



## Dolby Atmos<sup>®</sup> for the Home Theater

October 2016

Dolby Atmos<sup>®</sup>, the revolutionary cinema sound technology, has come to home theaters, bringing a new and exciting sense of total immersion and reality to your favorite movies, music, video games, and other programming. In simple terms, Dolby Atmos is the most exciting development in home entertainment since the introduction of surround sound more than 20 years ago. With Dolby Atmos, content creators now have the tools to precisely place and move sounds anywhere in your living room, including overhead, to make entertainment incredibly immersive and lifelike.

This white paper explains how Dolby Atmos will work in home theaters and how you can build a Dolby Atmos enabled system or upgrade your existing system to support Dolby Atmos. It also explains the technological components of Dolby Atmos in home theater and the tools that content creators and broadcasters use to create and deliver Dolby Atmos content to homes. New advances in speaker design and audio/visual receiver (AVR) processing help bring this powerful new audio experience to the home theater.

## Why replace channel-based surround sound?

Dolby Atmos is a revolutionary technology that moves beyond the paradigm of channel-based audio, which has reached its maximum potential in the home entertainment space.

Dolby has led in the advancement of home theater technologies since the late 1980s, when we introduced four-channel Dolby<sup>®</sup> Pro Logic<sup>®</sup>. We pioneered the development of discrete 5.1 surround sound and then introduced 7.1 surround sound in the home and the cinema. But as home theater expanded to 9.1 and even 11.1 systems, the problems of pursuing more and more channels became clear. Home theater content often originates from theatrical content that is mixed, at best, in 7.1 sound and many times in 5.1. That meant that 9.1 or 11.1 systems reached a point of diminishing returns in parsing and upmixing that limited the signal to serve more and more channels.

In addition, the ability to recreate reality using channel-based audio is inherently limited. In real life, sounds move in specific and sometimes complicated ways—a hummingbird flies from a tree branch, hovers in front of a pair of blossoms, and then dives down to a fountain for a drink. Simply moving the hummingbird's sound from the Left Height channel to the Right Front channel can't possibly recreate the detail of that bird's flight. And when you lose those details, it detracts from the brain's sense that what it's watching is real.

## A cinema solution

Dolby started investigating solutions to the problems of channel-based audio in the cinema. Our goal was to free filmmakers from the limitations of channel-based audio by developing a system that allowed them to determine exactly where a sound should be and where it should move in three dimensions—that is, to faithfully recreate that hummingbird's flight in all its complexity.

We worked closely with filmmakers and sound mixers to perfect the technology. Renting out entire movie theatres to use as laboratories, Dolby engineers worked hand in hand with sound mixers, adapting their inputs into what would ultimately become the tool set that enabled mixers to create compelling Dolby Atmos object-based soundtracks.

The result of that intense collaboration, Dolby Atmos, debuted in June 2012 in the movie *Brave*. Since then, all the major Hollywood movie studios have embraced the technology. Dolby Atmos has been

adopted by the cinematic community worldwide, with more than 500 movies already released or in production and more than 150 mixing facilities to date enabling this new creativity in filmmaking.

## Dolby Atmos and sound objects

Dolby Atmos is based on the concept of sound objects. In the cinema, Dolby Atmos relies on a combination of 9.1 “bed” channels and up to 118 simultaneous sound objects to deliver an enveloping sound stage. Every sound in a scene—a child yelling, a helicopter taking off, a car horn blaring—can be a separate sound object. Each of those sounds comes from a specific location in the scene, and in some cases, they move. The car careens from left to right, while the yelling child runs up a set of stairs.

Using sophisticated content creation tools that represent the sound objects in a three-dimensional space, filmmakers can isolate each of the sound objects in a scene and decide exactly where they want them to be and how they want them to move. In the final sound mix, the sound objects are combined with positional metadata—additional data that describes a number of parameters about the sound object, including its location and movement, if any.

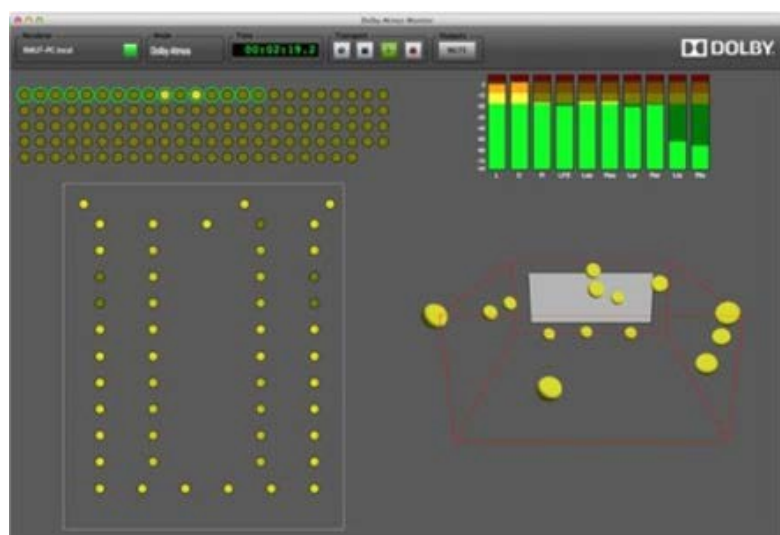


Figure 1: Filmmakers use this tool to manipulate sound objects in a three-dimensional space.

