dante



AES67

2013 - ??????

# Audio History

**(Computer Audio Chapter)**

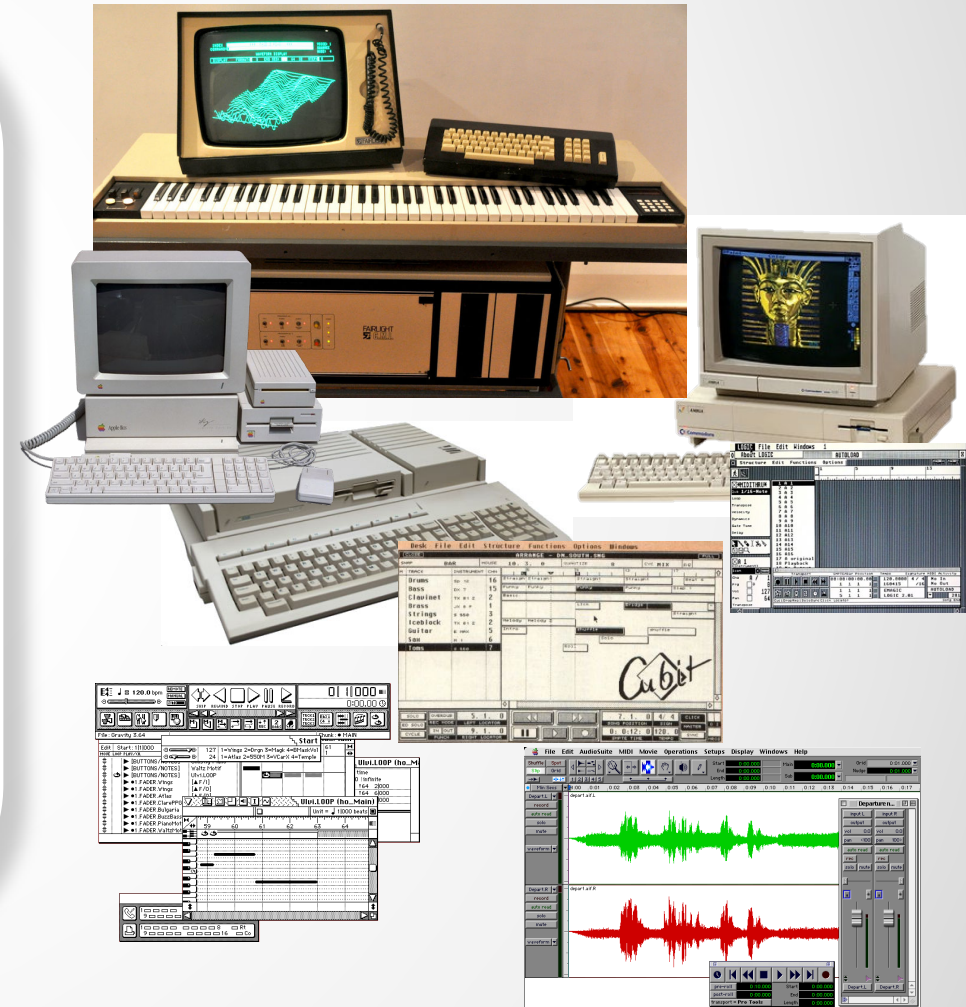
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# COMPUTERS – FROM OFFICE TO STUDIO

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



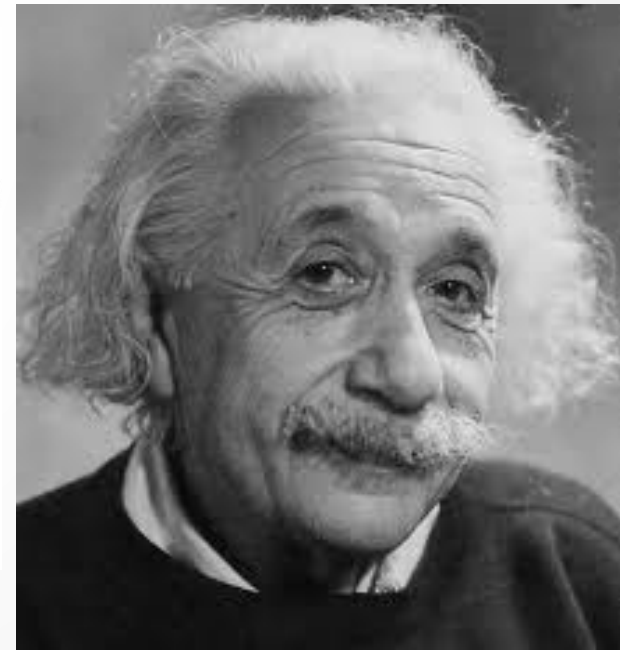
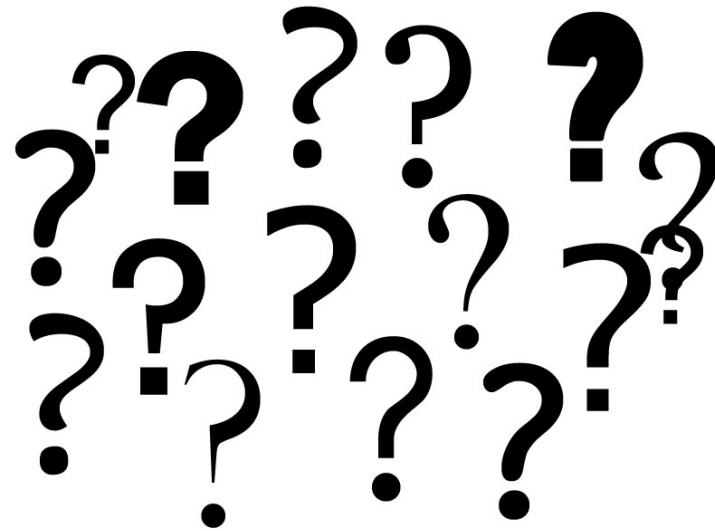
And are the dominant method for recording and playback of multichannel audio.



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

# DIGITAL AUDIO **WHY WE USE IT**

## Any Thoughts?





# DIGITAL AUDIO **WHY WE USE IT**

Sound Quality

Is that the only reason?



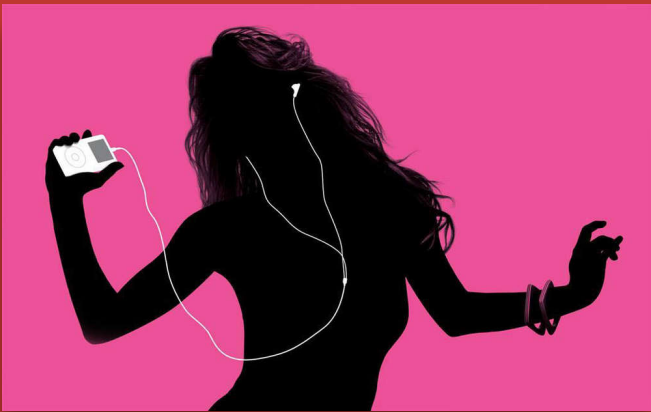
# DIGITAL AUDIO **WHY WE USE IT**



Instant Access,  
Polyphony/Multitimbral



Non-Linear Editing  
(Virtual Tracks, Undo)



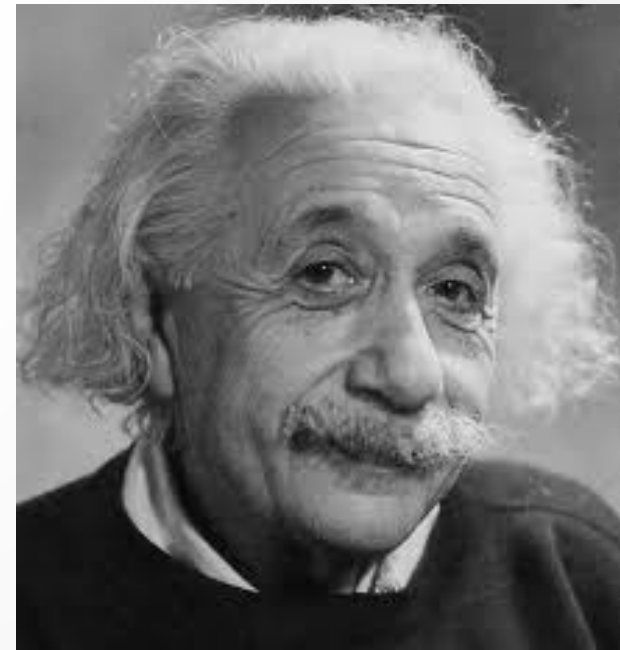
Convenience/Portability



Recall, Scalability,  
Compact

# DIGITAL AUDIO **WHY WE USE IT**

IT ALLOWS US TO DO THINGS WE WERE  
NOT ABLE TO DO!



