



Surround for movies

Technology Backgrounder



PHILIPS
sense and simplicity

The limits of listening to soundtracks through headphones

Without a doubt, headphones are a great invention. A good set of headphones can reproduce tiny sonic details perfectly, render punchy and deep bass without distortion, and create the most transparent of timbres. You can also take them with you and enjoy your music wherever you go without disturbing the people around you.

Even with all these advantages, however, the sound that headphones produce will never seem as immersive or natural as what loudspeakers can deliver. This limitation becomes all the more apparent when listening to movie soundtracks. Try it for yourself. Put your headphones on, play a movie on your portable player and close your eyes. Imagine the space based on what you hear. Who is speaking, from where and how far away? Does the action feel like it is in front of you, like in a cinema? It probably does not. Instead it most likely feels like the action is coming from inside your head.

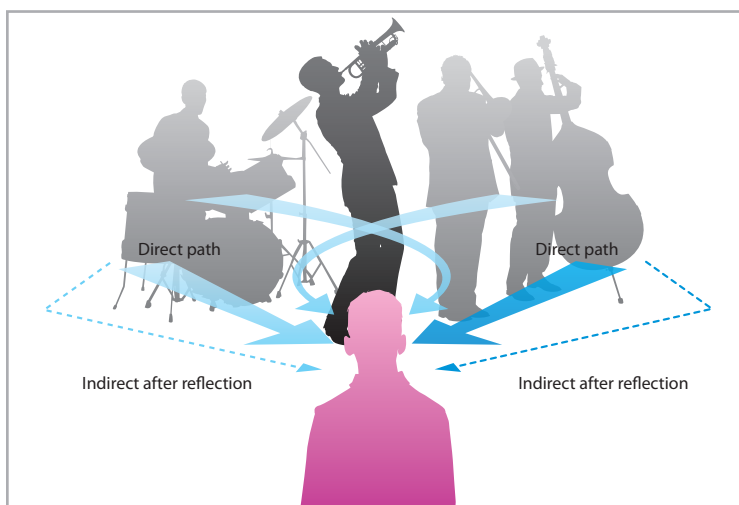
That is why Philips has introduced Surround for movies in its line of GoGear MP4 players. Surround for movies' proprietary algorithm faithfully recreates what you would hear in real life – just as the film's sound engineer intended.

The challenge of recreating natural soundscape through headphones

Sound wave paths in real-life listening situations

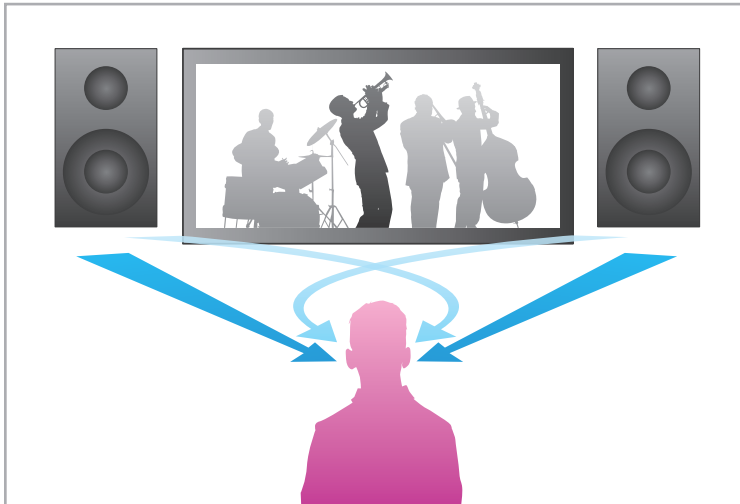
In real life, you use both of your ears to locate where sounds come from. Your brain naturally combines the complementary information to estimate an accurate "soundstage". This is possible because your left and right ears receive slightly different signals depending on the position of the sound source and the surroundings.

Your brain also processes additional information, such as sound reverberation, that gives cues as to where the sound sources are placed. Someone speaking in a hallway will sound quite different from someone speaking in a bathroom.



Listening with a stereo loudspeaker setup

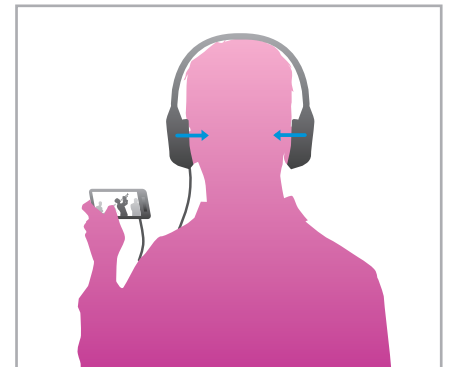
To create the illusion of natural soundscape, recording engineers balance the sounds coming from voices, noises and musical instruments. As long as the listener is positioned within the loudspeakers' "sweet spot", the sounds heard will be as the engineer intended.



Listening with headphones

Unfortunately, until now, headphones could not create the same illusion as loudspeakers. This is due to a number of reasons:

- no crossfeeding, or blending, of the left and right stereo channels
- no spectral or temporal differences between what your left and right ears receive, depending on the virtual sound source positioning
- frequent presence of incoherent or unexpected reverberation in the sound track that does not correspond with what you see and where you are



Solutions on the market

To improve the sensation of natural soundscape, headphone manufacturers have developed some hasty solutions such as "stereo wideners". These have been on the market for decades but the sound delivered rarely seems natural and may even seem colored. Other innovations, including "headphone virtualizers", try to simulate a full multichannel 5.1 (or more) surround system. These are better at recreating space but are more often found in home audio systems than in portable applications due to the high processing power required.