## Dolby Atmos in home theater

Dolby has developed the technology required to translate the Dolby Atmos experience in cinema to home theaters. In the case of the home theater, every sound in the mix is represented as an audio object. When you set up your Dolby Atmos enabled AVR, you inform your receiver how many speakers you have, what type of speakers they are (large, small, overhead, and/or Dolby Atmos enabled), and where they're located. Armed with this information, a sophisticated processor in your AVR—the Object Audio Renderer or OAR—analyzes the positional metadata and scales each audio object for optimal playback through the connected speaker system. This process includes determining in real time exactly which speakers it needs to use from moment to moment in order to reproduce the sounds of the car careening across the screen and the child fleeing up the stairs. That detailed, very specific movement of sound helps your brain suspend disbelief and feel as if what you're watching is real.

Key to the reproduction of this three-dimensional soundfield is the creation of a layer of sound above the listener. This is achieved through the introduction of overhead or Dolby Atmos enabled speakers in the home theater system. Later we will describe how that is achieved.

The flexibility of Dolby Atmos object-based sound makes it incredibly adaptable. A Dolby Atmos movie can be played back on nearly any speaker configuration in the home. You'll be able to hear the placement and movement of sound in a Dolby Atmos movie whether you have a system with five speakers on the floor and two overhead or 24 speakers on the floor and 10 overhead (the current maximum for a Dolby Atmos supersystem) or any variety between. The more speakers you have, the more precise the audio positioning becomes.

And you have lots of flexibility to upgrade your system. Adding more speakers to the system will provide a higher level of object resolution and even more detailed, richer sound.

## Delivery of Dolby Atmos movies

Major Hollywood studios are partnering with Dolby to create Dolby Atmos home video versions of current box office releases and previously released favorites. In addition to global studio partnerships, Dolby is working with game, music, and broadcast content creators to take advantage of Dolby Atmos technology in a home theater.

Exciting and dynamic Dolby Atmos soundtracks can now be enjoyed on Blu-ray Disc™, Ultra HD Blu-ray™, broadcast, and even streaming sources that support 4K and Dolby Vision™ playback. To enable this, we developed a new, scalable algorithm as well as new extensions for our existing technologies Dolby TrueHD, which is Dolby's lossless audio codec employed on Blu-ray Disc, and Dolby Digital Plus™, which is used by leading streaming video providers, broadcasters and for secondary languages on Blu-ray Disc. Both formats support delivery of Dolby Atmos sound.

A Blu-ray player that fully conforms to Blu-ray specifications can play a Dolby Atmos movie without a firmware update. The player will need to be connected to an AV receiver or preprocessor capable of supporting Dolby Atmos and set to audio bitstream out. Note also that some Blu-ray players default to secondary audio, a playback mode in which third-party content is mixed with the primary soundtrack and output as a Dolby Digital signal; be sure to turn this feature off to ensure decoding of the Dolby Atmos bitstream and associated positional metadata by your AVR.

New HDMI® cables are not needed. The current HDMI spec (v1.4 and later) fully supports Dolby Atmos audio.

Dolby Atmos audio tracks (both Dolby TrueHD and Dolby Digital Plus) are backward compatible. If you play a movie mixed in Dolby Atmos on a non Dolby Atmos system, you'll experience traditional 5.1 or 7.1 audio, depending on the configuration of your speaker system. This means content providers don't need to provide separate Dolby Atmos and non Dolby Atmos mixes. One mix supports both!

## Setting up your Dolby Atmos home theater

Dolby Atmos is a revolutionary new home theater format, but it doesn't require that you start from scratch. Although you will need a new AV receiver or preprocessor, in the majority of cases you'll be able to keep most, if not all, of your existing speakers.

Many people currently have 5.1 or 7.1 systems with a subwoofer and either five or seven speakers positioned at about ear level. Many of these speakers will work without a problem in a Dolby Atmos system. An ideal listener-level setup will include monopole or bipole speaker designs. Dolby does not recommend the use of dipole speakers for use at the listener level; the highly diffuse sound patterns of dipole speakers interfere with the accurate positioning of sounds in the three-dimensional soundstage that is Dolby Atmos.

Similarly, it is important not to position listener-level speakers too high on the wall. At the listener level or 2 feet higher is optimal. Avoid placing your speakers close to the ceiling as this will also disrupt the accurate positioning of objects in the listening space. Installing listener-level speakers and overhead speakers in the ceiling of the room is equally a non-desirable solution for recreating the immersiveness and object movement of Dolby Atmos.