# DIGITAL AUDIO **WHY WE USE IT**

Digital audio has been around for awhile



Digital audio networks: Only for the second half



What are the differences between digital audio and a digital audio network?



Let's take a closer look.



# DIGITAL AUDIO – “POINT-TO-POINT”

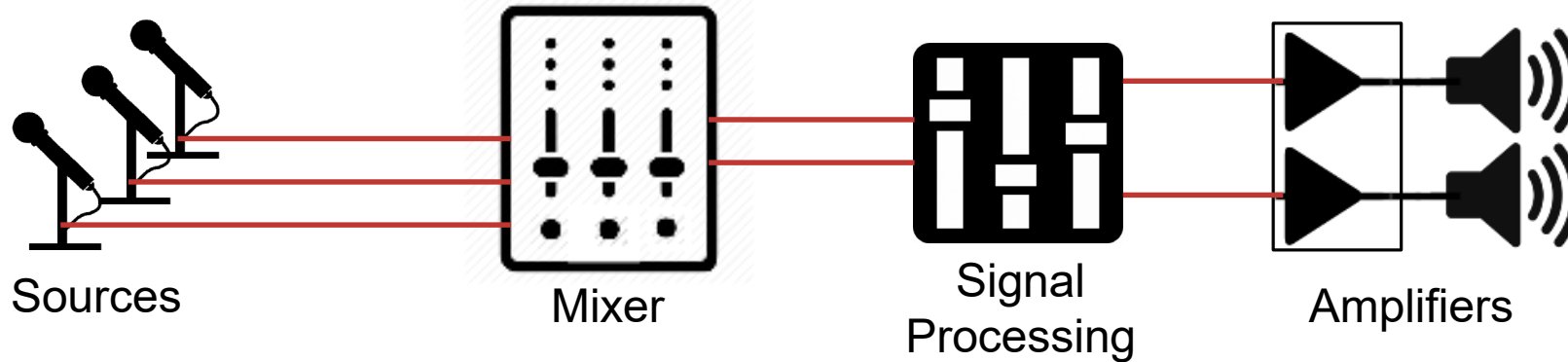
Until the existence of audio networking, digital audio connections between devices were “point-to-point”.

- In many ways, similar to analog connections.

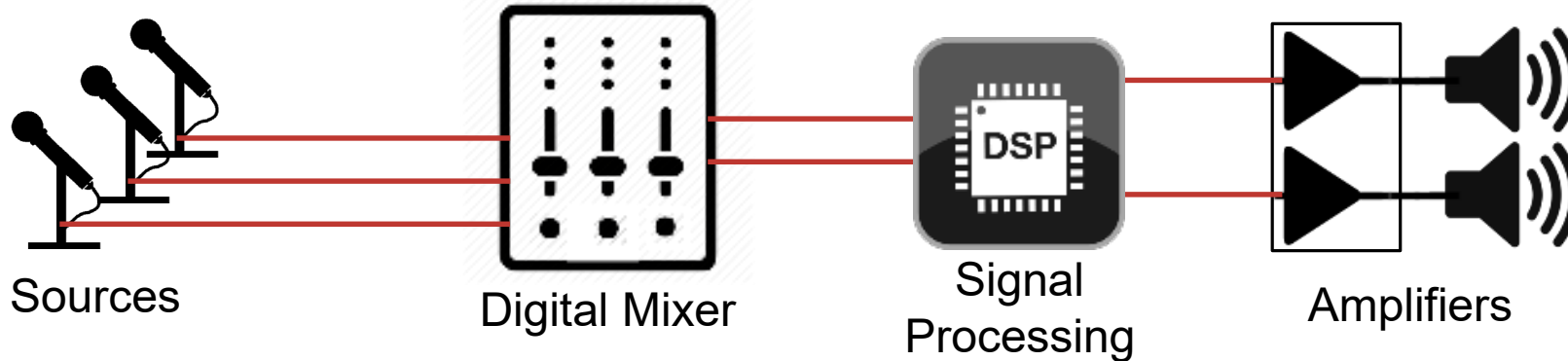
- Distribution of signals required extra hardware.



# DIGITAL AUDIO – “POINT-TO-POINT”

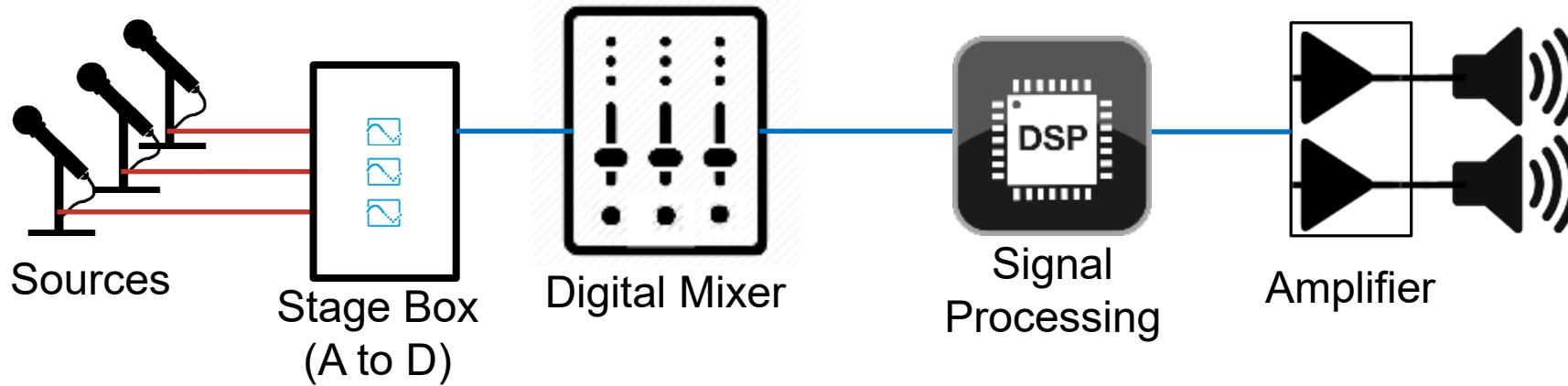


**Analog System**



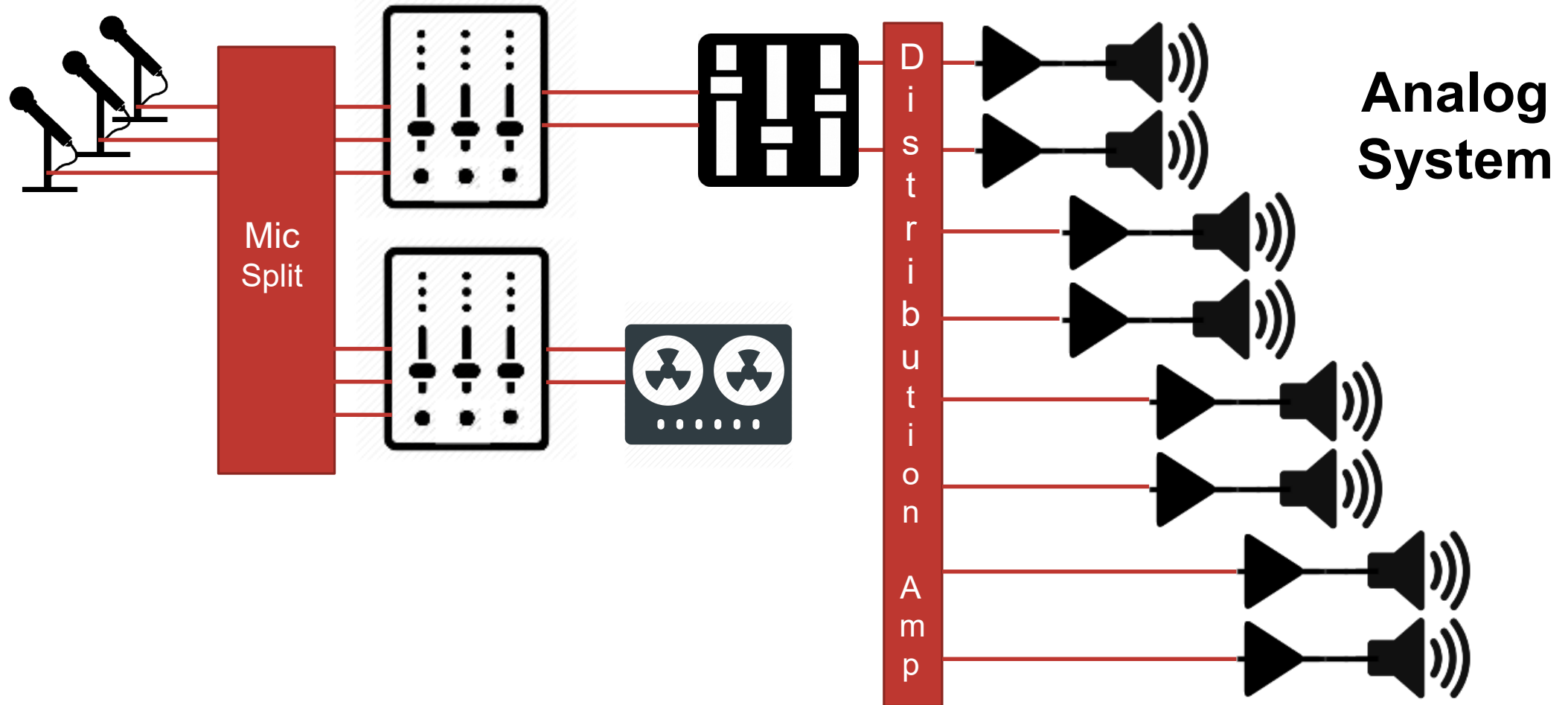
**Hybrid System**  
(Digital devices with analog interconnectivity)

