Shaping the Future of Audio for Gaming and Entertainment

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Introduction

Since we launched the first Sound Blaster 25 years ago -- when we first empowered the 'dumb' PC to have the ability to make sound -- the gaming and entertainment landscape has undergone many sweeping changes over the years.

Not only is the way we play games and enjoy entertainment on the PC different from the past, with the arrival of smartphones and tablets, gaming and entertainment is now no longer confined to just the PC.

This document aims to shed light on key functionalities demanded by the new gaming and entertainment landscape. More importantly, it will describe how Sound Blaster -- as the key enabler of gaming and entertainment audio -- evolves to satisfy these changing needs.

We have identified 5 critical functionalities in this new audio landscape: Wireless Connectivity, Audio Fidelity, Communications, Content Creation and Cross-Platform Usability. In each of these functionalities, Sound Blaster is positioned to not only answer the demand of this new era; it will also be a major game changer that enables new possibilities for experiencing audio moving forward.

Understanding the Changing Gaming and Entertainment Landscape

The gaming and entertainment landscape has been shaped by two major trends:
1) A new generation of infrastructure and devices
2) A new generation of gamers and social entertainment users.

A New Generation of Infrastructure and Devices

The evolution of the Internet with the advent of high-speed broadband, streaming services and cloud-based computing has enabled high-speed media-rich content sharing between users. This infrastructural development has produced unprecedented levels of interactivity and transformed how we enjoy media entertainment, the type of games played and the nature of gameplay itself. We have entered a new world where high-definition first-person shooter games are played by whole communities simultaneously across countries -- where voice

communications has become key to winning, team coordination and even social bonding. Media-rich video content upload and access is also no longer limited by physical media storage thanks to a whole range of social media sites such as YouTube which allows users to not only enjoy videos but to upload them as well.

This new interactivity has also transformed device usage among gamers. What was once played solely on a PC can now also be experienced on a whole range of smart devices such as smart phones and tablets. However, many manufacturers fall short in responding to these new needs by simply playing a game of "specmanship." They are trapped under the old paradigm and completely ignore the need for consistent high-quality audio, communications and media-rich exchanges when users switch platforms.

This is where Creative aspires to be a major force in shaping the future of audio with Sound Blaster – through a total system solution that not only sets benchmarks in audio performance specifications, but one that allows users to enjoy equally consistent high-quality audio across platforms.

A New Generation of Gamer and Social Entertainment User

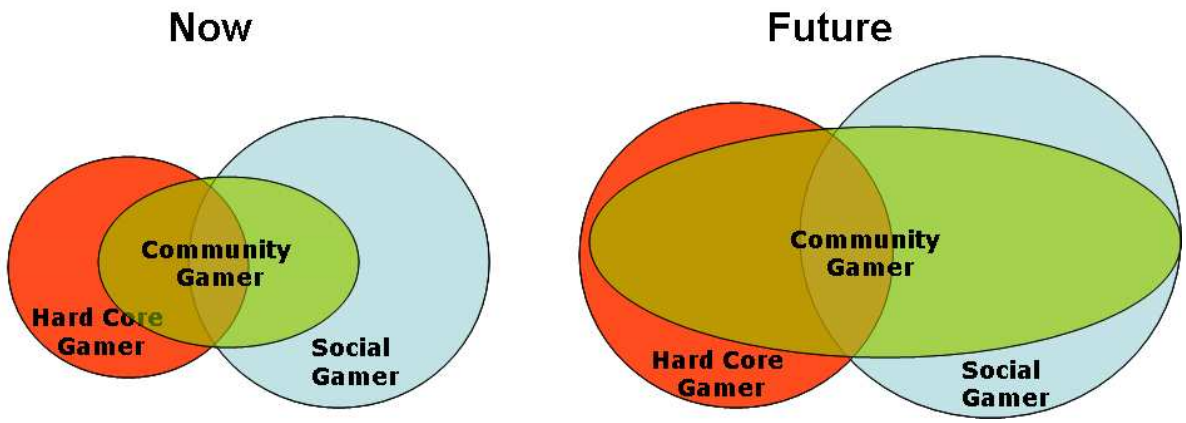
Essentially there are three major gamer profiles in existence today: they are the Hard Core Gamer, the Community Gamer and the Social Gamer. The traditional viewpoint has always been that there are two main segments of gamers: the Hard Core Gamer and the Social Gamer. While the Hard Core Gamer is driven by a quest for performance, excellence and power, Social Gamers on the other hand are typified by playing games like Angry Bird and Farmville; they compete by time invested in their games – the more time spent playing a game, the more assets they acquire.

