

**CLEAR COMMUNICATIONS:
PLACING THE END USER
AT THE HEART OF COLLABORATION**

BIAMP SYSTEMS WHITE PAPER

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Executive Summary

The 2010's are shaping up to be the decade when business computing became genuinely user oriented. Thanks to the innovations of Apple, Google, Microsoft and others, it is easier than ever to use a range of devices to access information and be productive from almost anywhere in the world. There is one area, however, where technology has largely failed to live up to its promise: collaboration.

As businesses continue to expand across the globe, the need to build strong 'virtual' teams grows. Technology plays a vital role in these teams' development - yet many of the tools fall short of their users' expectations. The experience is often jittery and prone to disruption, and these technological interruptions get in the way of effective teamwork.

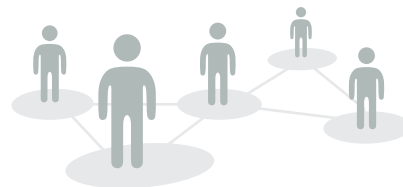
Biamp Systems surveyed IT decision-makers at UK firms in the first part of 2014 to understand the attitude of today's IT leaders towards business collaboration. Since many of the tools currently in use fall under the responsibility of the IT department, we were expecting a consistent endorsement of one or two of the systems businesses already have in place.

Our study actually found the opposite to be true - IT leaders are themselves frustrated. We discovered:

- **59 percent** of respondents agreed that as a business they are spending more time on conference calls than they did a year ago.
- **Over a third (38 percent)** said their business wastes time on calls due to failings in the technology.

A DEMAND FOR COLLABORATION IS ON THE RISE

There are an estimated
55 MILLION
CONFERENCE ROOMS WORLDWIDE¹



60%

OF SURVEYED BUSINESSES HAVE SEEN CONFERENCE CALL USAGE ESCALATE OVER THE PAST YEAR.

59%

OF WORKERS SPEND MORE TIME ON CONFERENCE CALLS THAN THEY DID ONE YEAR AGO.

87%

OF WORLD BUSINESSES USE TELEPHONE CONFERENCING.²

56%

OF GLOBAL CFOs SAID THEY WOULD INVEST IN VIDEO CONFERENCING TO REDUCE THEIR TRAVEL NEEDS.³

The IT leaders believe that the hardware of business collaboration – the audio-visual equipment that supports conference calls and video conferences – should reside on the IT network.

- **62 percent** of respondents agreed that audio-visual systems (AV) which are joined to the existing IT infrastructure would make the company more productive.
- **52 percent** went further – stating that networked AV technology could help improve their company's bottom line.

Although convergence of AV and IT has gained momentum over the past few years, there has not been the 'land-grab' from CIOs that concerned so many AV professionals. IT leaders stop short of taking full ownership of AV infrastructure – almost half of our respondents (45 percent) agreed that AV technology was not an area of responsibility that falls under their purview. While protocols such as Audio Video Bridging (AVB) make it possible for AV equipment to run on compatible IT systems, making them a truly valued work tool for people takes a special skill set which currently remains the sole domain of AV experts.

We suggest that the most effective collaboration platforms may themselves be the result of a strong collaboration – between the IT department that manages the system and the AV experts who work to create rich, shared experiences for colleagues.

“
The most effective collaboration platforms
may themselves be the result of a strong collaboration
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Collaboration in the Modern Workplace

Collaboration technologies have had a dramatic impact on the workplace over the past three decades. Beginning with conference calling in the late 1980's, continuing with the introduction of ISDN-based video conferencing systems in the 1990's, and followed in the 2000's by soft codec platforms like Skype, Lync, and high-end telepresence systems, the technology has enabled progressively richer interactions.

Once again it seems that collaboration technologies are moving up the agenda for senior IT professionals. Our research found that nearly two thirds of businesses have seen conference call usage escalate over the past year. And as the number of calls has grown, not only has the cost been reduced but the quality of the interactions has also become richer. Today's employees can 'click to call' via Skype or Lync, and add video from their webcam at the click of a mouse (and without the costs of a traditional telephone call).

At the same time, the infrastructure they run over has become increasingly standards-based, and converged on Internet Protocol (IP). Session Initiation Protocol (SIP) has emerged as the de facto standard for IP voice and video calling, bringing with it compatibility between equipment from different manufacturers. Similarly, the Simple Network Management Protocol (SNMP) has simplified the task of managing everything. IT staff have therefore found themselves required to support a wider range of capabilities - from high definition video calling to mobile conferencing with co-workers around the world, both inside and outside the firewall.