# DIGITAL AUDIO – “POINT-TO-POINT”



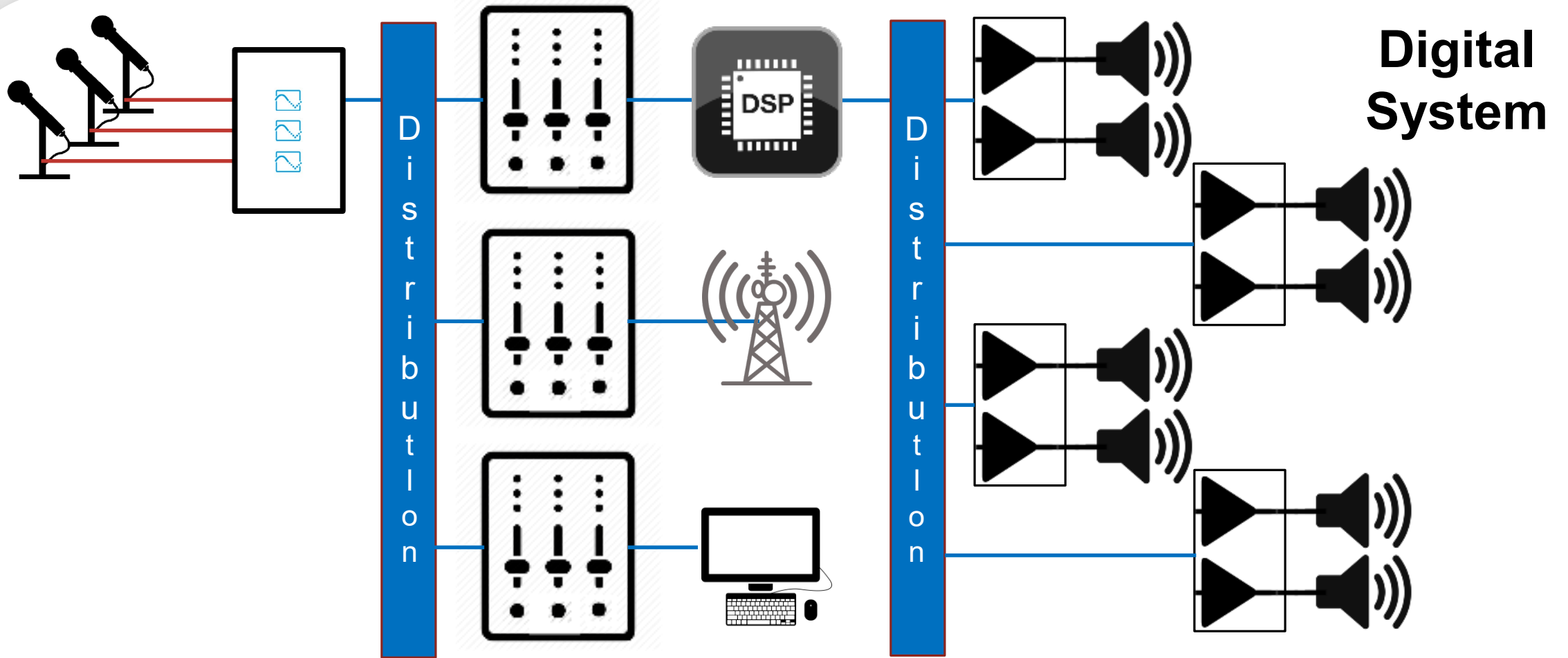
**Digital  
System**

# DIGITAL AUDIO – “POINT-TO-POINT”

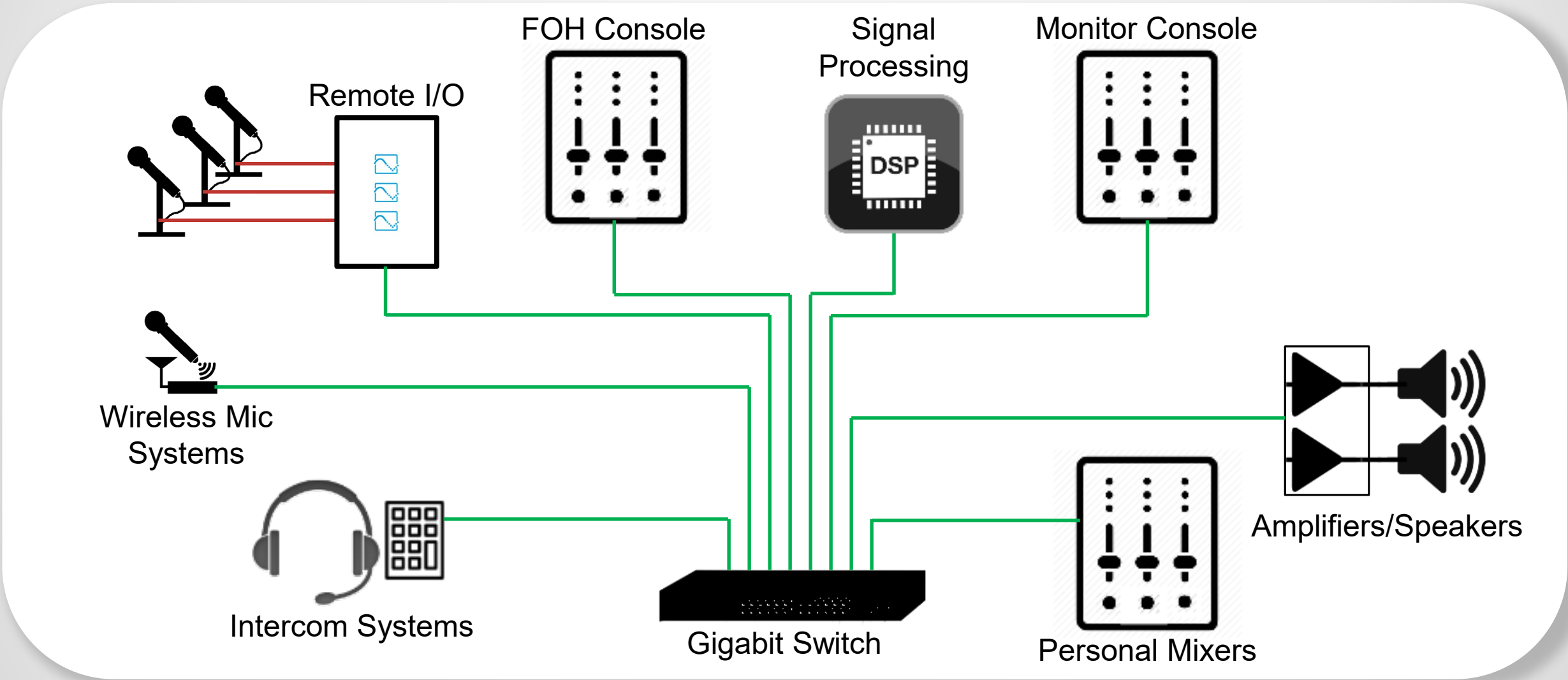




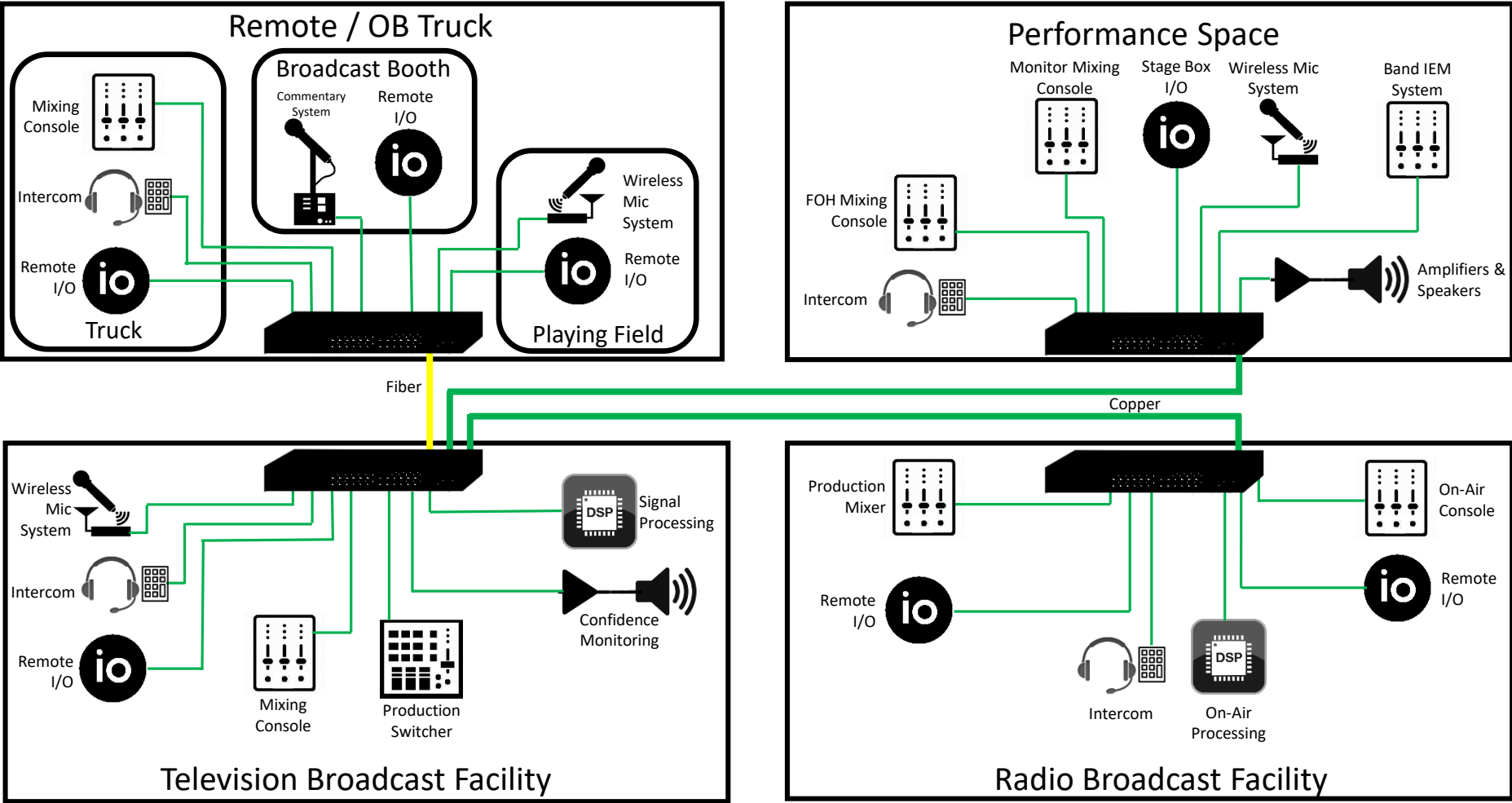
# DIGITAL AUDIO – “POINT-TO-POINT”



# DIGITAL AUDIO NETWORK – DISTRIBUTION



# DIGITAL AUDIO NETWORK – SCALABLE



# Present Day Digital Audio Technology

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# 