The Rise of the Community Gamer

A rising new segment of Community Gamers is emerging today that is forcing us to change our traditional viewpoint on who makes up the gaming profile demographic. This new segment has emerged largely as a result of the Internet's ability to support the sharing of media-rich content – leading to unprecedented levels of interactivity. The Community Gamer is actually a profile that overlaps the Hard Core and Social Gamer profiles; these gamers are driven by the desire to play game titles together with other like-minded gamers out there and

communicate with them at the same time – whether in Hard Core or Social Gaming. The Community Gamer segment is set to rise phenomenally along with the rising adoption of smartphones, tablets, on top of the PC – all working on the new generation high-speed infrastructure (Fig 1) . So, as they straddle between PCs and smart devices, the challenge in making their audio experience consistent with high-fidelity audio is one of the major challenges this white paper seeks to address.

Fig 1: The Rise of the Community Gamer



A New Generation of Social Entertainment User – From Consumer to Creator

At the same time, the evolution of social media on the Internet in conjunction with the availability of high speed fibre broadband and 4G networks has given rise to a new phenomenon amongst Social Entertainment Users -- the Social Entertainment Consumer is slowly also becoming the Social Entertainment Creator.

The Social Entertainment Consumer mainly accesses sites like YouTube , Sportify, Netflix and Hulu to access a wide variety of media content, including HD content, and they expect high-quality audio as far as possible. The Social Entertainment Creator on the other hand demands higher audio quality to create better contents for their audience especially with the rising availability of HD channels on social media sites. With the explosive trend of user-generated content, there will be more and more Social Entertainment Creators moving forward.

With the arrival of a new generation of infrastructure and devices, coupled with the new generation of gamers and Social Entertainment Users, manufacturers will now need to take a

hard look at this emerging landscape. This is where Sound Blaster will shape the future of audio in Gaming and Entertainment via the 5 key functionalities of Wireless Connectivity, Audio Fidelity, Communications, Content Creation and Cross Platform Usability.

The 5 Key Functionalities: How Sound Blaster aims to shape the future of Gaming and Entertainment Audio

Key Functionality #1: Wireless Connectivity

Traditionally, people may think about Wireless Connectivity for gaming and entertainment as a cumbersome experience when it comes to setting the gear up. Not only that, wireless audio also brings with it an image of being lower in audio quality and having latency. The new generation of Sound Blaster wireless products will change all that with a superior wireless experience that will take gaming and entertainment audio to the next level.

Wireless audio is a growing requirement and an indisputable trend. With the rising adoption of smartphones and tablets, it's a necessity and no longer just a want. Users desire freedom of movement that wireless connectivity brings. On top of that, they expect pristine, high-quality audio. Creative realizes this and has set out to design a new generation of Sound Blaster wireless gaming solutions – solutions that sound as good, or even better than wired audio products.