However, there is a gap between the capabilities of hardware and software, and their fitness for collaboration. A desk phone's microphone will never capture everyone's voices around a meeting room table faithfully, just as a static webcam will never capture their facial expressions.

ROADBLOCKS TO EFFECTIVE COLLABORATION

POOR QUALITY TECHNOLOGY:

38%

of senior IT professionals agreed that time was regularly wasted on conference calls because of failings and shortcomings in the technology.

INCOMPATIBLE TECHNOLOGY:

75%

of 3,300 businesspeople surveyed said that the biggest problem with virtual meetings is that it is hard for participants to build rapport.⁴



10
MINUTES

OF THE AVERAGE 60-MINUTE MEETING IS WASTED ON FIGURING OUT THE CONFERENCING SYSTEM, WAITING FOR EVERYONE TO DIAL IN, TAKING ATTENDANCE, ETC. **THIS EQUATES TO USD \$5.5 BILLION PER ANNUM OF LOST VALUE.**⁵

The IT leaders surveyed in our study expressed concerns that instead of enabling effective collaboration, these new technologies are actually creating new barriers. According to our study, over a third (38 percent) of senior IT professionals agreed that time was regularly wasted on conference calls in their businesses, because of failings and shortcomings in the technology.

AV and IT: Sharing Resources

Consequently, our study finds the majority of senior IT professionals take the view that AV belongs at the heart of the corporate network and not as an afterthought investment. Almost two thirds of respondents (62 percent) agreed that AV systems that are networked into the existing IT infrastructure would make their companies more productive. More than half (52 percent) went so far as to agree that such AV systems could improve their company's bottom line.

This is a significant finding. The proliferation of free-to-install software codec collaboration platforms, such as Skype, Fuze, and Facetime, is likely to have helped increase employees reliance on distance conferencing. While the technology is easy for end users to adopt, they are at the mercy of demands on the rest of the network (as discussed later in this paper). A period of heavy traffic criss-crossing the network at the same time as a software-brokered video conference will impair the user experience and weaken the outcome of the meeting.

Adding AV solutions onto the network is likely to have a genuinely transformational impact on how employees harness AV in their work, and work together over large distances, as the next section explains.

“
A majority of senior IT professionals believe
AV belongs at the heart
of the corporate network
”

SPEAKING THE LANGUAGE

WHAT DO WE MEAN BY 'NETWORKED AV'?

In the simplest possible terms, 'networked AV' refers to audio and video data being moved from one device to another, generally using Digital Signal Processors (DSPs).

The AV networking model is based on a hierarchy of three layers. Layer 1 is the physical transporter for data (e.g. the wires and cables) while layer 2, known as the 'Data Link layer,' refers the method by which data is moved those across those physical links in the network. Above this is layer 3, or the 'network layer,' which is responsible for routing across Internet protocols (IP).

Of course this only accounts for a closed system and in order for data to leave the network (via layer 3) it must first be run through a codec. The codec 'encodes' the data file in order to run it across internet protocols without taking up too much bandwidth and ensure deterministic synchronization. The data is then decoded at the other end by a compatible codec. It's worth noting that while codecs were traditionally developed as hardware, many businesses are adopting so-called 'soft codecs', such as Skype, Lync, and Fuze, in which all functions are completed in the software level.

While the majority of protocols introduced recently have been layer 3, over the last few years we have also seen a number of exciting developments happening in layer 2. Late in 2011, the IEEE published the 802.1BA standard for Audio Video Bridging (AVB), a network system which augments the Ethernet protocols and allows data traffic to be intelligently and dynamically managed depending on bandwidth needs.

WHY CHOOSE AN AVB-BASED NETWORKING SYSTEM?

For many businesses placing all network traffic into layer 3 is the easiest choice as a purely layer 3 network means a simpler and easier integration for the IT department. Additionally, layer 3 networking is often considered as a more mature technology, with a number of proprietary systems having already been adopted into the mainstream.

However, by moving AV traffic natively over Ethernet via the AVB protocol, businesses are seeing exactly how much traffic is crossing the network and, therefore, exactly how much bandwidth is needed. This reduces the existing IT issue of network overprovisioning (common to layer 3), ensuring that businesses can purchase exactly how much bandwidth is required (with only between five and 10 percent extra) rather than having to overestimate (often having to add around 40 percent) and pay for so much unused space. Similarly, an AVB system can protect itself from data surges, limiting and de-prioritizing large or unfamiliar traffic so that the network isn't flooded and crashes can be avoided.