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



# 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

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1. LIVE SOUND
2. HOME/PROJECT STUDIO
3. HOUSE OF WORSHIP

# APPLICATION 1 – LIVE PERFORMANCE

Snakes!

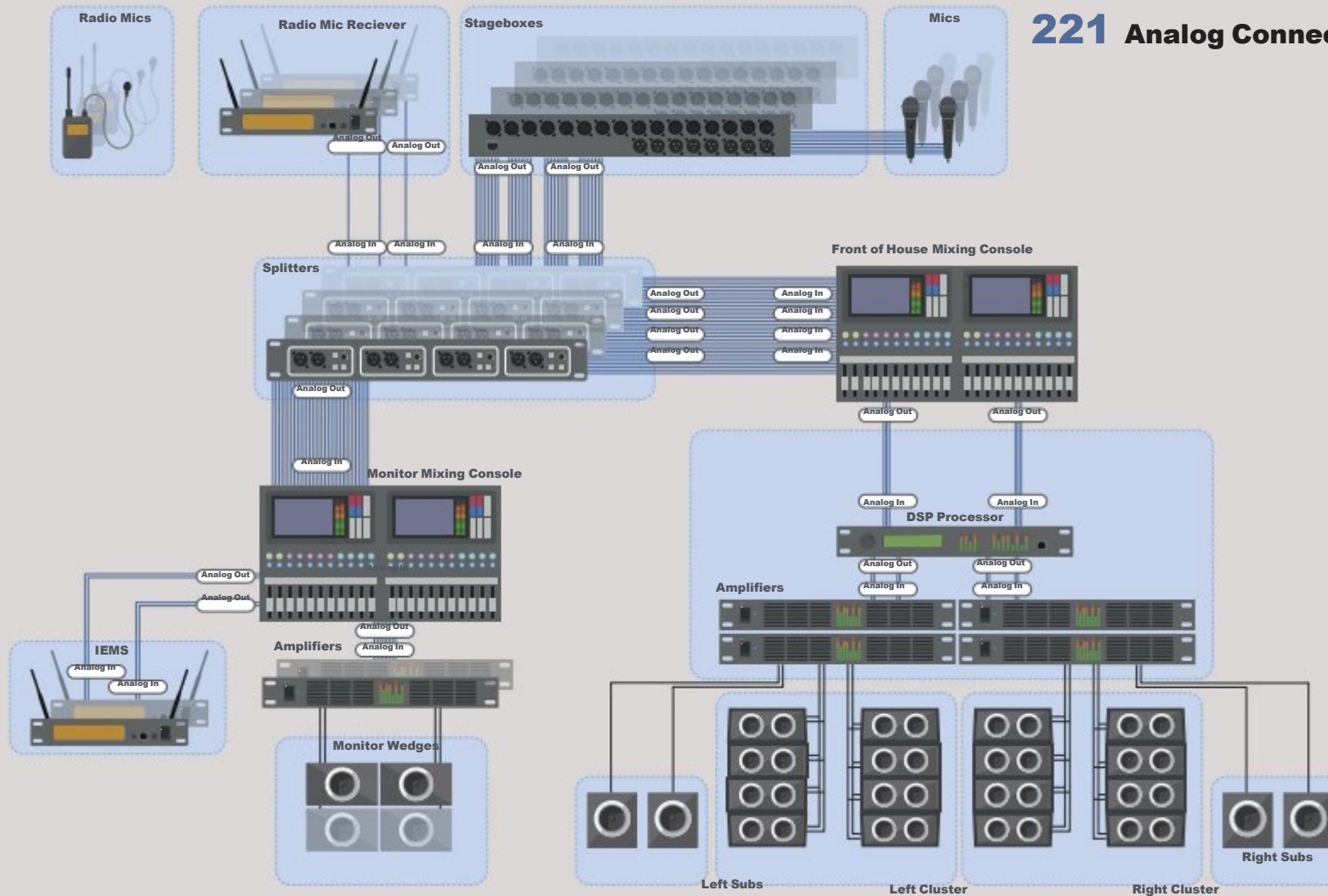
- At least one or more snakes and fan-out cables

- To connect the sources on-stage to the mixing console(s)