In our quest to not only meet user's aspirations for high quality wireless gaming and entertainment solutions, but exceed them, the Sound Blaster design-team adopted a bold design philosophy based on the following tenets:

- High-quality wireless audio – Premium wireless technologies coupled with Creative's proprietary advanced audio technologies such as SBX Pro Studio deliver audio performance on par or even better than wired audio
- Ultra-low latency wireless audio – Equipping our wireless gaming headsets with the latest wireless audio technology eliminates all perceivable latency from your movie and gaming experience

- Seamless Setup – by implementing a simple wireless USB dongle for Mac or PC, we can implement fast and easy connectivity, where each dongle and headset is factory pre-paired
- Outstanding battery life – made to endure a marathon gaming session, our latest battery technology delivers up to 16 hours of wireless performance on one charge. Headsets should also be usable while charging via USB to avoid any interruption in use
- Minimized interference – By enabling each wireless headset to cycle through different frequency bands, we can avoid interference

As an example, Creative's latest Wireless Gaming headset, the Sound Blaster Tactic3D Rage Wireless leverages the latest wireless technologies available to deliver high-quality wireless audio with ultra-low latency and superior battery life. The setup is seamless as the dongle and headset are factory pre-paired allowing users to use the headset with their PC or Mac in no time. It does not stop there; Creative's Sound BlasterAxx actually allows smart device users to wirelessly experience the same high-quality audio produced by a Sound Blaster card on a PC – plus it supports crystal clear voice communications!

With Creative's answer to wireless connectivity, you will experience leading standards of wireless audio quality where latency is reduced to absolutely the lowest levels possible -- whether you are on a fixed platform like the PC or notebook, or mobile platforms like the smartphone or tablet.

Key Functionality #2: Audio Fidelity

With more than 400 million Sound Blaster solutions in the world, Creative has continued to set the industry standard for audio quality and fidelity. This standard encompasses not only audio playback but recording as well -- an area which has been largely ignored.

Audio Fidelity -- Playback

So what made the difference between Creative's approach and the competition that set us apart in PC audio? We understood one fundamental absolute: it's all about total system performance, it's not about specsmanship. Having gold connectors, high quality components, a high signal-to-noise ratio (SNR) or low total-harmonic-distortion (THD) is not enough – they only tell part of the audio quality story. The key differentiator is in a total system architecture; how our proprietary technology (such as Sound Blaster SBX Pro Studio) works with optimized host processing, or accelerated via our audio processors -- delivered through high quality components -- produces the most immersive, realistic, high-fidelity gaming and entertainment audio experience ever.

Now, let's just take a closer look at what SBX Pro Studio offers that delivers the fidelity that Gamers and Social Entertainment Users desire in their audio experience:

- SBX Surround™ -- Creates unprecedented levels of audio realism surrounding and immersing the gamer. This gives gamers the pinpoint accuracy they need to win in a First-person Shooter (FPS) game, and the critical immersion factor in an Massively Multiplayer Online (MMO) game.
- SBX Crystalizer™ -- Hearing the clang of armor or the hum of a BFG makes for a great game experience. SBX Crystalizer ensures that every audio detail is heard by restoring the "highs" and "lows" that are compromised with audio compression. These details allow games, music, and movies to truly shine and convey powerful emotion that is often lost through compressed digital audio.
- SBX Bass™ - SBX Bass technology dramatically improves the sound experience by expanding the low frequency tones. This is much more than a simple bass EQ. By creating and expanding low frequency tone, the resonance and impact of bass frequency audio becomes much more powerful, delivering a truly cinematic experience
- SBX Dialog Plus™ - SBX Dialog Plus intelligently enhances voices in games and movies for dramatically clearer dialog. Dialog Plus enhances the entire vocal range, allowing for

game audio to be played at full volume and still allow for voice communications over applications like Ventrilo to be heard clearly over the game audio. There's no need to sacrifice the advantage of immersion that game audio can deliver just so you can hear your teammates if you are equipped with SBX Dialog Plus™ hardware

- SBX Smart Volume™ - Address the problem of abrupt volume level changes in games by intelligently applying gain and attenuation to deliver consistent volume levels. Ideal for playing at night or in environments where consistent volume audio is essential such as tournaments, SBX Smart Volume™ assures that volume levels will stay at a consistent level

Creative's total system architecture approach to providing the audio fidelity that gamers and social entertainment users desire is a solution that is unmatched in the industry simply because the competition lacks the know-how that Creative has amassed through 25 years of market leadership and innovation.