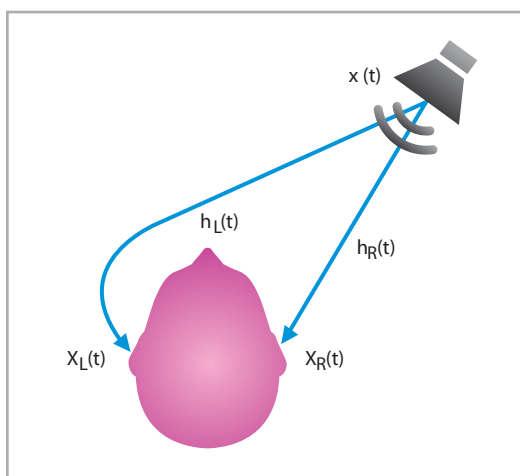
Surround for movies recreates a natural soundscape

Philips Surround for movies is an advanced audio technology specifically designed for Philips GoGear MP4 players. Unlike conventional headphone virtualizers, Surround for movies does not try to create multiple virtual loudspeakers. It directly analyzes each sound source in the soundtrack and recreates a natural soundstage with sound elements that are individually and precisely localized. The effect puts the listener in the middle of the action for an immersive sound experience.

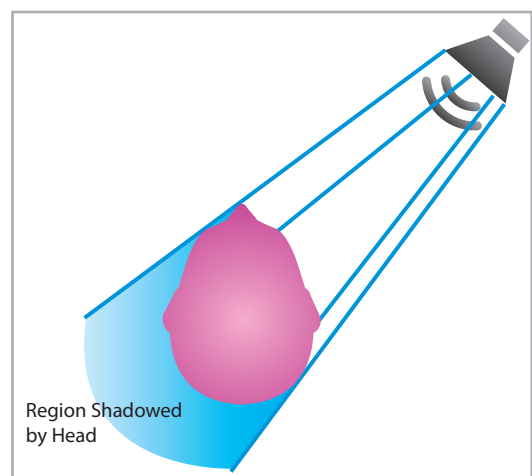
In the first stage of the process, each audio channel is converted from the time domain into the frequency domain via a resource intensive operation called a "Fast Fourier Transform" (FFT). Then, a Philips proprietary algorithm estimates, per frequency band, the angle of the most prominent sound objects and extracts them. The remaining (more ambient) signals are kept separate for processing later.

Each extracted sound object (and the angle associated to it) is then virtually positioned with "head-related transfer functions". Each sound object is positioned at its own precise angle and the remaining signals from the extracted sound objects are also virtually positioned at fixed angles. All the virtualized signals are then combined and converted back into the time domain.

At the same time, the input stereo signal is processed with a series of complex delays, filters and inter-channel crosstalks to recreate a natural acoustical space, where sound waves not only seem to travel from the sound emitter to your ears, but also bounce off walls, furniture and other objects.



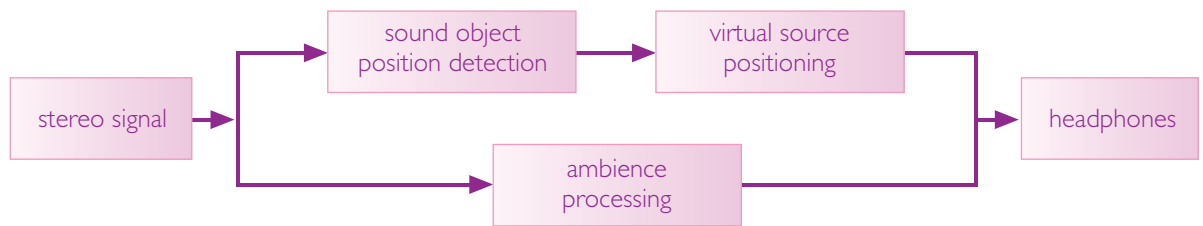
Head-related transfer functions describe the filtering of a sound source as perceived by each ear



Head shadowing effect

With the sound objects precisely and individually positioned and the ambience recreated, the two effects are combined to generate the soundscape as the film's sound engineer had intended. Just like watching a movie at home or in a cinema, the sound you will hear will be deep and in perspective to the action you will see on the screen.

Surround for movies for a truly immersive sound experience



Recreating a natural soundscape



Sound object position detection and virtual source positioning

The sound sources in the soundtrack are detected and their positions defined. The sounds of a rally car, as in this example, are usually centered, whereas the sounds of the crowd in the stadium or other environmental ambience, are positioned more to the left or more to the right.



Ambience processing

The stereo signal is simultaneously processed to recreate a natural acoustical space, where sound waves not only seem to travel from the sound emitter to your ears, but also bounce off nearby objects.



Merging sound objects and ambience

With the sound sources precisely and individually positioned and the ambience recreated, the two effects are combined to generate the soundscape as the film's sound engineer had intended.

Surround for movies is exclusive to Philips GoGear

Surround for movies was designed specifically for Philips GoGear MP4 players with in-ear headphones. Watching movies and videos puts you right in the middle of the action for an immersive surround experience – just as the film's sound engineer had intended.

Specifications:



Philips GoGear Muse MP4 Player

Fullsound™ to bring your MP3 music to life
Surround for movies to put you in the middle of the action
Sound Isolation headphones to minimize environmental noise
FLAC & APE lossless codec support for precise sound quality
3.2" HVGA color display for superb video enjoyment
Touch-screen control for smooth and intuitive navigation
HDMI out to watch High Definition (720p) video on HDTV
microSD card slot for expanded memory capacity
FM radio with RDS and 20 presets for more music options
Philips Songbird: one simple program to discover, play, sync

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