Audio Technology Business Report:

Strategic Drivers of Change

iabm

Contents

Introduction

About this Report

The Audio Technology Business Report aims to identify major strategic drivers of change in the audio technology business. The purpose of this report is to enable IABM member companies to discover emerging trends in the audio technology sector, including buying, selling and technology development trends.

Report Methodology

The information analyzed in this report was derived by both quantitative and qualitative research carried out by IABM. The primary sources used in this report are:

- Quantitative Evidence: Public and private financial data of audio technology buyers, such as radio stations, gathered and analyzed by IABM
- Qualitative Evidence: Expert interviews with audio technology businesses carried out by IABM as well as survey evidence gathered by IABM

We use both these pools of information as well as variety of secondary sources – including news, announcements, earnings calls, technology material etc. - to provide users with a comprehensive account of the status of the audio technology industry.

More information about the report's methodology can be found in the Appendix of this report.

Report Content

This analysis was undertaken by the IABM Insight & Analysis team. The contents of this report are divided into the following three macro-sections:

- The Audio Technology Market
- Primary Buying Groups
- Sector-Specific Trends

Users can view the highlights of this report in the Executive Summary section of the study.

Executive Summary

This section includes the main highlights of this report accompanied by the most relevant data visualizations. Key findings of this report are as follows:

The Audio Technology Market

- The audio market is undergoing a radical transition with a variety of trends having an impact on demand for audio technology
- Most vendors interviewed for this report highlighted that the transition to AoIP is a question of when rather than if. However, adoption of AoIP has been slow with most broadcast and media organizations adopting a hybrid approach to deployment
- AES67 is seen as a positive development by most suppliers although most highlight that some challenges such as discovery need to be addressed. The deployment of multiple standards is common at users' organizations although Dante has grown significantly in recent years
- Drivers of AoIP deployment include efficiency, flexibility, remote production and immersive audio
- Virtualization and automation of audio workflows were highlighted as the next big thing in audio technology according to interviews carried out for this report. While virtualization is at an early stage of development, it is a major focus going forward
- Immersive audio was the third most important priority highlighted by research participants. This is a key area of interest for suppliers, though adoption by customers is low and still in the "education" phase
- Many companies interviewed for this report highlighted how they had to develop new audio products, most of which are simpler and more cost-effective, as a result of customers' changing requirements and skillsets
- The rise of streaming platforms and content investment is having a huge impact on audio technology, with OTT players being increasingly seen as the trend-setters by audio technology suppliers
- As the industry increasingly leverages data throughout the content chain, technology users are demanding solutions that take data into account
- Most companies interviewed for this report highlighted the competitive nature of the audio technology market, which has led to price compression and product differentiation
- The adoption of multiple standards for AoIP has prompted suppliers to boost R&D investment to support these standards and is driving premium pricing for hybrid deployments
- Some companies have also targeted emerging adjacent verticals as competition has prompted them to launch more cost-effective offerings
- Regional and cyclical drivers of audio technology spending include the transition to next-generation terrestrial formats and digital radio as well as the spectrum reallocation in some geographies. These drivers have significantly increased revenues for suppliers in specific regional markets and sectors

Primary Buying Groups

- Television and radio broadcasters have historically been major buyers of audio technology, with radio broadcasters having smaller budgets and a greater focus on efficiency
- Streaming platforms have emerged as a major buyer of audio technology, though their impact on audio technology spending is mostly due to the increased investment in production and post-production
- Many suppliers interviewed for this report highlighted how the changes in the business model of the music industry have driven a significant wave of spending in audio technology
- As the price of professional audio technology has plummeted, it has become available to an increasing number of people, including freelancers and small productions. This category of audio technology buyers has been described as growing, particularly when it comes to audio acquisition
- Theaters and operas are other historical buying groups very focused on the quality of sound, with a high level of support needed as a result
- Adjacent markets such as e-Sports, education and corporate have different requirements compared to traditional buyers, with a focus on smaller products that are easier to use

Sector-Specific Trends

- In audio acquisition, products have become more efficient to follow buyers' objective to do more with less. Products have also become smaller, more versatile and easier to use as a result. A major driver of spending in this category is the spectrum reallocation that has made some legacy wireless products obsolete
- In audio monitoring, users have moved to products that are easy to use. The sheer volume and complexity of signals to be monitored has driven revenues (and R&D spending) for audio monitoring suppliers. Immersive audio is also considered a major driver of revenues in this category, as it leads to an increase in the number of channels to monitor
- In audio processing, suppliers are moving to smaller consoles that are easier to use and more cost-effective. This also entails the move to headless (i.e. virtual) consoles where processing is handled by commodity hardware and the control surface is virtualized. Remote production features are also becoming increasingly important
- The transition to AoIP is the most relevant trend influencing the intercom market, with vendors pushing customers to adopt IP-connected intercom systems
- When it comes to audio automation, these systems have mostly been rolled out by radio broadcasters to further automate their workflows when delivering content to multiple platforms

The Audio Technology Market

This section aims to give readers an overview of the audio technology market.

Technology & Business Transition

The audio market is undergoing a radical transition with a variety of trends having an impact on demand for audio technology.

As with video technology, audio is moving to IP although this transition presents specific challenges from an audio perspective. The transition to IP is inherently linked to a move to virtualized and automated workflows, particularly in some audio technology products such as audio processing. This is being driven by the need for increased efficiency – a common theme in the broadcast and media industry – as well as by changing skillsets at customer organizations. The focus on efficiency is a must as programming investment rises to new levels and media organizations – including radio stations – deliver content to an increasing number of platforms. Rising requirements, flat budgets, and technology developments have also driven pricing down, which has in turn led some suppliers to target new markets with new offerings. A strategic divide between some suppliers that were actively pursuing this route, against others that did not see it as a viable growth opportunity, was evident from this report. Aside from the drive for efficiency, some audio technology suppliers are pushing their customers to adopt next-generation audio formats. This transition remains at an early stage according to most experts interviewed for this report. The three macro technology drivers analyzed in this report include:

- Audio over IP (AoIP)
- Audio Virtualization and Automation
- Immersive Audio

These trends are shown in order of importance for both audio technology suppliers and buyers. These three trends, and particularly the first two, are linked to other business and workflow drivers, including:

  - Changing Requirements and Skillsets
  - Rise of Streaming and Content Investment
  - Intelligent Workflows
  - Pricing Compression & Product Differentiation
  - Standards Support
  - Rise of Adjacent Markets
  - Regional and Cyclical Drivers

We will cover both the technology and business and workflow drivers below and throughout this report. We will also cover regional drivers of spending, including the transition to next-generation terrestrial standards and digital radio as well as spectrum re-allocation in some geographies, in this section. This should give readers a comprehensive analysis of revenue drivers in the audio technology market.