## The importance of overhead sound

In real life, sounds come from all around us, including overhead. Having the ability to recreate overhead sounds is a key element in making Dolby Atmos sound so realistic. If we see a helicopter take off onscreen and then hear its blades cutting through the air above our heads, the experience is one of being a participant in the scene, not just watching it.

Dolby Atmos cinemas recreate these overhead sounds with an array of overhead speakers above the audience. Some home theater enthusiasts will also choose to install speakers into or on their ceilings, but you don't have to.

## Making overhead sound practical for the home

Through our knowledge of psychoacoustics and sound physics, we've developed Dolby Atmos enabled speakers. These unique speakers are designed to reproduce overhead sound even though they're positioned only a few feet off the floor. Dolby Atmos enabled speakers direct sound upward, where it reflects off the ceiling to produce incredibly lifelike overhead sound. The effect is so real and immersive that some mixers actually prefer the performance of Dolby Atmos enabled speakers over traditional overhead designs.

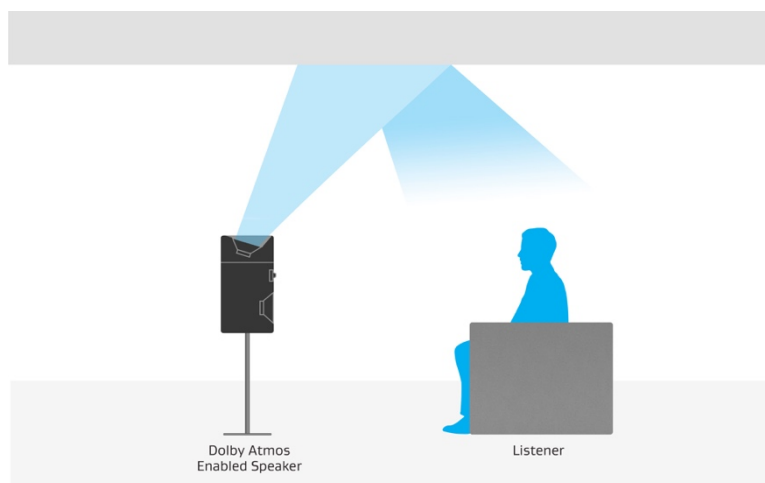


Figure 2: Dolby Atmos enabled speakers reflect sound off the ceiling to produce an incredibly lifelike experience of overhead sound.

You can purchase integrated speakers, which are designed to include both traditional front-firing speakers and upward-firing elements in one cabinet. (These speakers have two sets of posts, one set for the traditional speaker and one for the upward-firing Dolby Atmos enabled speaker.) The Dolby Atmos drivers are enclosed in a sealed baffle and integrated in the primary speaker cabinet.

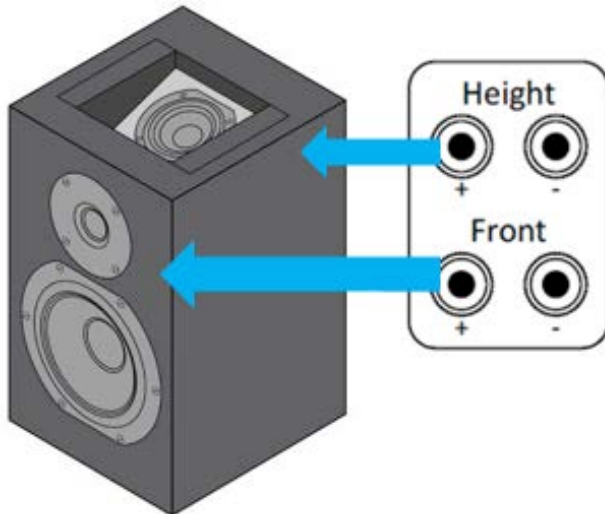


Figure 3: Integrated Dolby Atmos enabled speakers include both traditional drivers and upward-firing elements in the same cabinet. The two sets of speakers have individual binding posts or connectors.

If you already have conventional speakers you like, you can simply introduce Dolby Atmos enabled add-on speaker modules to your system. These components include only the upward-firing elements. You can place these add-on modules on top of your current speakers or on a nearby surface within a three-foot radius of your listener-level speakers.

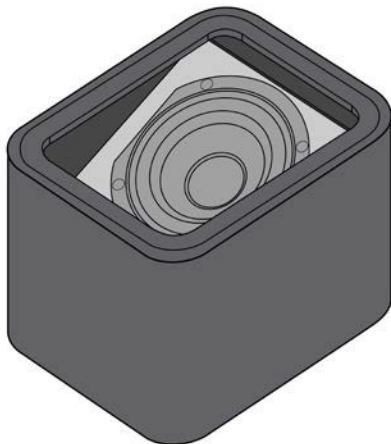


Figure 4: You can place Dolby Atmos enabled add-on speaker modules on top of or near your existing traditional speakers.

