



NETWORKING YOUR SOUND

## Four Key Advantages of Audio Networking

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Digigram has identified four clusters of customer benefits resulting from the application of digital audio networking technologies:

1. Network program content
2. Network efficiency
3. Network control
4. Network device monitoring

The purpose of this document is to explore these subjects so that they may be considered as part of the programs and products of our partners.

### **Limitations of current solutions**

To provide a perspective for examining the four subjects, we should look at some of the restrictions imposed by current analog and digital audio interconnection and distribution systems.

#### Interconnection complexity

Audio installations require careful planning to assure availability of signals where needed. Co-located audio electronics generally must be wired with the signal path flowing from the first device to the last. Most often, there is a one-to-one correspondence between an audio channel and an audio cable. Adjacent devices in a rack may need to be interfaced via a matrix switcher or distribution amplifier to achieve interconnection objectives of the system.

To increase flexibility of the signal flow, and to make possible systems with audio electronics in different rooms, inputs and outputs are frequently extended to switchers or patch bays. While this makes it possible to modify the signal flow, it can result in significant runs of multi-pair cable, larger and more expensive conduit, limited control points for implementing changes, and complexities in maintaining audio levels and quality as the signal moves from device to device.

Digigram S.A.

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ZA Pré Millet  
38330 Montbonnot, France  
Tel: +33 (0)4 76 52 47 47  
Fax: +33 (0)4 76 52 18 44  
info@digigram.com

[www.digigram.com](http://www.digigram.com)

**Digigram Inc.** – Arlington VA - USA  
**Digigram Europe** – Montbonnot, FRANCE  
**Digigram Asia Pte Ltd.** – SINGAPORE  
**Digigram América Latina** – Cuernavaca, MEXICO

Unless all speakers in a system will play identical audio, they are installed in multiple zones. In typical analog installations, multiple cables are used so that each zone makes a “home run” back to the audio amplifier or, sometimes, the source. Speakers that are hard-wired into a single zone must always remain part of that zone; to change the zone assignment of a speaker requires reinstalling the cables.

This complexity results in less predictable installation. There are often limitations on installation options revealed after the work has commenced, resulting in higher costs and/or modification of design. System reconfiguration, to address a change or improvement in functionality, may require a total system redesign and significant hardware and/or cabling installation.

#### Lack of integration between content and control/monitoring services

Separate and dedicated cable runs are generally used for data separate from the audio. This further increases the number or size of the multi-pair cable. Control, monitoring, and/or diagnostic points are limited to its data path and can limit any one location to either a “data contributor” or a “data reader.” Control choices may be restricted and/or expensive because many audio devices have limited control interfaces.

### **Advantages of audio networking**

If we look closely at audio systems, we find they are comprised of three sub-systems:

1. Audio transport
2. Human interface
3. Control/monitoring mechanisms.

Audio networking is able to “unbundle” these subsystems. Each sub-system is now granted “installation independence,” with a single data stream purposed to every function of all three. While careful planning is still required, audio networking promotes, rather than inhibits, system modifications to achieve new requirements. The bottom line: a higher level of flexibility and reliability at lower cost.

Let’s now look at the four key benefits of audio networking in more detail.

#### Network program content

Audio content may consist of foreground or background music programming, or of recorded or live paging messages. The digital audio network handles each in the same manner, providing three transport options:

- Streamed from live or recorded sources for real-time playback.
- Streamed for recording for later playback. (Store and forward.)
- Delivered as a file transfer for later play.

The ability to originate a live or recorded stream, to play a stream, and to transfer an audio file or accept one for storage may be assigned to any device on the network that has the appropriate hardware/software. Modifying the functions of any device may be as simple as software reconfiguration. If the device is not configurable for the desired function, most likely an appropriate device can rapidly substituted without modifying the installed cable runs.

Extended network architectures, such as Wide Area Networks (WAN) and the Internet, may be used to expand the choices of program source and/or storage locations. Further, audio networking is agnostic to audio processing, so that system content may be processed at one location or decentralized.

### Network efficiency

Audio networking technology that is based on Ethernet takes advantage of the protocol's ubiquity, off-the shelf functionality, and standardized hardware, software, and administration tools. Many solution-specific features may be implemented now and in the future without altering the core system infrastructure or contributing significant additional costs.

New Ethernet developments will result from the ongoing R&D by industry leaders to provide constantly enhanced networking choices to a demanding marketplace. For example, most standard Ethernet functions are not limited to wired networks, so wireless implementations may be easily incorporated into technology/product roadmaps for audio networking solutions.

The use of Ethernet significantly reduces cable, conduit, and installation costs. Job site change orders are less likely to require major modifications to the system design.

Signal routing capabilities, including filtering, bridging, and tree spanning, are inherent in Ethernet functions. These provide maximum interconnect options with minimum hardware and no effect on audio quality. Not only can each device on the network be individually addressed, devices may be assigned to a virtually unlimited number of groups (or zones) and subgroups. Groups may be may be reconfigured on the fly, without the time and expense of rewiring.

### Network control

With audio networking, control information may be transported on the same cabling as the audio. Neither a separate run nor additional cable "pairs" are needed.

Control of any device on the network, including full reprogramming of functions, can be local, remote, or both. Remote choices can include locations on the network, Internet, telephone dial-in, and other options. All functions may appear anywhere and function subsets can be used to limit user choices for security or operational preferences.

Interface with commonly used building automation systems is straightforward. As with content, WAN and Internet architectures expand control location choices. Any location at any networked device can control any other location and need not be in a central equipment rack room.

### Network device monitoring

Status information, like its control counterpart, may be transported on the same cabling as the audio. Neither a separate run nor additional cable pairs are needed to enable any location at any networked device can monitor any other location.

System or external events, device diagnostics, audio performance, network quality of service, and life/safety information may be monitored, logged, and result in the triggering

of automatic responses. The result can be instant system changes or message broadcast, determined automatically by the audio networking system or the building automation system. In real time, local or remote monitoring personnel can be notified via dedicated device (for example, via SNMP), e-mail, pager, or other method via WAN and/or Internet.

Event logs may be generated and accessed across the network. A complete record of all audio on the network may be created and archived.

### **Conclusion**

It is clear that audio networking can overcome the limitations of traditional analog audio systems. The result is more efficient and economical design, enhanced features, and improved and more flexible function.