Technology Drivers

Audio over IP (AoIP)

Most vendors interviewed for this report highlighted that the transition to AoIP is a question of when rather than if. In fact, this transition brings media organizations several cost and workflow benefits – some of the workflow benefits are described later in this report. The main cost benefit lies in moving from point-to-point cabling installations to a networked infrastructure, which leads to lower overheads.

Despite all its benefits, adoption of AoIP has been slow with most broadcast and media organizations taking a gradual approach to deployment. The reasons behind this are cultural, financial and technical. Many research participants highlighted that moving to IP-based workflows requires new skills that are currently scarce in the broadcast and media industry – more on this below. From a financial perspective, customers have been reluctant to divest legacy infrastructure. From a technical perspective, the emergence of a variety of proprietary standards since Cirrus Logic's Cobranet (1996), some of which suited to different use cases, has prompted many audio technology users to adopt a wait-and-see or hybrid approach to minimize the risk of any vendor lock-in.

More recently, the industry has backed the AES67 standard for interoperability, an open transport solution for IP networks published in 2013 by the Audio Engineering Society. AES67 was adopted by a variety of industry stakeholders after its publication and was included in the SMPTE 2110 suite of standards. Several experts highlighted that AES67 is not a complete solution as it does not cover some crucial aspects of IP networking such as device discovery. According to research participants, the Networked Media Open Specification (NMOS) developed by the Advanced Media Workflow Association (AMWA) will ease many of these issues and favor adoption. This specification includes IS-04, which handles discovery, and IS-05, which handles connection management. AMWA is working on future specifications as well. Some research participants highlighted that there is still much work to be done on interoperability for AoIP.

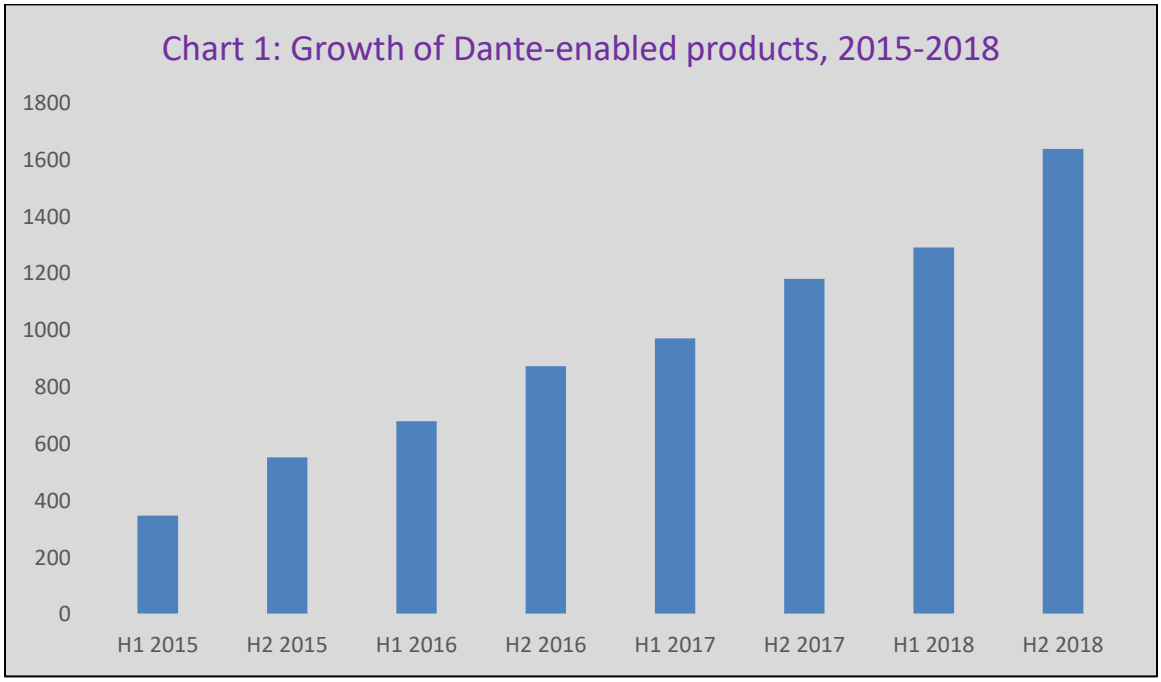
AES67 facilitates interoperability of IP networking solutions such as Dante, Ravenna, Livewire+, Q-LAN and Audio Video Bridging (AVB). Therefore, it acts as a bridge to allow communications between products relying on different protocols for IP networking. The adoption of a particular protocol very much depends on the specific application, with some protocols being more widely used by some buyers – for example, Livewire+ has been widely adopted by radio stations.

Dante was developed by Audinate and launched in 2006. It is a commercial solution for IP networking, requiring suppliers to license the technology from Audinate. Dante has become extremely popular as evidenced by the growing adoption of Dante-enabled products – according to Audinate's 2018 Annual Report, the company has 438 licensed Dante OEMs and over 1,600 products are available on the market. Dante is today widely considered as the primary networking protocol for professional audio applications. Its popularity has been driven by its compatibility with off-the-shelf IT equipment such as Ethernet-compatible network switches, as opposed to other standards that require dedicated

appliances. Also, some suppliers highlighted the support provided by Audinate on audio networking as a differentiator as opposed to other open-source solutions – this allows companies to focus on their niches for development.

It is important to note that Dante is also sold in software units – these sales increased by 58% according to Audinate's 2018 Annual Report.

Chart 1 shows the growth in Dante-enabled products between 2015 and 2018. Dante is considered the successor of Cirrus Logic's Cobranet and Digigram's Ethersound, which are still used in some legacy products.



Source: Audinate

Other standards like Ravenna were designed specifically for broadcast applications – with a special requirement for low latency. Adoption of these standards seem stable according to interviews done for this report, with some suppliers highlighting the increasing importance of Dante in broadcast.

The IP networking market is complex, as evidenced by the number of standards mentioned or described in this report. This has prompted many technology users to adopt a hybrid approach to IP deployments, while vendors have worked on solutions to facilitate interoperability between different protocols. For example, Calrec has launched a product called Connect to facilitate interoperability between different registration/discovery specifications including NMOS, mDNS, AES70, or Audinate's SAP. Other suppliers have also launched solutions to facilitate interoperability between IP-based systems and legacy equipment. The preference for hybrid installations was evident from most of the interviews conducted.

