

# AURO-3D FOR DIGITAL CINEMA

## 1.1 Auro 11.1

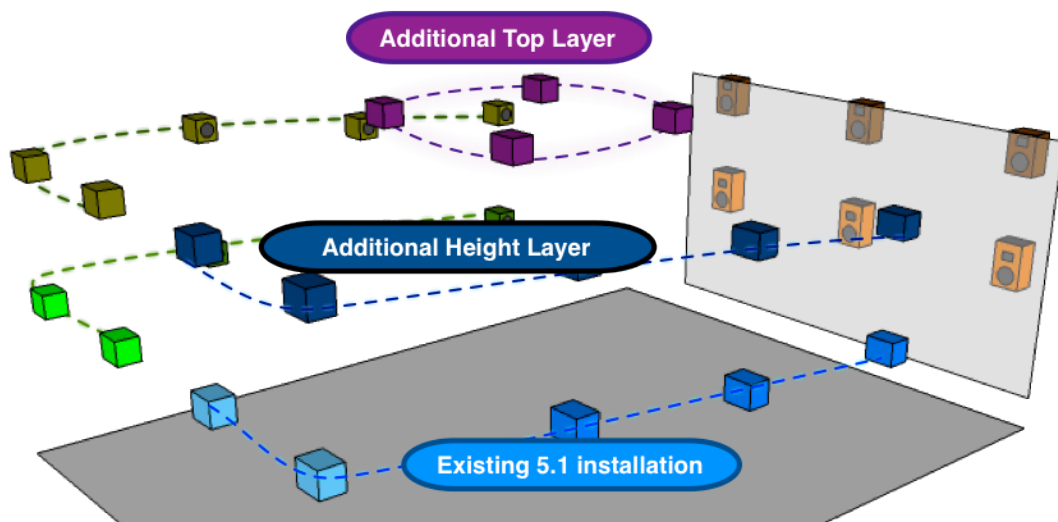
**Auro 11.1** as introduced by **Barco** and **Auro Technologies** is one of the possible Auro-3D configurations, defined in the **Auro-3D** concept.

The Auro 11.1 soundfield configuration specifically targets the Digital Cinema market, by building further upon the traditional 5.1 Soundfield Configuration as defined by SMPTE, by adding two additional layers of speaker arrays.

The Auro-3D Concept is based upon the use of **3 layers** of speakers to create a three-dimensional soundfield, providing the possibility to pan individual elements in the 3D-field around the listener, as well as reproducing extremely realistic 3D ambiances.

The three layers are defined as:

1. The **Surround** layer: the standard 5.1 surround layer as defined in SMPTE
2. The **Height** layer: placed at the same positions as the 5.1 surround layer, but at a higher angle (typically 20°-30° above the lower Surround layer as seen from the central setting position). This layer includes three additional screen channels, placed at the top of the screen.
3. The **Top** layer: also known as the Voice of God or Overheads layer. It exists of a mono channel, reproduced by an array of speakers mounted on the ceiling above the audience.



## Channel Layout

Auro 11.1 is a channel-based system, using the 12 of the 16 AES3 outputs of the Media Block. The total configuration is built using the following channels:

Lower		Height		Top/Overhead	
<b>L</b>	Left Screen Channel	<b>HL</b>	Height Left Screen channel	<b>T</b>	Top
<b>R</b>	Right Screen channel	<b>HR</b>	Height Right Screen channel		
<b>C</b>	Center Screen channel	<b>HC</b>	Height Center Screen channel		
<b>Ls</b>	Left Surround channel	<b>HLs</b>	Height Left channel		
<b>Rs</b>	Right Surround channel	<b>HRs</b>	Height Right channel		
<b>LFE</b>	Low Frequency Effects				

## Auro-Codec

Content in the Auro-3D format is encoded using the **Auro-Codec**. This codec has the unique capability to combine the Auro 11.1 version and the 5.1 version into a single PCM Main track. The encoded tracks are normal PCM tracks, containing the traditional 5.1 Surround mix, which can be played back as such by any DCI compliant Digital Cinema server.

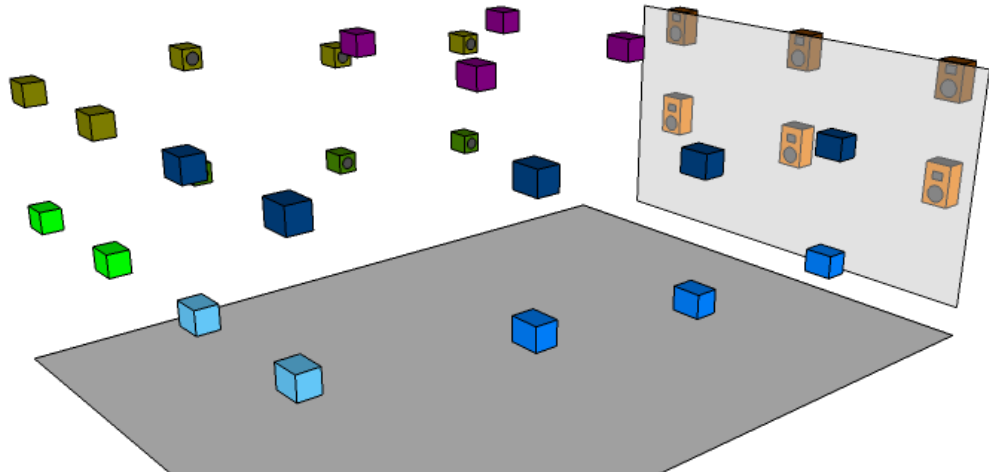
Media Blocks equipped with the Auro-Codec Decoder software can decode the full Auro 11.1 mix from this 5.1 Surround PCM Main Track, called the Carrier, at near lossless quality. The decoded signal is then transmitted to the Audio Processors via the normal AES3 outputs. Since the signal has 12 channels, there is still room for HI and VI-N tracks.

This system allows thus to distribute one single mix to both 5.1 and Auro 11.1 theaters.

## 1.2 Auro 13.1

While current installs in theaters are limited to Auro 11.1, the Auro-3D System also contains an Auro 13.1 configuration, which builds further on the 7.1DS Soundfield configuration as described in SMPTE ST428-12.

Similar to Auro 11.1, this configuration uses the standard 7.1 Surround layer and adds the same two layers (Height and Top) as described above.



The resulting channel layout is then as follows.

Lower		Height		Top/Overhead	
<b>L</b>	Left Screen Channel	<b>HL</b>	Height Left Screen channel	<b>T</b>	Top
<b>R</b>	Right Screen channel	<b>HR</b>	Height Right Screen channel		
<b>C</b>	Center Screen channel	<b>HC</b>	Height Center Screen channel		
<b>Lss</b>	Left Side Surround channel	<b>HLs</b>	Height Left channel		
<b>Rss</b>	Right Side Surround channel	<b>HRs</b>	Height Right channel		
<b>Lrs</b>	Left Rear Surround				
<b>Rrs</b>	Right Surround				
<b>LFE</b>	Low Frequency Effects				

As this configuration still only uses 14 channels in total, two tracks remain for the HI and VI-N tracks.

Using the Auro-Codec, the content is now encoded in a standard 7.1DS Carrier.