Furthermore, as an open standard AVB is potentially one of the most flexible, scalable, and affordable protocols on the market. The second is perhaps most important: AVB has been designed with scale in mind - from simple audio-video setups in the home, to complex enterprise AV environments with dozens of meeting rooms and hundreds of endpoints.

A number of hurdles stand in the way of mainstream AVB adoption, the most significant of which is the requirement for specialist switching infrastructure - and at time of writing there is only one AVB-certified switch on the market.

Perhaps the long-term future of networked AV will lie at level 3. The Institute of Electrical and Electronics Engineers (IEEE), which developed the AVB standard, is currently developing an AVB over IP variant, which can run at level 3.


Sound Matters!

Sound is the most important, and the most overlooked determinant of our wellbeing and productivity today. A great deal of research has been carried out into the effects of noise, reverberation (echo), and distortion on our health, stress levels, and ability to concentrate. In short, higher audio quality in a communication setting correlates to a better understanding of the content being discussed.

Biamp Systems published an overview of the key research in its paper, *Building in Sound*, published in January 2013. The key points from the study are summarised below.

- NOISE HAS A COST.** The European Commission has estimated road noise alone creates additional social costs of between €30 billion and €46 billion (\$39-\$60 billion) each year in lost work and healthcare costs.
- NOISE DISRUPTS UNDERSTANDING.** Numerous studies of schoolchildren have found that noisy classrooms (or the din of cars or air traffic) prevents concentration and delays development.
- ECHOES MAKE PEOPLE SHOUT.** The Lombard Effect (or Lombard reflex) is the name given to the tendency we all exhibit of speaking more loudly as it gets noisier around us. It is an important consideration in acoustics, as a room's reverberation can spark a vicious spiral whereby one can feel forced to speak more loudly by the sound of one's own echo.
- BETTER SOUND DESIGN HAS TANGIBLE IMPACTS ON INDIVIDUALS, AND THE ORGANIZATION AS A WHOLE.** The introduction of noise cancellation in schools and hospitals has brought substantial benefits, including faster recovery times and increased concentration.

NOISE (dB)	EQUIVALENT	MANDATED / RECORDED NOISE LEVELS	HEALTH IMPACTS
15	Rustling leaves		
30	Library	} WHO recommended noise level for optimum night-time sleeping and patient rooms in hospitals	
35		} WHO recommended noise level for school classrooms	
40	Refrigerator hum	} WHO recommended limit for night-time noise	
45		} Recommended noise level for operating theaters	
50	Quiet office	} Typical noise level in intensive care unit (ICU)	} Increased blood pressure detected when night noise surpasses 50dB
55	Air conditioning unit	} 40% EU population exposed to daytime traffic noise levels exceeding 55dB	} Sleep is disturbed and heart disease risk increases 40% of office workers report impaired concentration
60			} Average time needed to get to sleep rises from 14 to 22 minutes
65	Busy office	} European Commission considering mandatory ear protection at 65-75dB Average noise measured in a German classroom Average noise level in recovery care units (67dB)	} Heart attack incidence increases
70	Street traffic		} Permanent hearing loss
80	Aircraft one mile away	} 82-90dB - Typical level of street noise recorded in Kolkata	} Higher cholesterol levels Higher likelihood of industrial accidents
85	Busy motorway	} US Federal law mandates use of ear protection for prolonged exposure to sound above 85dB	} Increased absenteeism
150	Shotgun		



In the same way that environmental noise such as machinery and traffic sound can cause problems, work place noise and low audio quality can be just as distracting and damaging to productivity. Poor sound isolation between meeting spaces, white noise on low quality VoIP services, and conference call reverberation all have a negative impact on our working lives.

While people are grudgingly receptive of these disturbances, there is little doubt that technology for many takes a distant second place to face-to-face contact for the most important discussions. Yet that is more a reflection of people's current experiences, rather than a criticism of all collaboration technologies. Cisco CEO John Chambers has said that the technology giant closed its 2007 acquisition of WebEx in just three weeks, largely thanks to the Cisco TelePresence™ high-definition meeting system. Cisco and its advisors were able to move so fast, not just because they are all technology-literate people, but because the technology itself successfully minimized the 'distance' between them. Key to Cisco's success was not simply that the TelePresence user experience was far richer than conventional web conferencing platforms but that it successfully replicated the experience of a face-to-face meeting faster than business travel could allow.