These mixed installations generally rely on hybrid products designed to handle a plethora of signals. As technology suppliers have invested heavily in R&D to support the various standards, hybrid products are

more expensive. Most suppliers interviewed for this study envisage that the next-generation of IP-based products will be more cost-effective while, at the same time, retaining the same features.

According to most research participants, a complete transition to AoIP is being considered mostly for full facility upgrades. For upgrades of current facilities, a hybrid approach is generally preferred. Most suppliers highlighted that they need to invest significant effort in educating their customers on their new IP-based products.

An important driver of AoIP is remote production. This is one of the most important priorities for audio technology buyers according to IABM Buying Trends data. It is also a focus of audio technology vendors as shown by recent initiatives at trade shows.

Another important driver of AoIP is immersive audio production as AoIP is more efficient – i.e. able to carry more audio channels – compared to legacy infrastructure. Research participants highlighted how a move to IP can anticipate the adoption of immersive audio. Immersive audio is described in more detail below.

Adoption of AoIP is disrupting the whole audio chain, from acquisition to distribution. AoIP is also the top technology priority for audio technology buyers as evidenced by IABM Buying Trends Data. More on this trend is provided in the following chapters and sections.

Audio Virtualization and Automation

Virtualization and automation of audio workflows were highlighted as the next big thing in audio technology according to interviews carried out for this report. As mentioned earlier, this is heavily linked to the deployment of IP-based systems.

According to most companies interviewed for this report, although virtualization is at an early stage of development, it is a revolutionary trend for audio workflows. From a business perspective, virtualization allows users to achieve significant cost savings as evidenced later in this report. Most importantly, virtualization allows users to scale resources depending on demand – and without the need to buy more dedicated equipment.

From a vendor perspective, virtualization ultimately translates into a shift in revenue models towards subscriptions, with a consequent cashflow transition feared by many audio technology suppliers.

Virtualization in an audio environment involves the deployment of software with no dedicated audio processing hardware – but rather off-the-shelf equipment. Many suppliers highlighted that they have moved in that direction and developed apps to manage their new, software-based products. This shift is particularly important as it has forced suppliers to develop new skillsets, including the ability to develop swift and easy-to-use user interfaces – more on this below.

From an audio chain perspective, virtualization has had a greater impact downstream – in audio processing - than upstream – in audio acquisition.

Most research participants also highlighted the increased automation of routine workflows driven by IP-based systems. Automation has had an impact throughout the audio chain, from acquisition to distribution.

In acquisition, suppliers highlighted that their customers, particularly in broadcast, want to do "more with less" and are therefore demanding technology that minimizes the number of people needed for a live broadcast, for example.

In distribution, automation is also driving change as audio technology users balance the need to deliver content to multiple platforms with their decreasing budgets.

Immersive Audio

Immersive audio was the third most important priority highlighted by research participants. Companies that aim to differentiate their offerings through quality (to drive premium pricing) are particularly focused on this technology to increase their revenues.

Suppliers interviewed for this study reported that immersive audio was a key area of interest for them though adoption by customers was low and still in the "education" phase. One of the major challenges hindering adoption of immersive audio is consumer adoption of equipment in homes, as some suppliers reported this to be a key concern for their customers.

Streaming platforms and sports broadcasters were reported to be some of the first adopters of immersive audio technologies as they could marry that with UHD content – these players mostly operate through subscription-based models so they can differentiate themselves with higher quality broadcasts.

In terms of market developments, the immersive audio sector is characterized by intense competition between different vendors that aim to drive licensing revenues from their proprietary formats; below we describe some of the most important ones.

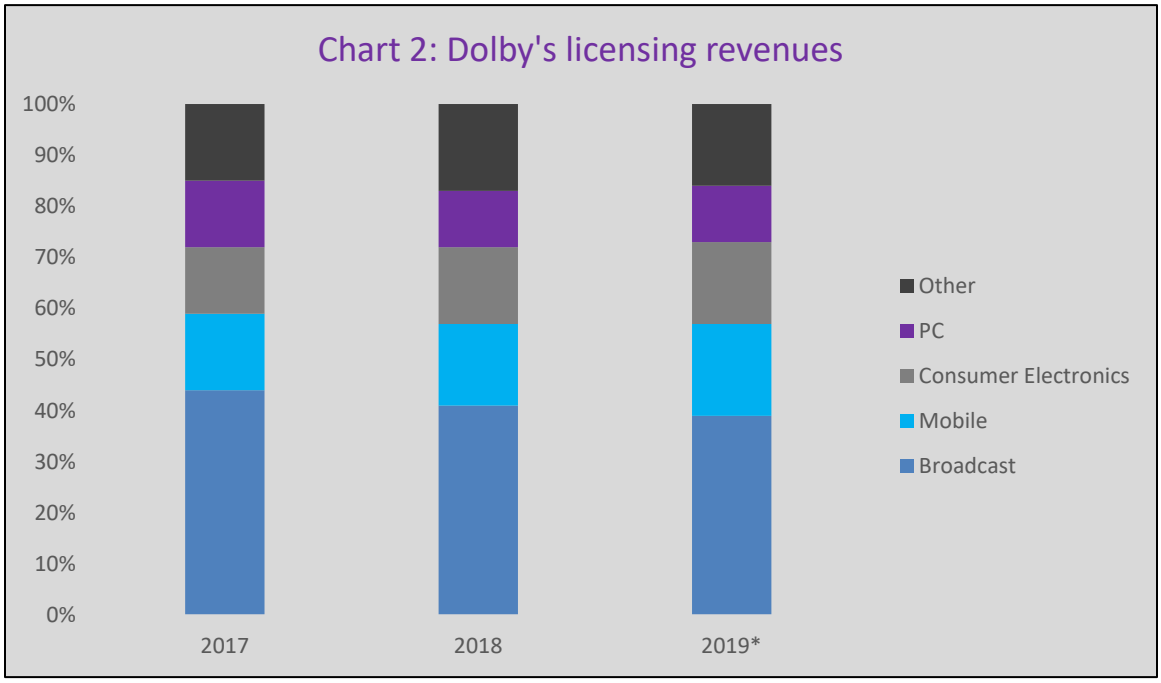
Dolby Atmos

Dolby has developed Dolby Atmos and as of April 2019, there were over 4,800 screens that supported Atmos, and over 1,300 feature films had been mastered using Atmos-based sound. This is significantly up compared to previous years. According to interviews done for this report, Atmos adoption is also up and currently leading other formats particularly when it comes to cinema and broadcast. Dolby's dominant presence in these markets has also favoured this.