Dolby Atmos enabled speakers produce an incredibly accurate Dolby Atmos experience in many types of rooms. You'll get the best sound if your ceiling is flat (not vaulted or angled) and made of an acoustically reflective material, such as drywall, plaster, concrete, or wood. Testing by Dolby suggests

that the user can achieve a high-quality overhead experience from Dolby Atmos enabled speakers in environments where the ceiling height ranges from 7.5 to 12 feet (2.3 to 3.66 meters). The effect is very robust and rolls off gradually. You will achieve a good result even with ceilings as high as 14 feet (4.3 meters).

Recessed lighting fixtures, chandeliers, crown molding, and heating or air conditioning vents in your ceiling will not noticeably interfere with the Dolby Atmos experience.

## When to avoid overhead speakers

There are some rooms in which we don't recommend using overhead speakers. If your ceiling is low (8 feet or less) or you have to mount your loudspeakers on overhead trusses or brackets, the overhead speakers will be too close to the listening position. The overhead audio may become distracting because you'll hear exactly which speaker is producing the sound instead of feeling immersed in an atmosphere in which sounds occur naturally overhead.

In this environment, Dolby Atmos enabled speakers may better reproduce the Dolby Atmos sound you would hear in a movie theatre, where the overhead speakers are high in the auditorium, creating a more diffuse experience. Audio experts who have heard Dolby Atmos enabled speakers agree that in certain rooms the sound these speakers produce can be preferable to the sound that overhead speakers produce.

## What if I choose to use overhead speakers?

We recommend that overhead speakers are frequency matched, power matched, and timbre matched as close as possible to your listener-level speakers. For ceilings 8 to 14 feet high, we recommend speakers with a wide (+/- 45) degree dispersion pattern. For ceilings over 14 feet high, the sound from most speakers will have dispersed sufficiently at listener level.

## Speaker recommendations

Dolby recommends that you use four Dolby Atmos enabled speakers when possible. Use of four speakers will make the placement of overhead sounds more accurate, and you'll get more precise, realistic sounds as an object—such as a helicopter—passes overhead in a video. Two of the speakers (whether they are integrated speakers or add-on modules) should be in the front left and front right speaker locations of your system. The other two should be positioned in the rear surround speaker location.

If you opt to use only two Dolby Atmos enabled speakers, you'll still get a very immersive experience, with sounds moving overhead. Simply place the Dolby Atmos enabled speakers at the front left and front right speaker locations.

For the best sound, locate your speakers at or slightly above the height of your ears when you're seated. Avoid placing the Dolby Atmos enabled speakers higher than one-half the height of your wall. Make sure the speakers are at least 3 feet (0.9 meter) away from you, ideally 5 feet (1.5 meters) or more. If you're using add-on modules, place them either on top of your front and surround (ideally, rear

surround) speakers or within 3 feet (0.9 meter) of those speakers.

If you use overhead speakers, Dolby recommends that you use four or more speakers when possible, though two speakers will still provide a great experience. If you use four overhead speakers, you should place the front pair of overhead speakers in front of the position where you'll be listening and place the second pair of overhead speakers behind you. (Each pair should be roughly one third of the way in from either the front or rear walls.) If you use two overhead speakers, mount them slightly in front of where you'll be listening. The ideal overhead speaker should be timbre matched to your primary speakers and support equal power-handling capabilities and full-range performance. For more detail, please refer to the Dolby Atmos installation guide.

As noted previously, we recommend using overhead speakers with wide dispersion patterns (plus and minus 45 degrees). If you use overhead speakers with narrow dispersion or those with drivers you can aim, be sure to angle the drivers slightly toward your listening position.



Figure 5: If you use overhead speakers, Dolby recommends using four or more.

You can also combine Dolby Atmos enabled speakers with overhead speakers in your home theater. This can be useful if, for instance, you have two speakers already installed in your ceiling but want to add two more speakers that can produce overhead sound. You can add two Dolby Atmos enabled speakers and get detailed overhead sound without going to the trouble of installing new speakers into your ceiling. You'll hear the same overhead sounds whether you're using overhead speakers, Dolby Atmos enabled speakers, or a combination of both.

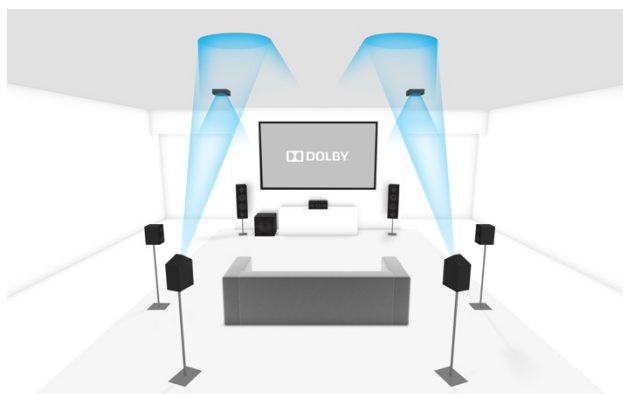


Figure 6: A "hybrid system" can consist of front in-ceiling and rear Dolby Atmos enabled speakers.