- Heavy and expensive



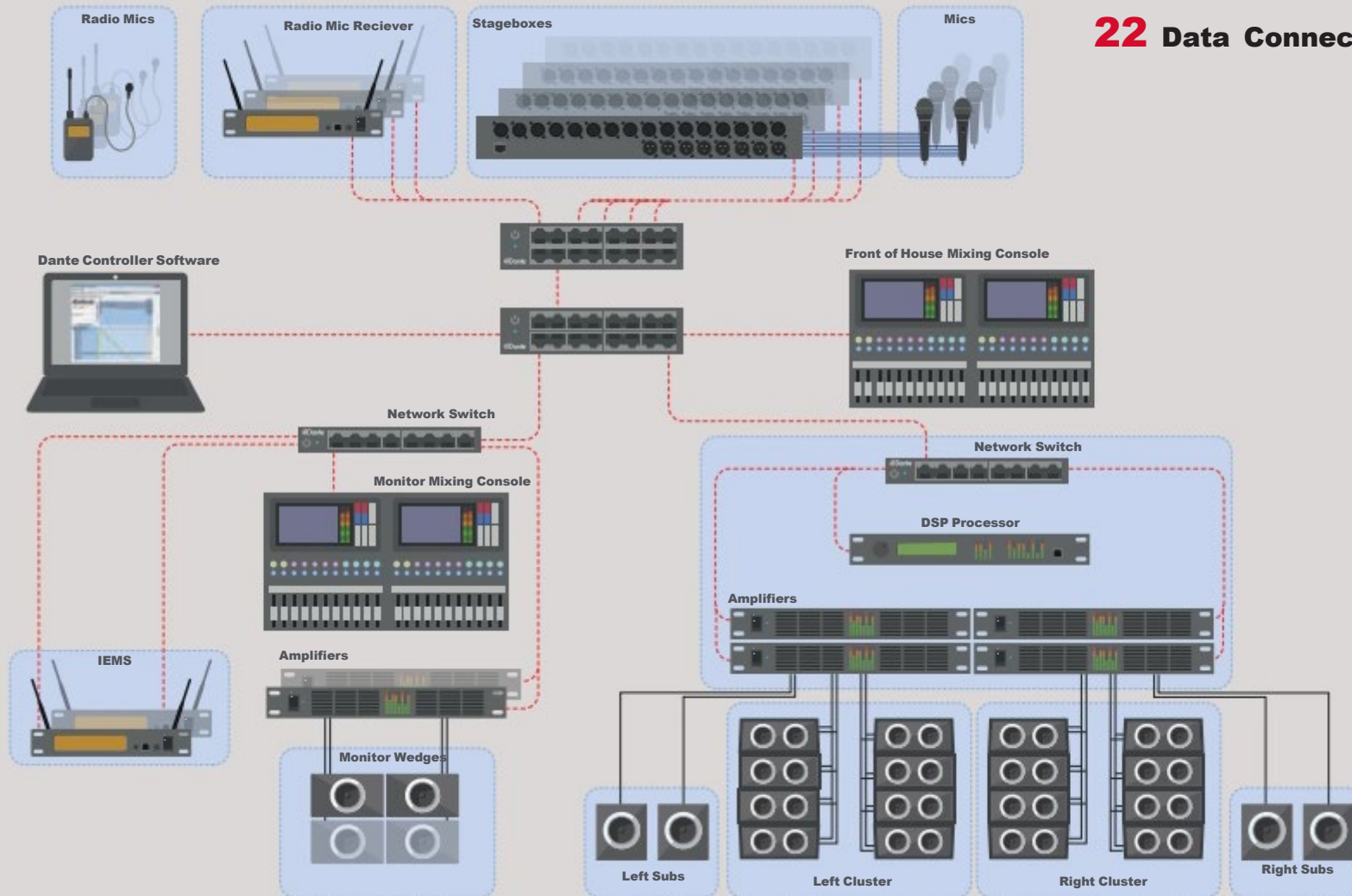
## 221 Analog Connections



V 1.0

# Live Performance: Touring using Dante

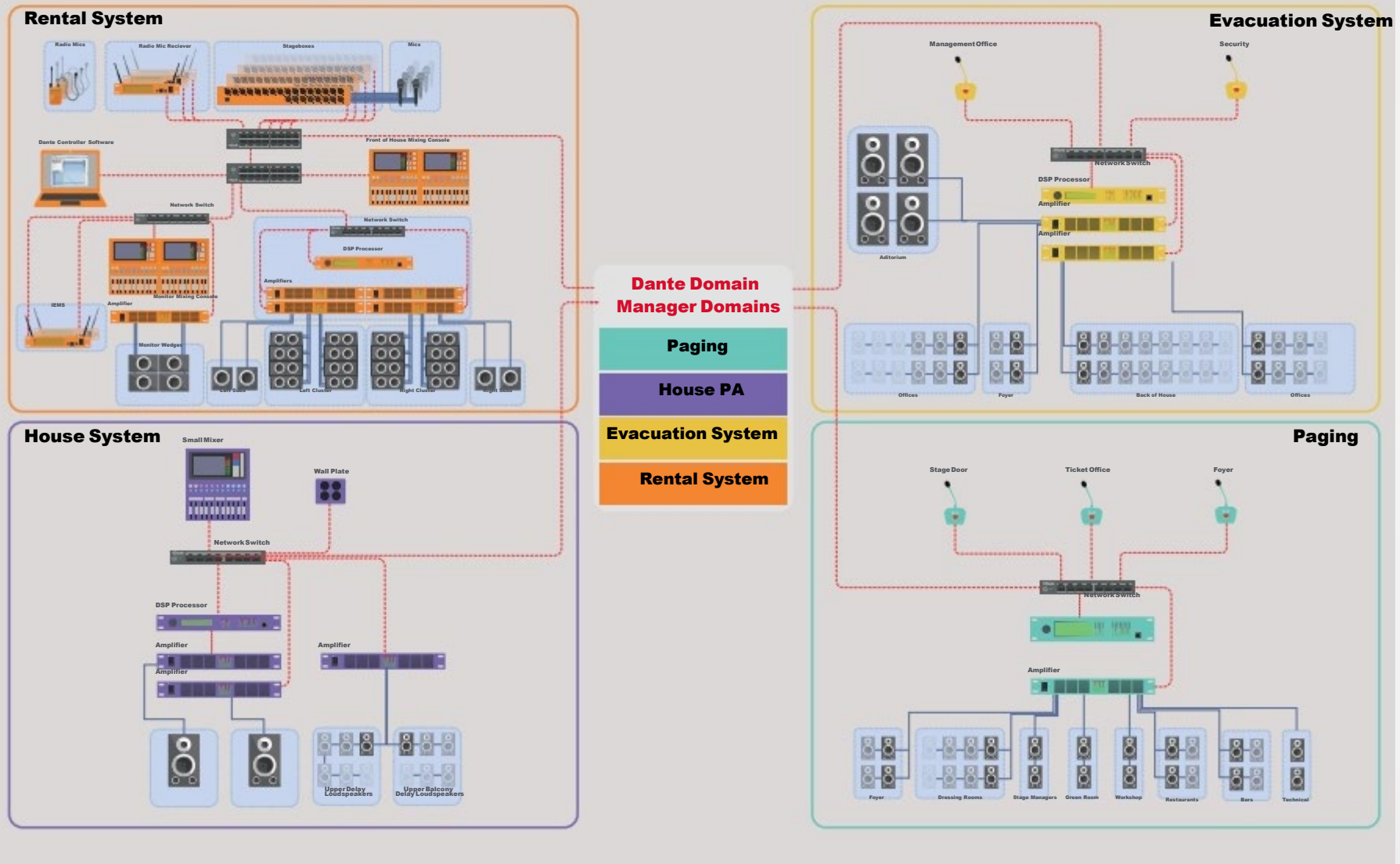
**22 Data Connections**



**V 1.0**

# Live Performance: Venues under Dante Domain Manager

connected by  
**Dante**



# APPLICATION 2 – BROADCAST/PRODUCTION/RECORDING

What defines a studio can vary greatly amongst individuals and organizations

- If your studio consists of a computer, a single audio interface, and some form of controller...

- Audio networking may not do much for you.

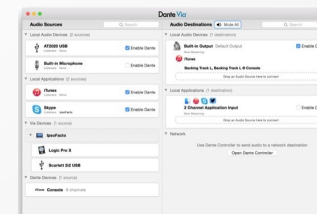
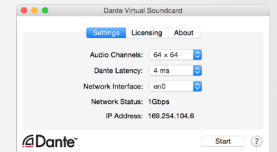


# APPLICATION 2 – BROADCAST/PRODUCTION/RECORDING

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

•  
And if there are multiple studios involved...

•  
Then audio networking can offer you some real advantages!