Dolby's recent announcements also confirmed this trend. During the company's Q1 2019 earnings call with analysts, Dolby CEO Kevin Yeaman commented on the strong results saying that they were driven by the stronger presence of both Dolby Atmos and Dolby Vision, their HDR format, in the market. Since the company unveiled Atmos, it has seen an increasing adoption of it beyond the cinema. At CES 2019, Dolby announced that Panasonic would launch its first TV set with Dolby Atmos while Lenovo "expanded

its support for the combined Dolby Vision and Dolby Atmos experience further into its line of PCs." Samsung and Huawei's smartphones as well as home entertainment systems like Apple 4K TV and Amazon 4K Fire TV all support Dolby Atmos. The Microsoft Xbox One became the first game console to support Atmos. These are just some of the consumer devices that now support the format. Many journalists reporting on CES 2019 highlighted how it was difficult to stumble upon a device that did not support Atmos.

Dolby aims to increase its licensing revenues (89% of its total revenues as of 2018) by expanding the range of devices that support Atmos. Chart 2 shows that Dolby's licensing revenues from the broadcast sector have been declining in recent years while revenues from consumer electronics and mobile have increased.



Source: Dolby, half-yearly data used for 2019

Dolby Atmos content is provided by the major OTT providers including Netflix, Amazon, iTunes, Vudu, Tencent, and iQiYi as well as by Pay-TV operators. That is why some research participants highlighted that these types of companies may drive immersive audio development in the next years.

DTS:X

DTS has developed DTS:X as its proprietary immersive audio format. In 2016, it made a deal with Paramount Home Media Distribution to include the format in a series of Blu-ray Discs. At the start of 2019, Microsoft announced that it would support DTS:X for its Windows PCs and Xbox – it already supports Atmos – while Panasonic's new soundbar was unveiled to be the first one to support DTS:X. DTS also announced that the first chips to include DTS:X in TVs will be available in the second part of 2019. Companies interviewed for this report did not see DTS:X as a strong competitor to Atmos.

Auro-3D

Auro Technologies has Auro-3D, an alternative to Atmos and DTS:X. Auro-3D was incorporated in Barco's cinema hardware offering in 2011 through a partnership, which drove increased adoption of the format in cinemas. Its adoption remains significantly lower than Atmos, according to interviews conducted for this report. According to 2017 figures, over 600 cinemas had adopted the Auro-3D format.

MPEG-H

MPEG-H was developed by a group of companies dubbed the MPEG-H Alliance including Fraunhofer, Qualcomm, and Technicolor. Compared to other immersive formats, MPEG-H is more focused on streaming and broadcast applications. MPEG-H is gaining traction. It was adopted in South Korea for its launch of ATSC 3.0 which led TV set manufacturer LG to license it for its 2017 models. and MPEG-H was trialled at major events in Europe such as the 2018 Eurovision Song Contest in Portugal and the 2018 French Open. At CES 2019, Sony announced that its new object-based mixing system would be based on MPEG-H.

Source: American University Blog

In the next section, we analyze the main business and workflow drivers of change in the audio technology industry.

Business & Workflow Drivers

Changing Requirements and Skillsets

Many companies interviewed for this report highlighted how they had to develop new audio products, most of which are simpler and more cost-effective, as a result of customers' changing requirements and skillsets.

As a variety of audio products is no longer operated by skilled engineers, but by operators who may know very little about audio technology, vendors have had to develop simpler functionalities and user interfaces as well as incorporate touchscreens to please the younger generations – this applies across different product categories. Vendors highlighted that this was also driven by a scarcity of skilled audio engineers – in terms of sound engineering - and by a focus on saving money on audio technology, with "good enough" becoming a mantra in some product categories. In fact, with these products, customers have been able to hire less expensive operators or avoid re-training existing engineers in new IP-based products. This is consistent with the increased focus on efficiency highlighted earlier in this report. This is also consistent with the adoption of remote production workflows as in these deployments less skilled operators might be available to use the equipment onsite.

In certain product categories, companies highlighted the increasing popularity of smaller and more versatile systems that are again focused on ease-of-use. In some cases, the choice regarding the degree of complexity of the audio system is left to the user to accommodate flexibility in terms of requirements and skillsets. This is of course easier to provide in a software world, which is why many vendors have launched apps or other virtualized systems linked to their products.

Moreover, many new audio technology products provide remote operation capabilities that can enable customers to achieve important cost savings. This is particularly true in audio mixing where the savings can scale with the number of mixing environments required by the customer.

In other instances, remote configuration allows customers to save on engineering costs as well by virtualizing any updates required after the set up – without the need for the engineer to physically be there. This is one of the benefits brought by virtualization.

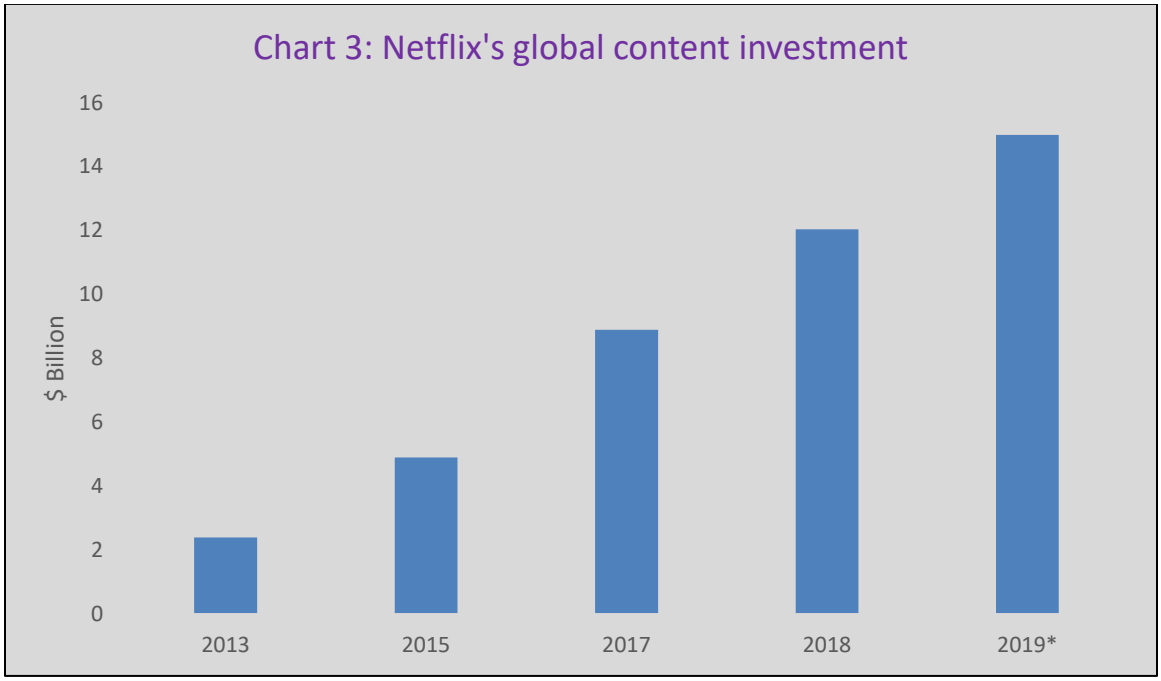
Generally, these new features are consistent with a wider trend towards more economical and flexible solutions, as audio technology users account for the spiraling costs of distributing content to multiple platforms while their traditional revenues are under pressure from new media operators. Many suppliers talked about this as a cultural shift within the industry.