In view of the further changing gaming and entertainment landscape, where the same media content or game can be played on different platforms and the listening environment can switch from a PC used at home to a tablet used in noisier outdoors, Sound Blaster's rich heritage of audio technologies enables them to customize their audio experience to suit their device and their listening environment, giving them the consistent high-quality audio experience that they expect – regardless of device or environment.

For example, with the Sound BlasterAxx, Sound Blaster's rich heritage of audio technologies can now be enjoyed on the PC, Mac and iOS, as well as Android mobile platforms. This enables users to enjoy crystal clear communication, as well as customize their audio experiences *across platforms* to give them a genuine competitive edge in gaming, and to get the best possible audio experience from their games, movies and music. This is but one of Sound Blaster's answers to this changing gaming and entertainment landscape brought about by the new generation of devices.

Audio Fidelity -- Recording

Again, when it comes to recording, Sound Blaster takes a total system performance approach, unlike other companies who simply provide high-grade gold connectors thinking it's enough to achieve a good recording – this is definitely not enough.

In Sound Blaster's case, superior audio fidelity in recording is achieved by taking a total system performance approach of how our proprietary audio technologies such as CrystalVoice work in conjunction with the audio processor and our microphone or microphone arrays to acquire a good signal so essential for a good recording. If that was not enough, our high-end sound cards now come with ¼" connectors and a 600 ohm headphone amplifier. The ¼"connector allows you to connect to studio-grade microphones for a better signal, while the 600 ohm headphone amplifiers allow you to connect to high-end studio headphones to monitor your recordings. This type of connectivity previously existed only in very expensive studio equipment. In a nutshell, Sound Blaster gives you a total home studio on your desktop – delivering studio-grade recording capability at a fraction of the cost.

In summary, audio fidelity does not equate to the highest SNR or the lowest THD. It goes beyond that. A consistently high-quality audio experience (in playback and recording) can only be achieved by taking a total system performance approach that considers the audio processors, the algorithms, high-quality components and superior connectivity that work in harmony, and are aligned to the emerging needs of the new audio landscape. This cornerstone in our approach to audio technology development will bring us beyond the rich audio heritage we have acquired to shape the future of audio. It will continue to drive us to push the audio fidelity envelope even further, and bring industry standards to the next level.

Key Functionality #3: Communications

With today's games, if you're not communicating, you're not winning. Unlike the past where games are played against the machine, today's new generation of gamers, like the Community Gamer, is likely to play games in groups and against others on the network. Or take an even broader trend of voice chatting on the Internet. Being able to communicate clearly is a must have. A good microphone or microphone array is key to communication -- but that alone is not what it takes for superior communications.

This is where Creative's audio scientists and engineers have dedicated as much effort and energy toward developing state-of-the-art communications technologies as they have for playback technologies. The result is Sound Blaster Crystal Voice, which consists of:

- Acoustic Echo Cancellation – Eliminates echoes that a microphone picks up from the speakers and enables whoever is speaking to listen to the other party clearly. This is perfect for Community and Hard Core Gamers during their team play with fellow gamers.
- Noise Reduction -- Enables the person speaking to be heard clearly over background noise by constantly monitoring the environment and eliminating unwanted noise that interferes with the conversation. The ability to remove noise generated from air conditioners, fans and even hair dryers from outbound communications during gameplay gives the team an important advantage.
- Smart Volume -- Automatically adjusts the loudness of a voice to maintain a consistent volume level. This makes it convenient for gamers who are speaking to converse normally, regardless of whether they are close to or far away from the microphone.
- Voice Focus – Beam forming creates a zone and suppresses noise outside it to enable whoever is speaking to be heard with amazing clarity. Multiple beam-forming microphones are now standard with our sound cards and are used to focus, enhance voice, and eliminate sounds outside the zone
- VoiceFX™ -- Enables alteration of voice with a variety of effects, which can be used to enhance the tone of a voice, create interesting accents, or enable someone to sound like a creature, robot or completely different person

The fact remains that communication is an essential part of the overall gaming audio experience. In fact, without it this experience is incomplete. But today, the sorry state when motherboard and sound card manufacturers provide a microphone socket -- thinking it is

enough for gamers to communicate -- falls short of the exacting standards that today's gamers desire. To make matters worse, they do not have the essential audio technologies to offer gamers a consistent high-quality audio experience when they switch platforms. How then can gamers communicate clearly? This is where Sound Blaster, via its CrystalVoice technologies, coupled with the power of our advanced audio processors, gives gamers that superior edge versus other generic motherboard and sound card offerings. So, again, if you are not communicating, you are not winning!