While the guidelines recommended here will yield the best experience, a Dolby Atmos system can support many other configurations that you may already have in your home. For instance, Dolby Atmos supports the standard “wide” speaker positions on the floor and the front vertical height positions usually found on the top of the front wall, as well as many other speaker positions.

However, before designing your room layout, refer to your AVR’s documentation to ensure that it supports the combination of speakers you plan to use.

## Describing your new Dolby Atmos system

With the debut of Dolby Atmos, there is a new way to describe surround sound speaker configurations. It is based on the standard terminology (stereo, 5.1, and 7.1) but adds a number at the end to specify the number of overhead or Dolby Atmos enabled speakers you use (for example, 7.1.4).

The following figures show the most common speaker layouts in a Dolby Atmos system for home theater.

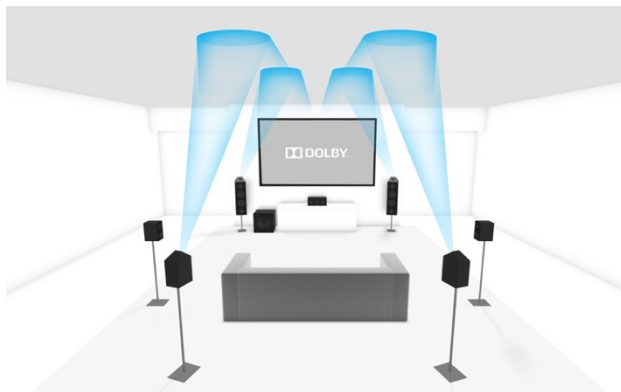


Figure 7: A traditional 7.1 speaker layout with seven listener-level speakers and four Dolby Atmos enabled speakers (7.1.4).



Figure 8: A traditional 5.1 speaker layout with five listener-level speakers and four Dolby Atmos enabled speakers (5.1.4).



Figure 9: A traditional 5.1 speaker layout with five listener-level speakers and two Dolby Atmos enabled speakers (5.1.2).

There is an additional important consideration in expanding your system: new speakers must be added to your Dolby Atmos system in pairs. A new speaker on the right side of the room must be matched by a similar speaker on the left side of the room. This is true for speakers located on the floor as well as overhead. This pairing ensures a balanced soundstage. The exceptions to this rule are when you add speakers in the center or center back locations.

For high-end home theaters, a 7.1.4 system (a traditional 7.1-channel-based layout with four overhead or Dolby Atmos enabled speakers) will provide a great listening experience. If you're ambitious, though, Dolby Atmos can support home theater systems with up to 34 speakers in a 24.1.10 configuration: 24 speakers on the floor and 10 overhead speakers.

Importantly, Dolby Atmos content is not tied to any specific playback configuration. Whether you have a full 7.1.4 system, a 5.1.2 system, or an ultimate 24.1.10 Dolby Atmos system, your receiver will get the same content decode it and scale it in a manner that takes full advantage of your specific setup.

As a starting point for a home theater system, we recommend that any system include speakers in the positions normally designated for a 5.1 system.

## Making the right connections

Once you have your speakers set up and you've purchased a new AVR or preprocessor, it's time to hook up your new Dolby Atmos system. Many AVRs that support Dolby Atmos have speaker connections labeled HEIGHT. (Some AVRs do not use that label, but they allow you to assign terminals for the height outputs through the set-up menu.) Connect your Dolby Atmos enabled speakers or overhead speakers to those outputs. If you're using four Dolby Atmos enabled speakers or overhead speakers (or think you might in the future), you will need an AVR with four height outputs.

Of course, not all the content you play on your home theater will be in Dolby Atmos. The good news is that a Dolby Atmos home theater can enhance the sense of immersion and realism from channel-based content. A new upmixer, included in all Dolby Atmos audio/video receivers, employs sophisticated signal processing to scale and adapt the channel-based signal for playback through your entire system, including overhead speakers.

If you're not able to upgrade your home theater to Dolby Atmos yet, we still recommend that you purchase the Dolby Atmos version of content whenever that is available. The Dolby Atmos format is designed to be backward compatible, so it will play on both new and existing hardware platforms. In the future, upgrading your equipment to components capable of supporting Dolby Atmos will unlock the ultimate experience from Dolby Atmos content. In the meantime, Dolby Atmos content will provide a great surround experience from traditional channel-based home theater systems.

## The technological building blocks of Dolby Atmos

You will play Dolby Atmos content from a Blu-ray Disc, broadcast as well as streaming video services. Video games that support Dolby Atmos have already been introduced. You will need a PC with HDMI output to enjoy this first generation of video games. Eventually, terrestrial and digital broadcast systems as well as video game consoles will also be capable of providing Dolby Atmos content.