Work on these features was confirmed as a major focus, also in terms of R&D investment, for most audio technology suppliers.

Rise of Streaming and Content Investment

The rise of streaming platforms and content investment is having a huge impact on audio technology, as evidenced by most of the interviews carried out for this report.

Due to the immense rise in content investment by OTT platforms such as Netflix and Amazon, who are likely to spend over $20bn on content in 2019, these players are increasingly seen as the trend-setters by audio technology suppliers. Also, the rise of new platforms has prompted traditional broadcasters, including both television and radio channels, to launch digital offerings. Chart 3 reports Netflix's content investment in recent years as an example of this trend.



Source: IABM, estimate provided for 2019

The effects of these trends have been multi-faceted. Some of the major ones are reported below:

- Overall, the rise of content investment and streaming platforms is seen positively by most audio technology vendors as this has driven a significant increase in content production, which has translated to increased audio technology spending, in terms of quantity rather than quality
- Due to the rising amount of content and platforms to be managed, audio technology buyers have demanded more efficient solutions, which has driven some suppliers to feel under pressure, particularly from an R&D perspective, but has also provided opportunities
- As OTT platforms have commissioned more shows, so content providers have driven technology suppliers to provide products that follow their specifications so that they could provide content to these outlets
- OTT platforms have been major proponents of immersive audio and driven investment in this part of the market

As evidenced by the effects above, the rise of streaming has had a mixed impact, mostly positive, on the audio technology supply.

Many suppliers highlighted that major OTT platforms have started taking audio much more seriously and now have similar requirements to traditional broadcasters. Netflix upgraded its audio specifications in May 2019 following feedback from the producers of "Stranger Things," who noticed audio degradation in the second season in 2017. Netflix, which has been using static audio streaming at a constant bitrate since the beginning, decided to switch to adaptive streaming, which optimizes quality depending on the network's connection. Netflix has a long list of sound mix specifications on its website – this includes vendors that have been approved by the OTT provider. There are unique requirements to optimize audio streaming at scale over the internet and mobile networks and this was also highlighted as an area of growth for the audio industry.

Source: Netflix

However, some suppliers also highlighted the lack of regulation when it comes to online content delivery. It is worth noting that there has been some activity in this area. The Audio Engineering Society formed a technical group in early 2016 to develop Audio Guidelines for Over-the-Top Television and Video Streaming. The group published updates in 2016 and 2017. The last update includes guidelines "focused on managing the loudness and loudness range of program and interstitial content distributed over-the-top (OTT) and by online video distributors (OVD) to maintain and improve the sonic integrity and listening experience across multiple devices."

The rise of streaming is seen as a very relevant demand driver by most audio vendors, particularly those whose revenues are linked to compliance with audio specifications, including delivery of content to streaming platforms. The rise of internet streaming is also providing new opportunities as broadcast and media organizations need to deliver and package audio for new platforms such as OTT services. As the number of platforms to deliver to proliferates, broadcast and media organizations may create 50 or 60 versions of the same content just to make them available for delivery to different platforms. The need for automating delivery to these platforms is becoming more pervasive, particularly as budgets become more stretched. Therefore, solutions that address compliance through automation are an increasingly important area of interest.

Intelligent Workflows

As the industry increasingly leverages data throughout the content chain, technology users are demanding solutions that take data into account. Although this report found little evidence that artificial intelligence and machine learning (AI/ML) functionalities are important in current audio products, most companies agreed that there is potential for these technologies to become more established as some of the technology transitions mentioned earlier progress.

A good example of this is the transition to AoIP. As media companies move to IP-based workflows, audio products are transitioning from passive devices to tools capable of actively requesting information and sending it back. This is seen as a major shift by audio technology experts, as audio devices can become active databases that enable users to run AI/ML algorithms and automate workflows such as loudness monitoring. Skillsets are considered a major barrier to this development, with some suppliers highlighting the need to train their customers on this.

Intelligence is also about products that are easier to use – as highlighted earlier – and simpler visualizations to please the younger generations.

Pricing Compression and Product Differentiation

Most companies interviewed for this report highlighted the competitive nature of the audio technology market. The entry of low-cost suppliers from Asia as well as the increasingly competitive prices of large audio technology providers in some segments have prompted most companies to re-formulate their strategies going forward. Moreover, the transition to new revenue models highlighted earlier has also caused sales to swing into new, cloud-based product categories.

Downward pressure on pricing has driven companies to adopt different strategies for product differentiation:

- Some companies have launched more cost-effective offerings to accommodate the changing requirements of traditional users and/or target new verticals.
  One supplier told us “Our cost-effective line of products is doing very well”
- Others have been reluctant to move away from premium pricing but have nonetheless identified new verticals (e.g. new media) as primary growth opportunities for the future.
  Another supplier told us: “We don’t want to go there [to the lower end of the market], it’s a completely different game”

The divide between these two clusters of companies was evident from the qualitative feedback gathered for this report. The one thing these two groups have in common is the pursuit of new opportunities and the frustration with traditional broadcast customers, in some cases.

Standards Support

As noted earlier, the transition to AoIP has given rise to a variety of standards, which has in turn prompted most audio technology users to prefer hybrid deployments, featuring a mixture of these protocols and/or legacy equipment. The adoption of multiple standards also depends on the specific application of audio technology, as noted earlier. Suppliers see this as both a challenge and an opportunity:

- As the audio industry has adopted various standards, audio technology suppliers have had to significantly raise their R&D investment in support of these
- Multiple standards adoption has also translated in increased revenues as hybrid deployments have been priced at a premium

Generally, the overall impact of standards on revenues varies depending on the company considered. Some suppliers, particularly in the audio monitoring segment, see this as a significant opportunity to drive increased revenues and push premium pricing. Others consider it more of a nuisance.