Key Functionality #4: Content Creation

The advent of video on the Internet has ignited an explosive trend of customized videos being uploaded to social sites like YouTube. Nowadays, it's gone one step further. With HD video becoming mainstream, users demand a much higher quality of audio as well. We have of course just described a key psychographic characteristic of the Social Entertainment Creator and User here.

Take for example a professor wanting to create an HD quality lecture to post on iTunes U, or a musician wanting to teach guitar over the Internet, or the case of a boyfriend sending a simple videogram to his girlfriend. This is where Sound Blaster excels, providing studio quality features at a fraction of the cost.

For the professor, he could simply use the Voice Focus capability of the Sound BlasterAxx 20 (paired with a HD webcam on his notebook) to record a high-definition video with accompanying crystal clear audio.

For the musician, he could utilize our new generation "Z-series" of sound cards as it now comes bundled with a dual-array beam-forming microphone to get a good pick-up of his guitar strumming. If he has accompanying guitar software effects, he could even apply them in real-time and monitor through the headphones connected to his sound card.

Lastly, for the boyfriend, a simple videogram is as easy as connecting our new generation of Sound BlasterAxx devices to a notebook. He can then simply turn on the notebook's video recorder (from his notebook's webcam), play a background minus-1 and overlay his voice to the recording. It's that easy!

For those desiring an even higher quality of audio, our new generation of high-end "Z-series" Sound Cards also comes with ¼" connectors for connecting to studio microphones, and coupled with a 600 ohm Headphone amplifier, it allows for studio quality monitoring as well.

Sound Blaster has empowered the Social Entertainment Creator in the area of adding high-quality audio to their video contents or streams, allowing Social Entertainment Users to enjoy a higher quality audio experience as well. The quality of video soundtracks on YouTube or iTunes U will never be the same again!

Key Functionality #5: Cross-Platform Usability

Unlike a sound card that is fixed on just a desktop PC, our solutions should be cross-platform to also meet the rising demands of gaming, entertainment and communications on the smartphone and tablet as well.

Recognizing this, the Creative audio team has been hard at work at making its sound and voice technologies universally compatible – so whether you are using a PC, Mac, smartphone or tablet, you can enjoy the same immersive and high-quality audio that you have come to expect from a Sound Blaster.

This is clearly seen in Creative's new generation Sound Blaster -- The Sound BlasterAxx. The Sound BlasterAxx epitomizes Creative's total system performance approach in cross-platform usability, and is designed to work across a full spectrum of gaming, entertainment and communication platforms that includes the PC, Mac, smartphones and tablets.

Utilizing both Bluetooth wireless and USB wired connectivity, Sound BlasterAxx delivers high-fidelity audio playback and communications through the seamless integration of its SB-Axx1 multi-core Sound and Voice Processor, Bluetooth Wireless Speaker technology, High-Quality Microphone and Superior Speaker Architecture.

The product even comes with a downloadable application for iOS and Android Smart Devices (as well as PC and Mac software) that allows users to customize all their audio and communication settings from any device. This means that with Sound BlasterAxx, Gamers and Social Entertainment Users can access and customize SBX Pro Studio and Crystal Voice

settings across platforms (not just from their PCs) to optimize their audio settings to suit any gaming, entertainment or content creation scenario.

With the Sound BlasterAxx, experiencing the same immersive and high-quality audio across different platforms is now a reality. Moving forward, cross-platform usability will be key in shaping the future of the audio landscape , and it will be a quality that Creative and Sound Blaster will excel in.