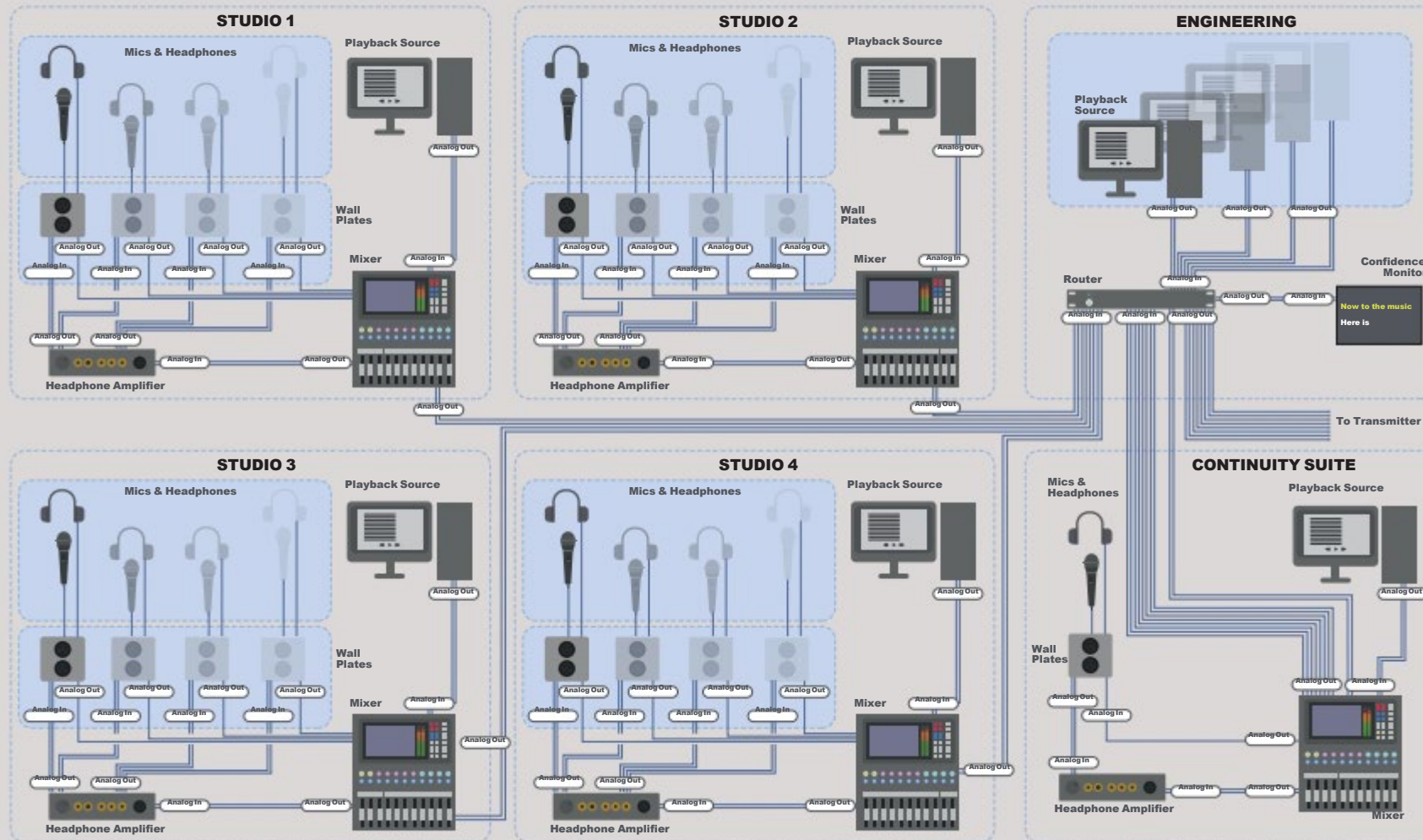




# Broadcast: Radio Station using Analog

Before  
Dante

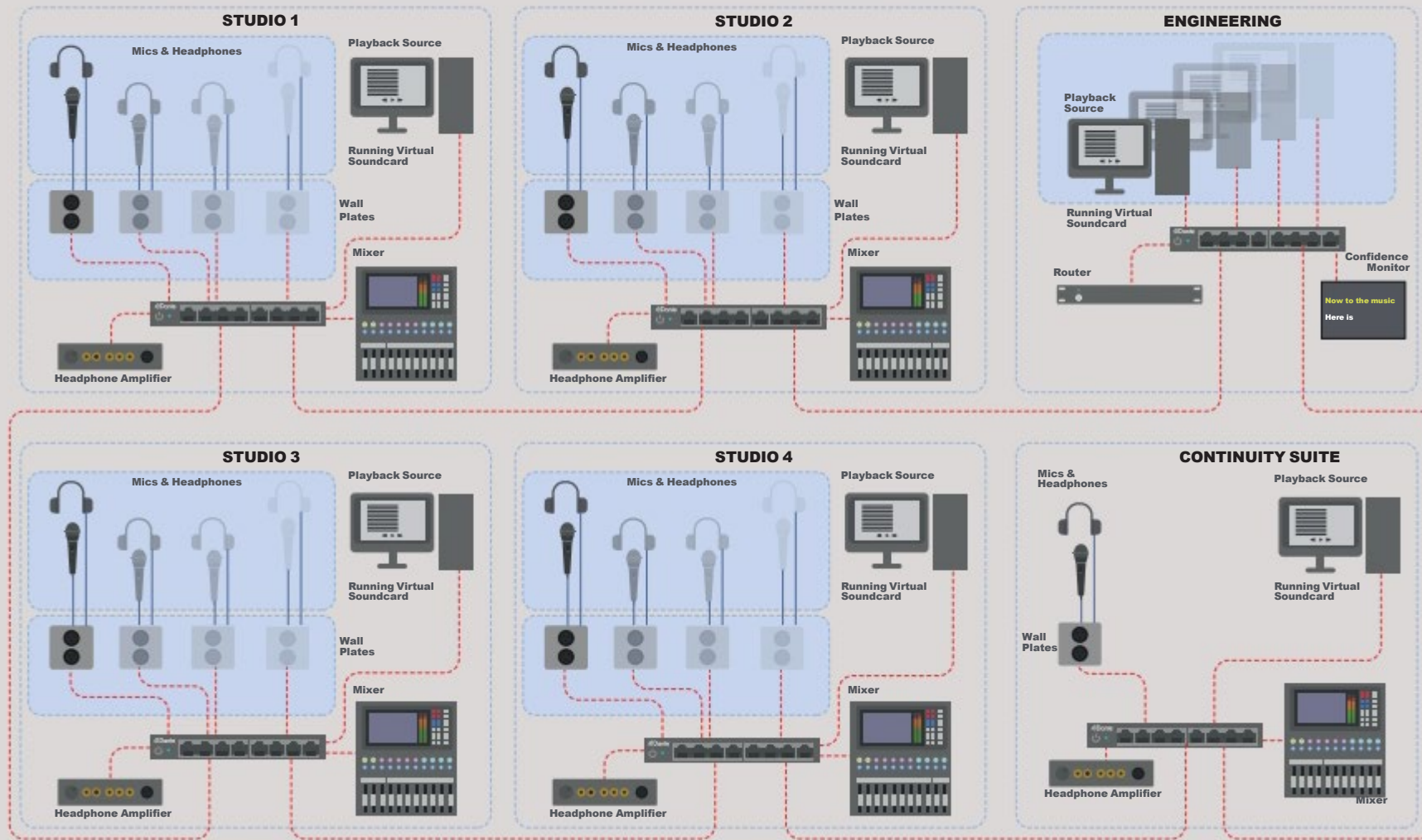
## 107 Analog Connections



V 1.0

# Broadcast: Radio Station using Dante

## 44 Data Connections



V 1.0

# APPLICATION 2 – BROADCAST/PRODUCTION/RECORDING

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

HoW come in all different sizes

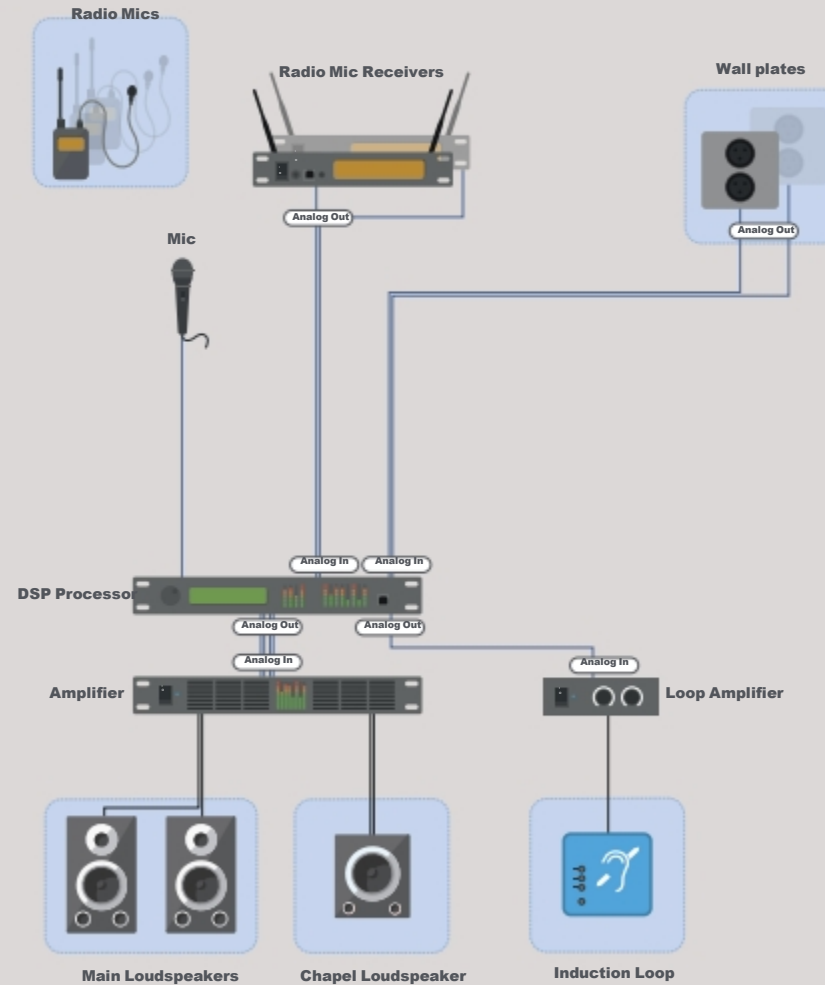
- Being able to expand your audio systems as your congregation grows is expensive

- Especially when it comes to infrastructure.

- Time consuming and expensive!

