Future of Audio Networking:
Software and Virtual Systems

By Brad Price, Senior Product Manager, Audinate

## The Current State of Audio Networking

Networking has come to define how audio is deployed in the modern era, fueled by coherent networking standards, well considered solutions and ever-improving commodity IT equipment. Networked audio provides integrators and designers with tremendous flexibility and lowered costs for installation, while allowing audiences to enjoy noise-free performance at a scale that was once unimaginable. While there are several different audio networking solutions available today, they all share characteristics that have pushed networking to the forefront:

The elimination of point-to-point connections: In legacy systems, audio flowed from one device to another using a dedicated connector. In networked systems, all devices are wired to a common set of switches, and all audio connections are made using software. This makes changes easier, less expensive to implement, and makes it possible to completely reconfigure systems without moving cables. Scale: Point-to-point systems do not scale well. As the number of devices and audio channels increase, management of the system becomes difficult or impossible. Because they rely only upon "logical" connections, audio networks can scale to hundreds of devices and thousands of channels with no change in performance, while network tools allow for system health monitoring.

Computer integration: As digital audio content continues to multiply, computers themselves are central to many systems as sources, recording devices and signal processors. Audio networking allows computer applications to easily become an integral part of any audio system without conversion or extra hardware.
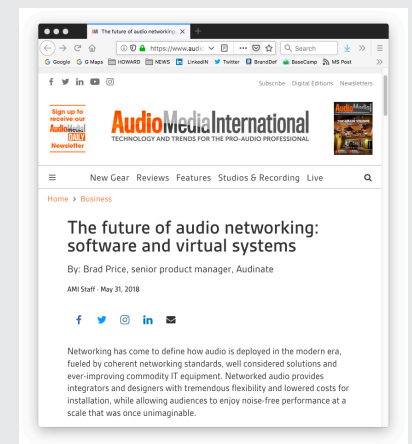
Audio networking solutions and standards

There are multiple audio networking solutions in use today. While some are used "in house" to exclusively connect products from a single manufacturer, others are broadly available across multiple vendors. Note that "standards" do not specify implementation, while "solutions" do – a key difference. A standard is a set of requirements to which products may be designed to conform, while a solution is the actual implementation of standards into a product. True solutions combine tools, user interfaces and ongoing support. Solutions currently in use are:

AVB: AVB is a set of audio networking standards developed by IEEE. AVB differs from others in that it requires special network switches in order to work. AVB is implemented as an "in house" solution by some manufacturers.

AES67: AES67 is an interoperability standard developed by AES that specifies basic, low-level audio control and transport between different solution types.

Ravenna: Ravenna is an audio networking solution developed by ALC NetworX. It is used by some manufacturers in the broadcast market. Ravenna also supports AES67.

Dante: Dante is by far the dominant solution, Dante is developed by Audinate and is used by over 400 audio manufacturers in nearly every segment of the audio industry. Dante also supports AES67.

Future Developments

The adoption of networking by the AV community has meant increased cooperation between IT departments and AV integrators, especially in larger and more critical installations. Expertise from the IT side helps integrators to deploy audio networking at a scale that "just works" for users of these systems Critically, IT professionals bring knowledge of security and authentication to audio networking, allowing installations to be safely deployed into areas where many people have access and technicians may need to make adjustments.

In corporate settings, audio networking is finding a home on existing infrastructure, carefully configured to ensure that all business functions can coexist on the same network securely and without interference. This is allowing for fluid use of conferencing and huddle spaces with high quality audio, directly connected to PCs.
In large, multi-zone installations, such as stadiums, audio networking is a perfect fit, allowing distribution of many different simultaneous content streams to different areas with only a few clicks of a mouse or the push of a button. In this area as well, access management is key to a successful, stable deployment and is a subject that IT experts know well. New tools, such as Dante Domain Manager, illustrate this direction, bringing IT-level user management to audio networking and allowing audio networks to span multiple subnets for nearly unlimited expansion alongside robust access control.

Moving Forward

As audio networking matures, it is changing in ways similar to the early days of computer networking. Foremost among concerns is security, which means controlling who has access to take actions, add devices and make changes. No audio network should be installed without considering security and answering the questions: Who needs to touch the system? Who has sufficient knowledge to make changes? What might happen if somebody gained access? While there are cases in which little concern is necessary, professionals should plan for secure installations in places where multiple people must use the system.

Dante Domain Manager is the first management platform designed specifically for audio networking. It allows administrators to assign specific users control over different areas of a Dante network and maintains logs of all changes by user, time and device. Like any good IT citizen, Dante Domain Manager integrates with existing directory services, such as Active Directory or LDAP, and denies access to any part of the audio network without appropriate credentials.

As audio networks grow larger and more complex, the need to segment the system into zones or domains becomes more and more critical. Dante Domain Manager allows many different domains to reside on a single network infrastructure, regardless of underlying subnets. Each domain (or zone) may separately assign users who can make changes or add devices, and operates independently from other domains within the larger system.

Tools like Dante Domain Manager point to the increased role of software in AV systems. Beyond networking, many conventional audio tools such as mixers and DSPs, are now built around computer architecture. Leading edge manufacturers are starting to release "soft" versions of some of these products, allowing audio functions to be carried out using off-the-shelf computer hardware for which IP is a native and natural fit. As this trend continues, expect to see more "virtual systems" that are comprised of software connected to audio endpoints – with a network, of course.