No More Tele-miscommunication

The rise of the software codec has had a significant effect on how AV is used within the enterprise. Designed with simplicity, practicality and affordability in mind, software codecs have quickly been adopted both by employees, who often already use the technology in their personal lives, and by businesses who do not have resources available to invest in high-end, expensive systems such as TelePresence. Nowadays, many business calls are conducted with nothing more than a laptop and Internet connection. It is not, however, the ideal solution and calls made across systems such as Skype or Lync are often plagued by fidelity issues caused by two common factors: a lack of sufficient network bandwidth and the low quality of the laptop's input and output hardware.

Providing better input into the software codec will, of course, improve collaboration, and installing high-quality microphones, speakers, and video screens in meeting rooms is one way to achieve this. Microphones will improve signal-to-noise ratio and professional speakers improve fidelity, though neither can compensate for reverberation due to low bandwidth or even inexpertly installed peripherals.

It's a common saying in the AV industry that your investment is most often destroyed in the last mile: with so many factors in producing good audio a single flaw can ruin an otherwise perfect set up. The digital signal processor (DSP) is vital and it's important that it also offer Acoustic Echo Cancellation (AEC) in order to smooth out ambient noise and echo.

For IT, it's crucial that this AV hardware offers an easy route in – USB interfacing is ideal and allows laptops to be plugged directly in to the system. Many DSPs will override the soft codec's own AEC, again helping to improve the clarity of communication.

Finally, the quality of the network represents a key part of the experience. Running AVB protocols across the network allows media traffic to be intelligently managed and reserved according to the bandwidth needed. Although there is no silver bullet for perfect audio quality, better managed data packets will help to avoid audio stutters and video drop-outs.

Ultimately, building the right communication system is a mixture of art and science. The science lies in the algorithms that are coded into the DSP devices; the art takes the form of custom installation which ensures the hardware caters for the exact characteristics of each room.

Consequently, creating the sorts of audio systems that enable genuine collaborations requires input from both the IT department and AV specialists. How this approach will work is the next part of the conversation.

Combined Thinking: The AV/IT Alliance

The key to creating strong links between the AV and IT departments lies in understanding the distinct mind-set each function brings to the solution. One of the biggest barriers to AV and IT relations is the fear that it is either not possible or not sensible to bring both skill sets together into a single role. Generally the CIO is considered the best fit but in practice it's an idea that has little credibility with either AV (who understandably are concerned for their existing roles) or IT departments (who feel they lack the resources and necessary expertise). Our research tells a similar story, finding that nearly half (45 percent) of IT decision makers agreed that responsibility for AV lies outside their department, once again suggesting that a close partnership (rather than a single function) would be the preferred route for organizations.

So, on a purely technical level, what exactly is needed for the AV/IT relationship to have the greatest success? Though it is possible to run AV across the enterprise network, it has a number of specific requirements. Even a Layer 2 protocol like AVB, which has been designed with IT convergence in mind, still requires compatible switches. Cooperation between AV and IT functions must be at a fundamental level, with both parties closely involved in the initial design phase as well as in the network's day-to-day operations. This means both considering AV requirements when building the IT network as well as using AV technologies to augment the system.

BRIDGING THE COMMUNICATION GAP

Many business calls are conducted via
LAPTOP & INTERNET CONNECTION



The use of Lync and Skype is increasing. This is not always an ideal communication solution as calls made with soft codecs are often plagued by fidelity issues caused by a lack of network bandwidth and the low quality of laptop input/output hardware. Adding the right AV solution to compliment soft codec technologies extends the desktop into conference room and huddle room spaces.

EMPOWERING THE AV & IT PARTNERSHIP:

45%

of IT decision makers believe AV responsibilities lie outside of IT departments. Combining the power of both disciplines paves the road for successful collaboration.

62%

of IT leaders agreed that AV systems which are joined to the existing IT infrastructure, would make the company more productive.

52%

of IT leaders stated that networked AV technology could help improve their company's bottom line.