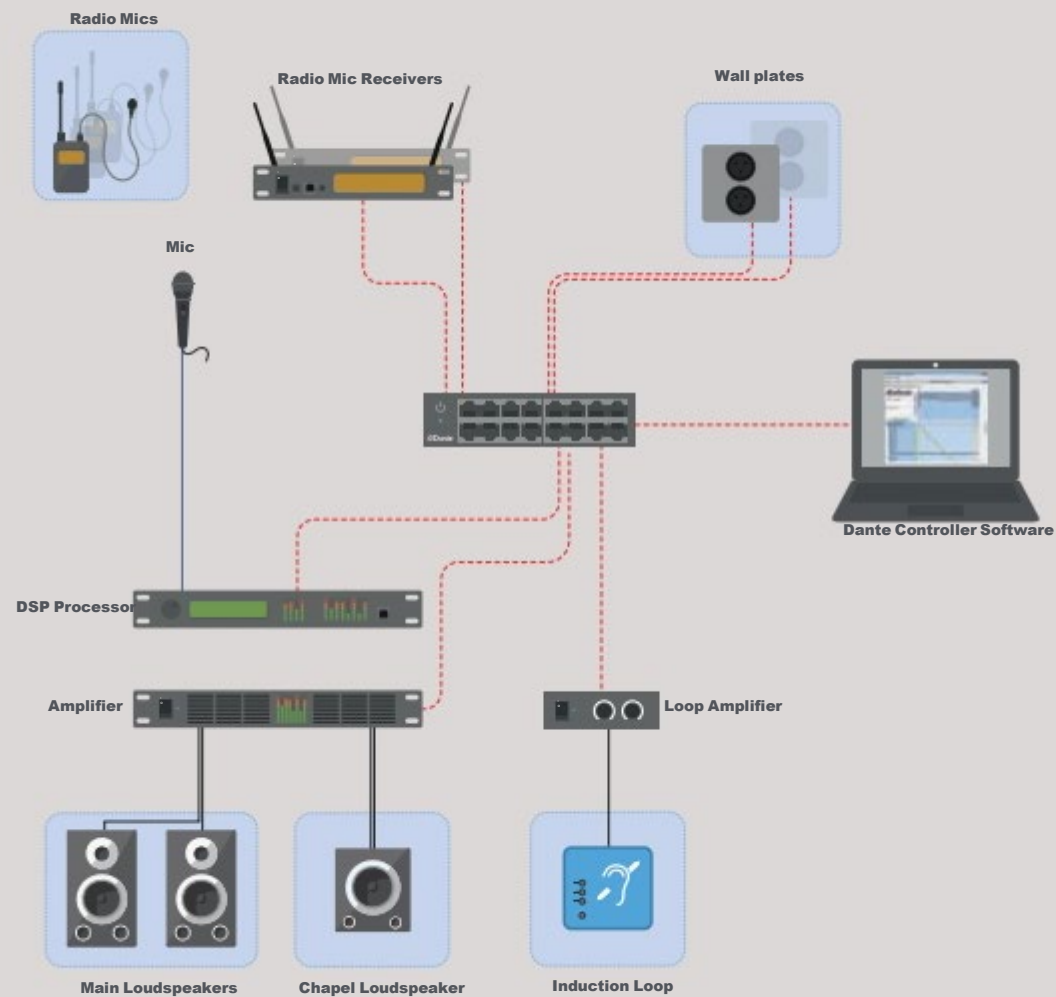


# Small House of Worship using Analog



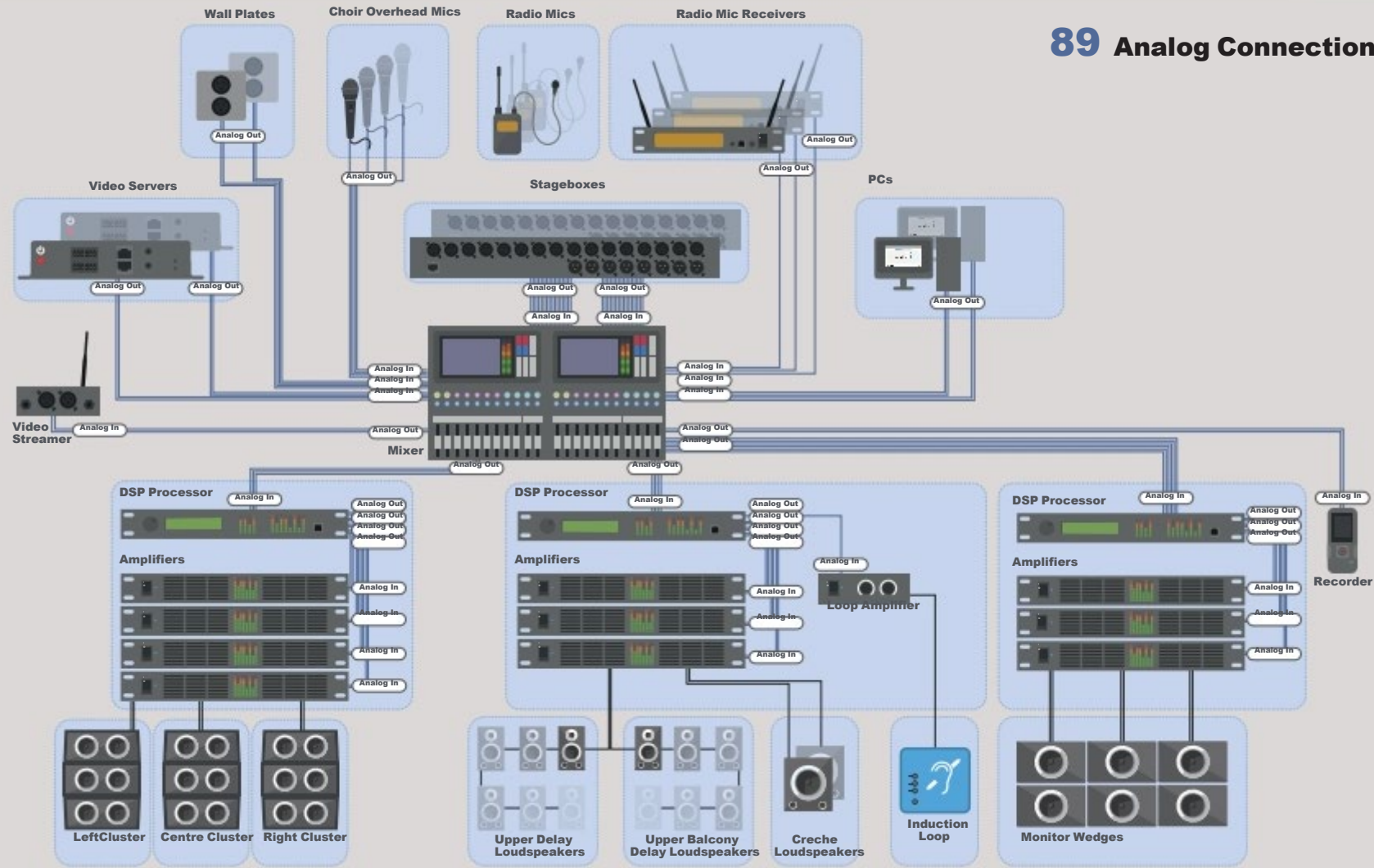
V 1.0

# Small House of Worship using Dante



**V 1.0**

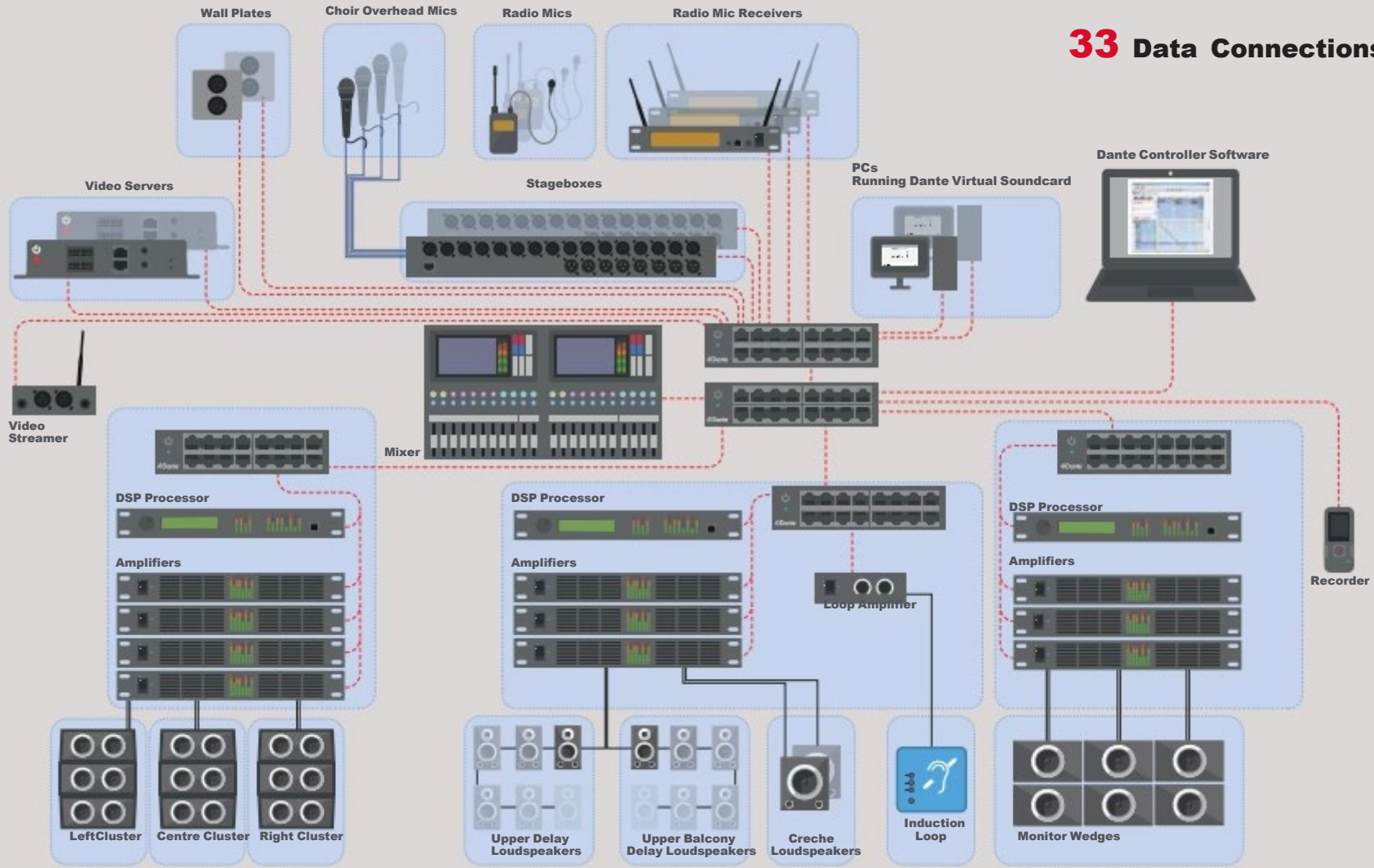
## 89 Analog Connections



V 1.0