To support the transmission of Dolby Atmos content, we've updated and improved many of the underlying Dolby technologies already in use today, including Dolby TrueHD, Dolby Digital Plus, and Dolby Metadata-enhanced Audio Transmission (Dolby MAT), while maintaining their full compatibility with older content formats.

The key to creating Dolby Atmos sound is the ability not only to recreate a movie's sound—such as the whine of an ambulance siren—but also to place that siren's whine in a specific place and recreate its movement through space as intended by the audio mixer. All Dolby Atmos content includes both sounds and positional metadata that describe how those sounds move through the multidimensional sound space.

The Dolby Atmos object audio renderer, integrated in the AVR or preprocessor is the intelligence that directs the system. It determines—in real time—how to use your speaker system to place and move sounds in exactly the way the filmmaker intended.

The Dolby surround upmixer allows you, , to play channel-based content while making full use of your Dolby Atmos home theater components, including overhead or Dolby Atmos enabled speakers.

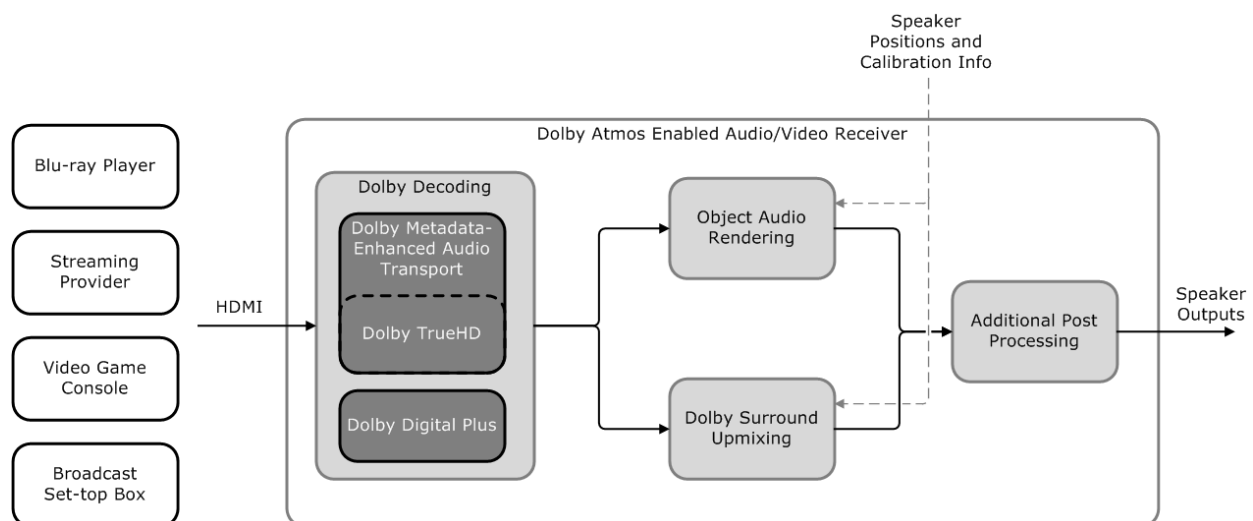


Figure 10: This diagram shows the signal flow for scaling and adapting Dolby Atmos and channel based content to a home theater system.

## Dolby Atmos in Dolby TrueHD

Dolby has expanded the Dolby TrueHD format to allow the format to support Dolby Atmos content on Blu-ray and ultra high definition Blu-ray Disc. Prior to Dolby Atmos, Dolby TrueHD provided lossless support for channel-based audio, such as 5.1 and 7.1. Now we have added a fourth substream for Dolby Atmos sound in Dolby TrueHD codec to enable a support for a losslessly encoded object-based sound mix.

Dolby Atmos in Dolby TrueHD is transmitted from a Blu-ray player or Ultra HD Blu-ray player to your AVR via an HDMI connection. If your AVR supports Dolby Atmos, the Dolby TrueHD object-based audio and related metadata will be decoded, processed, scaled, and rendered to your specific speaker configuration. Dolby Atmos audio can be encoded with Dolby TrueHD at multiple sampling rates (including 48 and 96 kHz) and bit depths (16- and 24-bit).

Dolby Atmos enabled receivers will also support legacy Dolby TrueHD bitstreams at multiple sampling rates (including 48, 96, and 192 kHz) and bit depths (16-, 20-, and 24-bit) to provide full backward compatibility with legacy Blu-ray Disc media and Dolby TrueHD music files.

## Dolby Atmos in Dolby Digital Plus

Dolby Digital Plus has been updated and features a new decoder capable of processing content encoded for Dolby Atmos. This module uses new bitstream metadata to extract Dolby Atmos object-based audio and outputs this information for further signal processing. The sampling rate for Dolby Atmos content is 48 kHz, the same sample rate as for Dolby Digital Plus content.

Both new audio decoders are designed to be fully backward compatible with legacy channel-based Dolby Digital Plus and Dolby TrueHD soundtracks.