Rise of Adjacent Markets

Some companies have also targeted emerging adjacent verticals such as education and eSports as competition has prompted them to launch more cost-effective offerings. These are large verticals viewed as important growth opportunities by many audio technology suppliers. These adjacent sectors have also compensated for the decline in traditional broadcast spending evidenced by some research participants. For instance, the rise of live touring in the music industry has driven a significant wave of investment in professional audio equipment, particularly live audio technology. Some suppliers also highlighted how demand from freelance audio professionals had risen, which is consistent with the increase in content investment highlighted earlier. We expect the reliance on these adjacent segments to increase in the next years with audio technology suppliers' customer base becoming more fragmented. More information on these adjacent markets is provided in the next section.

Regional and Cyclical Drivers

Regional and cyclical drivers of audio technology spending include the transition to next-generation terrestrial formats and digital radio as well as the spectrum reallocation in some geographies. Below, we analyze both these drivers.

Transition to Next-Generation Terrestrial Standards and Digital Radio

Regional transitions such as the transitions to ATSC 3.0 in the US and South Korea are an important driver of spending for audio technology, particularly when it comes to licensing revenues from immersive audio formats. As noted earlier, South Korea chose MPEG-H for its transition to ATSC 3.0 – this was used in the 2018 Winter Olympics in Pyeongchang. In the US, Dolby AC-4 was chosen in 2016. This has driven significant licensing revenues for Dolby and the MPEG-H Alliance.

Digital radio adoption has been very slow due to the high number of standards available globally and the rise of internet radio. The latter has undermined the incentive for radio broadcasters to go digital. Only a few countries such as Norway have switched off analog radio. The move to digital has driven large investment in selected geographies.

Spectrum Reallocation

Spectrum reallocation in selected geographies has the objective of vacating the 600 and 700 MHz frequency bands for wireless operators – for the deployment of next-generation 5G services. This has had an impact on suppliers of wireless microphones, as the reallocated spectrum has caused interference with these products, virtually making them obsolete.

In some countries, like Japan and the UK, technology buyers have been eligible for compensation to purchase new equipment. In the UK, the communications regulator Ofcom published a document at the end of 2018 that outlines compensation options for manufacturers eligible for funding – only companies that meet these eligibility criteria can apply for it.

In other European countries such as Germany and France, the cutoff date for assigning spectrum in the 700 MHz frequency band is 2020. Most of these countries do not have plans to subsidize microphone owners.

In the US, the FCC auction has already ended, and wireless operators are rolling out 5G services. For example, at the start of 2019, T-Mobile announced that it would begin rolling out 5G services using the 600MHZ band in the second half of 2019 and into 2020. It is up to wireless microphone users to avoid interference with these 5G services – owners of wireless microphones did not receive compensation in the US.

In all these geographies, wireless microphone suppliers have had to develop new offerings that work in different frequency bands.

Companies interviewed for this report talked about this transition as a significant driver of revenues going forward. In fact, even though technology users will not be subsidized in some geographies, they will be forced to replace their legacy microphones with new ones if they want to continue to use these products. Also, our research highlighted that microphone suppliers are working towards making these systems more efficient to make better use of the lower amount of spectrum available.

Primary Buying Groups

This section includes an analysis of the primary buying groups of audio technology.

Television Broadcasters

Television broadcasters have historically been major buyers of audio technology. According to most interviews done for this report, television broadcasters' spending on audio technology is slowing, though it remains a high share of total demand. In fact, their total budgets remain higher than other categories of buyers like radio broadcasters. Slowing demand is attributed to the increasing pressure on traditional broadcasters' business models, and particularly advertising revenues.

Television broadcasters are highly focused on audio quality from acquisition to distribution, with high levels of customization needed. Within the television broadcasting market, sports broadcasters are considered as the fastest growing segment (and the one most concerned about quality) with other segments such as news notably cutting down on spending – more on this later in this report. Sports broadcasters have also been major proponents of immersive audio as mentioned earlier.

With regards to some of the technology transitions mentioned below, television broadcasters were described as less likely to go into AoIP in the short-term compared to other buying groups due to the lack of SMPTE 2110 compliant video products in the market.

Radio Broadcasters

Radio broadcasters have been another major source of revenue for audio technology suppliers. Certain audio technology suppliers are exclusively focused on the radio industry, as demonstrated by some of the interviews carried out for this report. Like television broadcasters, these buyers remain some of the most focused on audio quality but, as opposed to television broadcasters, they generally have smaller budgets. Most recently, with the emergence of new platforms to distribute audio content, radio broadcasters have married video with audio streaming. This has given rise to new solutions for radio streaming.

Radio broadcasters have been also described as the buyers most focused on efficiency, from acquisition to distribution. These companies have been faced with stretched budgets long before their television peers and have therefore rolled out extensive rationalization programs within their organizations. Particularly in distribution, radio is highly automated. When it comes to new technologies such as programmatic, radio broadcasters have been much quicker in adoption compared to television broadcasters.

Radio broadcasters' zealousness has given rise to positive financial performance. According to IABM research, pure-play radio broadcasters have enjoyed a CAGR of 3% in revenues between 2014 and 2018.

Streaming Platforms

As described earlier, streaming platforms have emerged as a major buyer of audio technology. However, their main impact on audio technology spending is through the increased investment in production – see previous section. Most of the companies interviewed for this report described streaming platforms as an emerging category that is growing to have audio requirements which resemble those of their traditional broadcast customer base. This is viewed as a positive trend, particularly with regard to the adoption of immersive audio, where major streaming platforms are considered leaders.

Production and Post, including Broadcast and Film Production, Audio Recording and Post

Production and post-production companies are other buyers of audio technology. This is another group of buyers focused on quality like those described above. Production and post-production companies have greatly benefited from the rise in content investment from streaming platforms. According to most interviews carried out for this report, this has translated into increased investment in audio technology – as the quantity of productions has risen.

Live Music

Many suppliers interviewed for this report highlighted how the changes in the business model of the music industry have driven a significant wave of spending in audio technology. In fact. The shift to digital revenues has prompted many artists to turn to live touring to boost their revenues. The live music industry has therefore increased its demand for a variety of audio technology products, from audio consoles to intercoms. Some suppliers highlighted how the growth in this category in the last few years had made it become one of their major verticals, second only to broadcasting.