# Large House of Worship using Dante

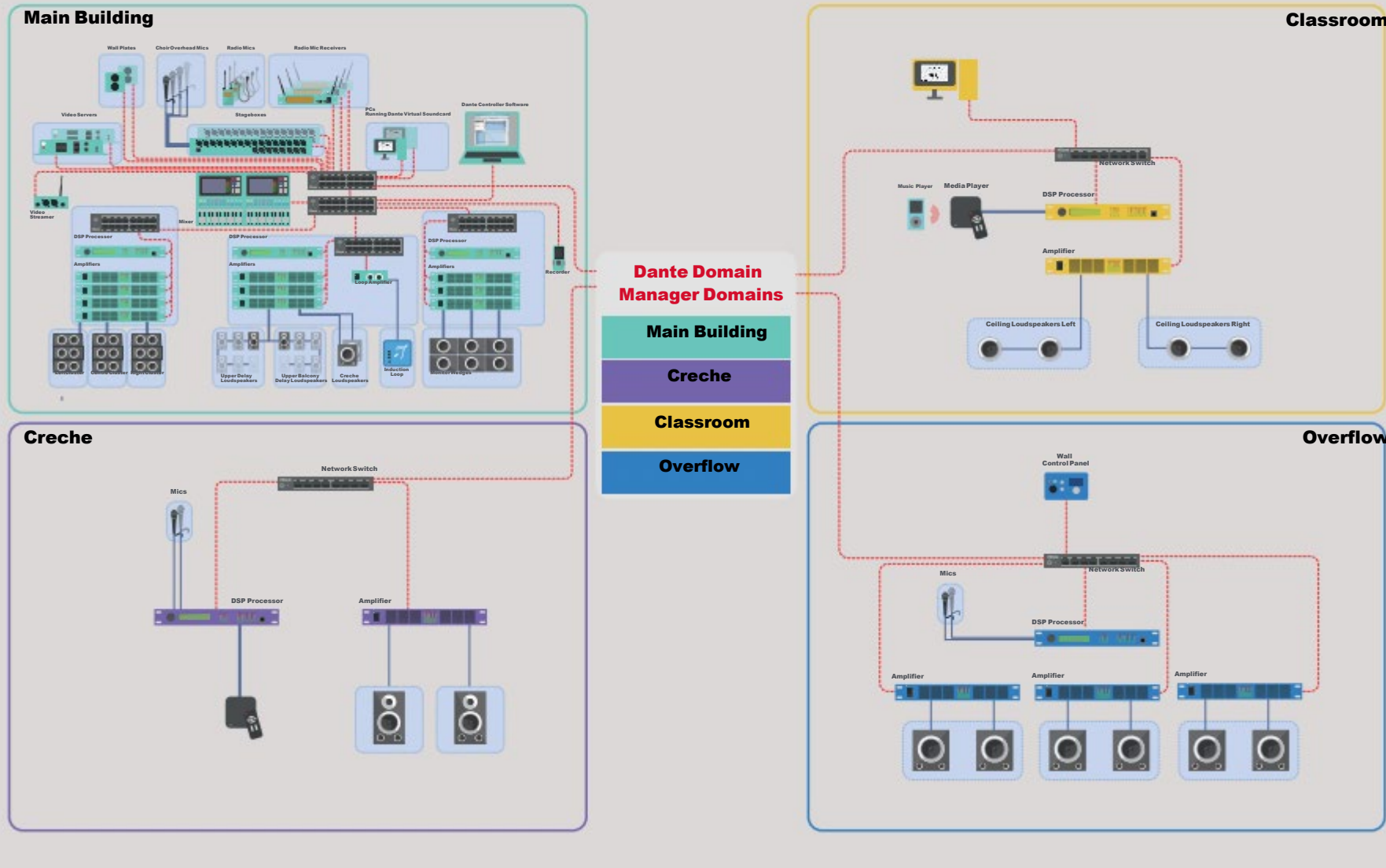
**33 Data Connections**



**V 1.0**



# Large House of Worship under Dante Domain Manager



# 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

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**THANK  
YOU**