Conclusion

For 25 years Creative has led the Audio Revolution via its Sound Blaster technologies and Gaming and Entertainment Audio solutions.

Looking ahead, Creative will continue to set new standards with Sound Blaster in meeting the evolving needs of the new breed of gamers and social entertainment users in the changing audio landscape.

We are committed to shaping the future of gaming and entertainment audio in the 5 key functionalities of Wireless Connectivity, Audio Fidelity, Communications, Content Creation and Cross-Platform Usability to bring about a seamless, compelling and consistent high-quality audio experience regardless of the platforms used.

In each of these functionalities, Sound Blaster is positioned to not only answer the demand of this new era; it will also be a major game changer that enables new possibilities for experiencing audio moving forward.

Through understanding the needs of the market in these 5 key areas, we have found new expressions of our technologies that have moved beyond just the PC -- with our Sound Blaster sound cards, Sound Blaster USB audio solutions, the Sound BlasterAxx, and Sound Blaster Gaming Headsets -- an expression that will deliver the same pristine audio quality that is synonymous with the Sound Blaster Brand.

Appendix A: Gamer Profiles

A. Who are the Hard Core Gamers?

The Hard Core Gamers are early adopters of technology who might build their own custom PC with specifications and looks that cater to their taste. Research and word of mouth make a big difference in what they buy. They also tend to see the PC as more superior to consoles. When playing games, they like to compete both individually and as a team. They also like to watch streaming gaming events on the PC.

In terms of the games that they play, they are likely to play MOBA (Multiplayer Online Battle Arena), MMO (Massive Multiplayer Online and FPS (First Person Shooter) games.

Audio realism is everything to the hard core gamers. In order to enjoy these games, high fidelity audio and crystal clear communications are indispensable elements for a authentic gaming experience. The freedom to move around the PC is desirable. They are also likely to record their latest conquest for sharing on social media sites.

B. Who are the Community Gamers?

The Community Gamers plays as many if not more hours as the Hard Core Gamers. Though they value technology, it's not the most important aspect of their gear. They value style, ease of use and a good price-to-performance ratio in their gear. They play the most massive titles in the market usually in larger groups up to thousands of people and they are constantly communicating. Part of their community engagement includes being a fan.

In terms of the games that they play, they play MOBA and MMO games. In addition, tablet gaming on the tablets has blurred the "Community" Gamer identity. Several mobile games are starting to offer functionality that will appeal to this demographic, fueling growth in the tablet gaming market.

An authentic communication experience is everything to the Community Gamer. Audio fidelity is also an important factor for an authentic gaming interaction with like-minded gamers. While a wireless gaming experience is appreciated by them, they may not pay a top dollar for it.

C. Who are the Social Gamers?

The Social Gamers play games on their PC, in their browsers or on mobile devices. They compete by time invested – the more time spent, the more assets they acquire. Much of the success of the social game model is due to the fact that they are free-to-play. However, some social gamers will spend hundreds or thousands of dollars on a favourite game to acquire assets or save time in gameplay. In terms of the games that they play, they play Browser-based games, Facebook/Google+ games, mobile or "Freemium" games.

Appendix B: Social Entertainment User Profiles

The Social Entertainment Consumer

The evolution of the Internet and high-speed broadband has changed everything for the social entertainment consumer. They are now able to access a wide range of audio and video content from the Internet at high speed from sites like YouTube, Sportify, Netflix and Hulu. To them, mobility, wireless audio connectivity and audio fidelity are factors they look out for to enhance the quality of the accessed content.

The Social Entertainment Creator

The evolution of the Internet and high speed broadband has also given rise to the social media phenomenon and the active sharing of customized media content in the form of voiced-over videos and sound-tracked video clips. The Social Entertainment Creator is the person who enjoys recording, mixing and sharing customized content with friends. To them, the ability to merge video content with fantastic audio is paramount to a compelling playback experience on their favorite social media sites.