Freelancers and Small Productions

As the price of professional audio technology has plummeted, it has become available to an increasing number of people. This category of audio technology buyers has been described as growing, particularly when it comes to audio acquisition. In fact, the rise in content investment was deemed to be positively correlated with the increasing importance of this buying group.

Freelancers and small audio productions range from amateurs to professional freelancers hired by broadcasters. The preference for audio technology, and the level of support needed, crucially hinges on their experience. For example, amateur producers are not really interested in the inner workings of audio systems but rather on simple and easy-to-use products. With the advent of internet distribution, some of these professionals can quickly turn from amateurs to professional podcasting studios, for example.

Theaters and Operas

Theaters and operas are other historical buying groups for audio technology suppliers. This category of buyers was described as very focused on the quality of sound, with a high level of support needed as a result. Some suppliers also highlighted how these companies tend to refresh their infrastructures much less frequently than other audio technology buyers. This generally results in big deals.

Adjacent Markets

As mentioned earlier, audio technology suppliers are increasingly providing products and services to adjacent markets. These adjacent markets have different requirements compared to traditional buyers - generally, smaller products that are easier to use are considered more suited to them. Some of the most relevant adjacent buyers of audio technology are described below:

- eSports: eSports organizations were described as the fastest-growing adjacent market. The rising budgets of these organizations have been targeted by audio technology suppliers although most of them are just entering this sector. This sector was mostly described as very similar to broadcasting in terms of the level of quality demanded. However, as these organizations' skills are skewed towards software, a high level of support in terms of sound quality and broadcast workflows is needed when providing technology to them
- Education: Educational institutes such as universities were described as another emerging buyer of audio technology, particularly when it comes to courses where the quality of sound is important
- Corporate: For some audio product categories, the corporate world is emerging as an important buying group although this is mainly a secondary market

Source: Geek.com

Sector-Specific Trends

This section includes an overview of sector-specific trends highlighted by this research.

Audio Acquisition

In audio acquisition, products have become more efficient to follow buyers' objective to do more with less. Products have also become smaller, more versatile and easier to use, consistent with some of the trends highlighted before in this report. This has included the addition of software functionalities, including more sophisticated touchscreens and intuitive features. More recently, automatic capabilities have been demanded to further automate some of the routine tasks needed in audio recording.

The main driver of change in this category is the search for efficiency. Several types of productions such as news broadcasts have moved from high to very low budgets, with a consequent reduction of people available onsite. More specifically, while in the past audio and video may have been managed by two different operators, now they are often managed by the same person. This has led audio acquisition suppliers to start manufacturing products that account for this by being more versatile. This, along with the push for increased product simplicity, has driven the R&D strategy of audio acquisition suppliers.

The move to wireless systems has been a very relevant trend in audio recording, as it has allowed more flexible productions. As mentioned earlier, a major driver of spending in this category is the spectrum reallocation that has made some legacy wireless products obsolete. This has influenced wireless microphones in two important ways:

- Suppliers have had to develop new products that work in different bands and are more efficient from a spectrum usage perspective. This has driven an increase in their costs in the short-term
- Suppliers have enjoyed a wave of investment driven by the obsolescence of legacy wireless microphones. This is set to continue as more countries reallocate their spectrum to wireless operators

The rising level of content investment is seen positively by suppliers in this segment as it generally translates to higher investment in recording technology. This has been negatively compensated with the downward pressure on pricing due to technology development and increased competition – which has led many suppliers to boost manufacturing levels – although the overall impact on audio acquisition has been positive.

AoIP is just emerging in this category but is leading to partnerships between audio technology suppliers in different segments to enable networked production environments, with microphones connected for example with audio mixing consoles. Audio acquisition suppliers are also receiving more requests for remote production deployments as a result of this.

Audio Monitoring

In audio monitoring, most of the technology, business and workflow drivers described before in this report apply. One of the major changes relates to the shift to products that are easier to use – by operators who may not be skilled in audio technology – and can handle an increasing number of functions. This has translated to easier signal visualization and an increasing reliance on UX design skills for suppliers. This is a major area of focus for audio monitoring suppliers.

The virtualization of audio monitoring configuration is consistent with this trend as audio monitoring suppliers roll out functionalities that enable users to save on engineering costs. Most vendors said that virtualization was in their future development plans.

The transition to AoIP is very relevant to this category of products. Many vendors have launched IP-compliant audio monitors at recent trade shows. For example, TSL Products upgraded its audio monitors with support for SMPTE 2110 and 2022.

Some systems such as loudness control are highly affected by government legislation. Vendors highlighted that these systems could enable further automation as the industry transitions to AoIP and monitors move from passive to active systems that are able to make use of the information received. Some of the future developments include the deployment of intelligent workflows which make use of this information – see previous section. This may involve a redeployment of staff dedicated to audio monitoring at some audio technology users as some monitoring tasks are automated.

The divide described earlier with regard to product differentiation applies to this category, with some suppliers launching low-cost monitoring systems while others are focusing on premium offerings. Generally, price compression has highly affected the audio monitoring market.

With regards to the AoIP transition, the sheer volume and complexity of signals to be monitored has driven revenues (and R&D spending) for audio monitoring suppliers. This is further accentuated by the preference of users for hybrid IP deployments – still featuring some legacy equipment. Most vendors consider this as a revenue opportunity.

Immersive audio is considered a major driver of revenues in this category, as it leads to an increase in the number of channels to be monitored. Most suppliers in this part of the industry said the are very focused on this and have launched offerings enabling users to monitor content in Dolby Atmos or other formats. Adoption of immersive audio is though at an early stage like in other parts of the market.

The rise of streaming has not had a significant impact on this side of the market according to most vendors interviewed.

Audio Processing

In audio processing, technology trends such as AoIP and virtualization have been particularly relevant. In fact, audio processing includes products such as mixers and consoles which connect some of the elements of the audio infrastructure.

The transition to AoIP has prompted many audio processing technology suppliers to launch new products that are compliant with new IP standards, including AES67. Signal discovery was again cited as a challenge with regard to this. Some of the major benefits of AoIP in mixing environments include automation, increased collaboration and the ability to work remotely. All these benefits enable a better utilization of human and technology resources.

More suppliers are moving to smaller consoles that are easier to use and are becoming more cost-effective for technology users, which is enabling them to reach some of the new markets highlighted previously in this report. Generally, the size and cost of a console very much depends on the use case.