## Dolby Atmos in Dolby MAT

The Dolby Metadata-enhanced Audio Transmission (Dolby MAT) encoder resides in a Blu-ray player to pack the variable bit-rate Dolby TrueHD bitstreams for transmission over the fixed bit-rate HDMI connections. A MAT decoder is subsequently employed in an AVR to unpack the Dolby TrueHD bitstreams. With the introduction of Dolby Atmos, we have expanded this technology to support encoding of Dolby Atmos content as lossless pulse-code modulation (PCM) audio.

A key benefit of Dolby MAT 2.0 is that Dolby Atmos object-based audio can be live encoded and transmitted from a source device with limited latency and processing complexity. Among the possible sources are broadcast set-top boxes, PCs, and game consoles. The Dolby MAT 2.0 decoder in an AVR outputs the object-based audio and its metadata for further processing. The Dolby MAT 2.0 container is scalable and leverages the full potential of the HDMI audio pipeline.

## Dolby Atmos object audio renderer

The Dolby Atmos object audio renderer is essentially the brain of a Dolby Atmos home theater. Dolby Atmos content consists of both sound objects and positional metadata that describes where sounds should be placed and how they should move, along with other data such as the type of object represented, its size, and its volume or intensity. The Dolby Atmos object audio renderer is informed of the speakers available in your system (you supply this information by following the setup instructions provided by your AVR manufacturer) and determines—in real time—which speakers to use to accurately recreate the sound the filmmakers intended.

Depending on the receiver configurations, the Dolby Atmos object audio renderer can support as many as 34 speakers—24 traditional floor-standing speakers and 10 overhead or Dolby Atmos enabled speakers—along with one or more subwoofers. The renderer also supports smaller configurations, including five listener-level speakers and two overhead (or Dolby Atmos enabled speakers), making it fully scalable and adaptable to a wide variety of home theaters.

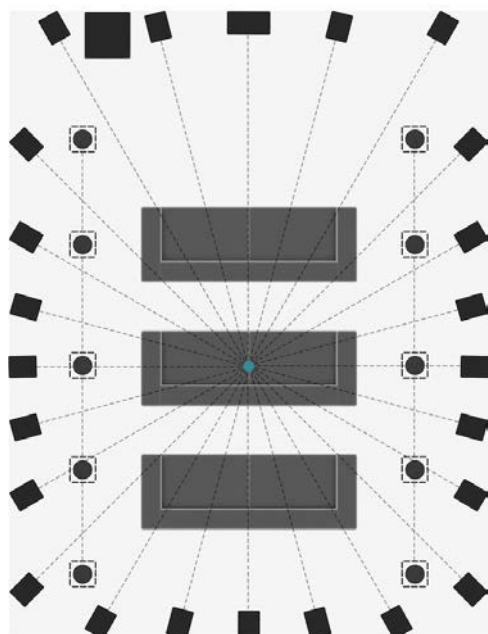


Figure 11: Dolby Atmos for home theaters supports as many as 24 speakers on the floor and 10 speakers producing overhead sound.

## Dolby Surround upmixer

If you invest in building a Dolby Atmos home theater, you want to get full use of it, even if the content you're playing isn't mixed in Dolby Atmos. That's where the Dolby Surround upmixer plays a big role.

When enabled, the Dolby Surround upmixer expands the audio of legacy channel-based content to take advantage of your entire system, including overhead or Dolby Atmos enabled speakers. The Dolby Surround upmixer processes and expands the channel-based soundtrack to create a highly accurate rendering of the environment in the movie while simultaneously honoring and maintaining the artist's intent for the mix.

Unlike previous wideband upmixing technologies, the Dolby Surround upmixer operates in the frequency domain, decoding and processing multiple perceptually spaced frequency bands for a fine-grained analysis of the source signal. Dolby Surround upmixer individually steers these frequency bands, producing a highly precise surround-sound field with enhanced spacious ambience. The Dolby Surround upmixer is included in the Dolby Atmos technology bundle and replaces the Dolby Pro Logic II family of upmixers, offering greater flexibility and superior audio performance.

To maintain the frontal spatial audio image, the upmixer will not send upmixed audio to speakers that are located between the left, center, and right speakers or to the left wide and right wide speakers. Additionally, upmixed audio is not sent to the center surround speaker. Spatial imaging is complemented through the use of overhead or Dolby Atmos enabled speakers in these cases.

## Translating cinematic Dolby Atmos content to the home

As we've noted, Dolby Atmos allows each sound in a movie scene to be represented as a separate audio object. And each of these objects has its own positional metadata, describing precisely where it should originate and how it should move, along with other data. This approach produces incredibly lifelike sound, but for a scene with lots of action, it also produces a lot of data. Getting all that data to your living room through the limited bandwidth of a Blu-ray Disc or streamed media pipeline is a challenge. We've met that challenge with a technology called spatial audio coding.