Addressing the Cultural Obstacles

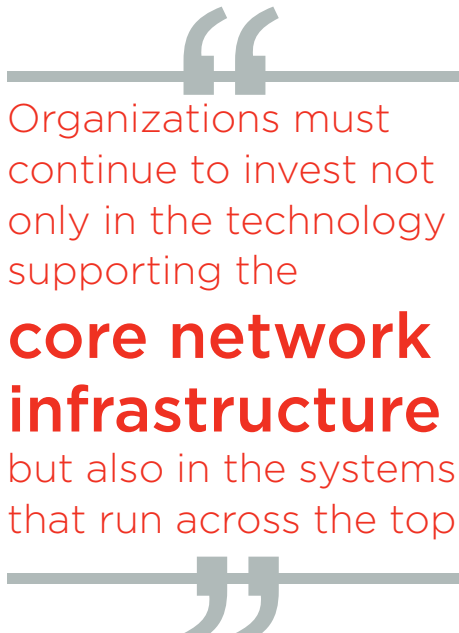
There is also something of a divide between what each department aims to offer: while AV looks after the aspects driving the user experience (such as conference lines, audio and visual platforms), it is IT which takes on the responsibility for the business processes that underpin them (document management, messaging, and so on). To enable meaningful levels of colleague collaboration across a distributed workforce requires both of these aspects: the immersive experience of AV and the technology environment of IT.

Any successful partnership is a two-way street and both departments should learn from the approach of the other. For a start, IT must consider that collaboration technology is not simply about giving employees access to data or sharing files but is a tool to bring the workforce closer together. The hallmark of successful virtual collaborations should be the conversations that pave the way for fresh thinking that creates new business opportunities.

The AV function can benefit by learning from IT's focus on business outcomes: it must ask what each investment really offers to the business, what users expect in return, and how it can manage costs and help the organization grow.

When implemented properly, the right combination of collaboration technologies can make colleagues separated by continents feel like they are working across the room from one another. Good sound quality enables organizations to make the right first impression with new business opportunities as well as create a reputation for professionalism. 61 percent of IT decision makers believing that better AV technology would result in improved communication across the business, and two thirds (66 percent) agreed that investment in the right conferencing technology could save the business huge sums on corporate travel.

Organizations must continue to invest not only in the technology supporting the core network infrastructure, but also in the systems that run across the top - ensuring that all technology is easy for end users to access.



Organizations must continue to invest not only in the technology supporting the **core network infrastructure** but also in the systems that run across the top

Preparing for the Distributed Workforce: Key Recommendations

The value of a distributed workforce is widely accepted, and it is encouraging to see that so many organizations implement this working model successfully, benefiting from a workforce with expanded global presence as well as a low cost of corporate real estate and improved disaster recovery. We have also seen that crucial to success is the wise investment in a range of collaboration tools – with an emphasis on technology which offers clear, accurate, and natural-sounding AV to help replicate the personal contact of the traditional office.

At some point everyone has used inadequate equipment during a conference call. Low intelligibility, echoes from other callers, and unexplained (and irritating) noises can all distract from the information being imparted and result in employees avoiding the use of conferencing.

However, in order to deliver the experience and benefits of a standard office model to a distributed workforce, organizations must foster a close working relationship between AV and IT departments.

Below is a selection of key takeaways in effectively implementing this partnership:

- 1. INVEST IN CORE NETWORK FACILITIES** – optimize the network for AV and IT by ensuring that compatible switches are installed wherever there are concentrations of meeting rooms.
- 2. SOUND MATTERS TO PEOPLE** – true collaboration will not be achieved until the audio quality is effective and intelligible. Therefore, audio shortcomings need to be conquered before video conferencing is even considered as a viable option for connecting the distributed workforce.
- 3. COMBINE THE CONTRASTING MIND-SETS EACH FUNCTION BRINGS** – AV and IT must work in tandem to deliver a single unified experience for users.
- 4. PUT THE END USER EXPERIENCE FIRST** – the needs of the end user are of crucial importance when designing any AV network. The system must not only meet their current demands, but also be able to provide seamless and uninterrupted connections and be scalable to allow for future innovation.

1. Wainhouse Research, 2014
2. <http://www.onconference.com/blog/2012/02/23/join-the-conference-call-infographic/>
3. <http://media-cache-ak0.pinimg.com/originals/07/bf/f2/07bff20ec8c11cb518b6eed52799e29f.jpg>
4. <http://online.wsj.com/news/articles/SB10001424052702304610404579405221066665830>
5. <http://loopup.com/blog/communicating-effectively/wasted-time-wasted-money-conferencing/>



B I A M P[®]

CONTACT US

A: 9300 S.W. Gemini Drive
Beaverton, OR 97008 USA

T: +1.503.641.7287

E: biampinfo@biamp.com

W: <http://biamp.com>