Another relevant trend is virtualization. This entails the move to headless (i.e. virtual) consoles where processing is handled by commodity hardware and the control surface is virtualized – also in the form of cloud apps. This enables audio technology users to achieve savings that scale with the number of mixing environments deployed, also giving them more flexibility as the volume of content to mix grows. The impact of virtualization in this category can be huge as a result of this. One of its consequences is the move to new business models relying on subscriptions or consumption-based spending.

Remote production allows users to better utilize technology and human resources and is therefore another relevant trend in the audio processing market. Remote production features are becoming increasingly important functionalities in consoles with some vendors such as Calrec and Lawo launching offerings to address this. Remote production deployments of audio processing involve a virtualized mixing environment that allows for control in a central facility. This enables users to rationalize resources, increase productivity and cover more events. The rise of remote production will also push development towards products that are easy to use due to the low availability of skilled operators onsite.

Support of immersive formats is also an important factor driving audio processing purchase although adoption of this has been slow, with customers only exploring the possibility of immersive audio mixing according to our research.

With regard to streaming, as mentioned earlier, the emergence of new platforms is driving a range of solutions that automate processing and content packaging for delivery. Increasingly, most of this work needs to be automated as broadcasters cannot cope with the increasing volume of content to be processed. This was evidenced as a high growth area.

Other Categories, Intercoms and Audio Automation

Intercoms enable communication between production teams in a variety of environments, from broadcast to live music. Although broadcasting remains the largest market for these products, a plethora of new, adjacent markets has emerged for intercom vendors – similar to audio processing. This has driven increasing revenues. Depending on the use case, intercom systems need to be very resilient, providing low latency and surviving in very noisy environments.

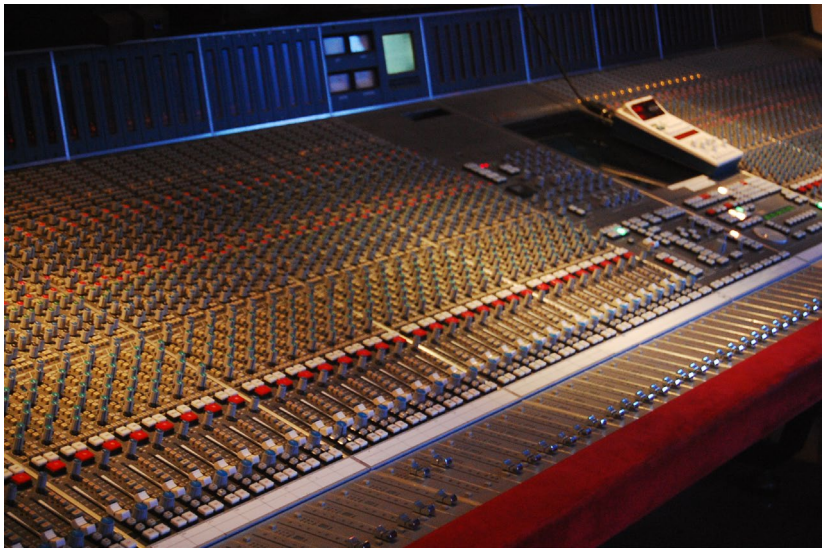
The transition to AoIP is the most relevant trend influencing the intercom market, with vendors pushing customers to adopt IP-connected intercom systems. Therefore, standards support is a crucial factor in this market.

As intercom sales are correlated with the number of people used in production, automation has negatively impacted revenues for intercom suppliers. However, the rise in content production has compensated for this.

When it comes to audio automation, these systems have mostly been rolled out by radio broadcasters to further automate their workflows when delivering content to multiple platforms.

Metadata is increasingly important in audio automation systems to organize assets for delivery to different platforms. Some suppliers highlighted the increased importance of personalization in internet radio, as opposed to linear content distribution, following the model of internet distributors like Spotify. Many radio stations have also integrated video into their internet streaming offerings.

Automation also includes the increasing adoption of programmatic advertising systems (and machine learning) in the radio industry.



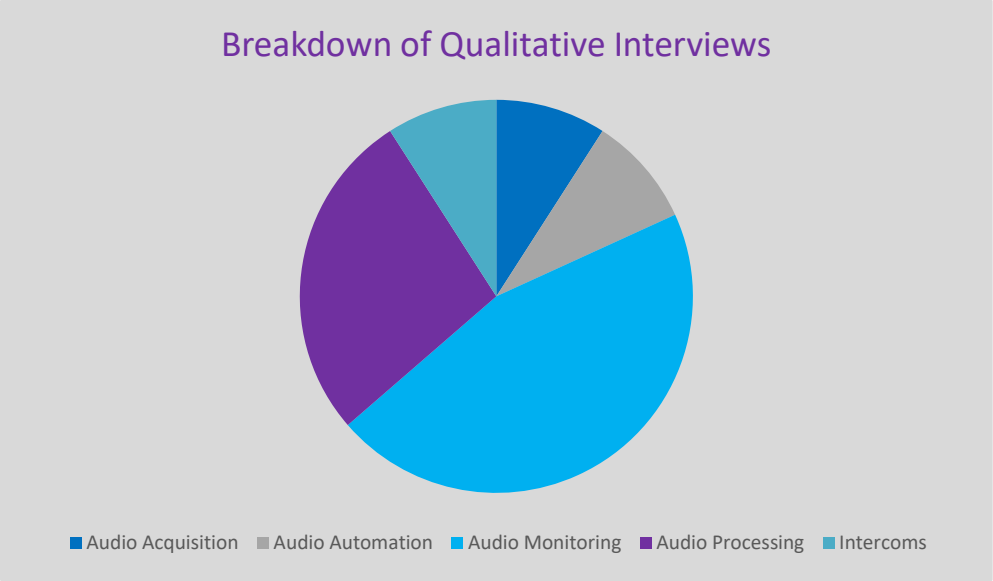
Source: Wikipedia

Appendix

Methodology

This report is based on both qualitative and quantitative research.

Qualitative research was conducted through an inductive methodology. We had no preconceived hypothesis on the main trends affecting the audio technology industry. We conducted structured, open-ended interviews and analyzed the patterns. 11 interviews were carried out for this report. A breakdown of research participants – by audio segment – is given below:



Source: IABM, breakdown is based on company's primary focus

Desk-based research was also carried out to deepen the analysis of some of the trends described above.

Quantitative research for this report includes IABM data on buying trends and financial performance as well as secondary research gathered.

Report Contribution

This report is updated on a continuous basis. Please contact biu@theiabm.org. Your contribution may take any form, from an email containing a view on the audio technology industry to an expert interview with one of our analysts.