Spatial audio coding takes into account the spatial information, along with other information about the sound objects, to efficiently encode them in Dolby TrueHD and Dolby Digital Plus. Spatial coding is not a channel-based matrix-encoding system like Dolby Pro Logic II or Dolby Pro Logic IIz. Instead, it is a fundamentally new coding technique that allows all of the objects present in the original cinema audio mix to be reproduced in your home theater.

Filmmakers frequently remix a film to sound its best in home theaters, a process known as creating a near-field mix. Spatial audio coding is a tool available to sound professionals in the near-field mixing process. During playback, filmmakers can monitor exactly how the film will sound when it is encoded to Dolby Digital Plus for streaming or encoded in Dolby TrueHD for Blu-ray and Ultra HD Blu-ray content.

## Creating Dolby Atmos soundtracks for home theaters

Initial Dolby Atmos content for home theaters was delivered via Blu-ray Disc and streaming video via over-the-top (OTT) services. For Blu-ray and Ultra HD Blu ray, studios will employ lossless Dolby TrueHD for the primary soundtrack and Dolby Digital Plus for secondary languages. OTT streaming services and cable services are supported by Dolby Digital Plus. In the future, Dolby Atmos content will be delivered via video on demand (VOD) and broadcast (terrestrial and digital) that use multichannel Dolby Digital Plus in their core architecture. Dolby Atmos can also be supported in video game soundtracks and delivered to the AVR for decoding and processing via Dolby MAT.

Production houses that create Dolby Atmos content for home theaters will use a tool called Dolby Media Producer, along with its suite of professional encoding, decoding, and media-related tools.

Before using Dolby Media Producer, though, production houses have the option to perform several preliminary steps, including a near-field remix and remastering of the cinematic master file. In this stage of the process, audio mixers may make small adjustments to the mix to ensure that it sounds as they intended in Dolby Atmos enabled home theaters.

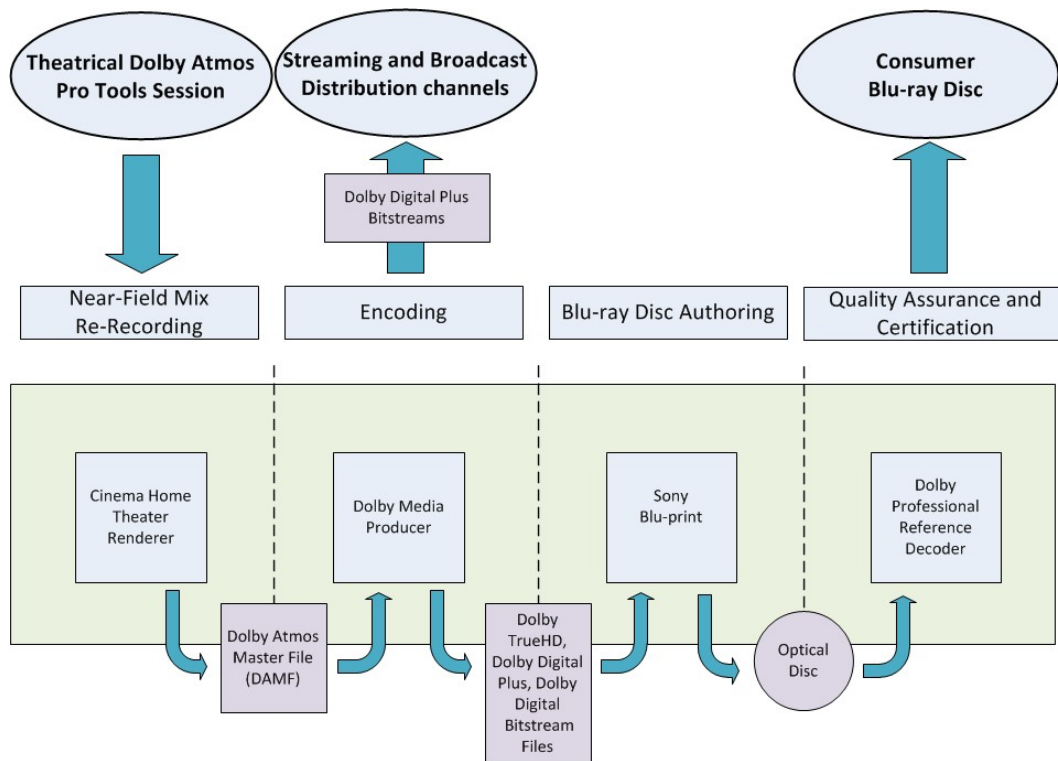


Figure 12: The content creation workflow for Dolby Atmos home content.

## Conclusion

Dolby has invested years of engineering and research work into accurately translating the Dolby Atmos experience from the cinema to home theaters. Today we can bring a Dolby Atmos experience to the home through established delivery methods while maintaining backward compatibility with legacy playback systems. The result is nothing short of the most realistic and immersive entertainment experience ever available for home theaters.

*The configurations noted herein are illustrative. We recommend that any overhead speaker installation be performed by professional installers with experience in installing overhead speakers.*

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