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MPEG-H AUTHORING PLUG-IN

User Guide for Version 2.0.0

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Versions

date	version	comment	editor
2018-10-31	1.0	version 1 release	SoundLab Group
2019-04-01	2.0	updates	SoundLab Group

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1 Introduction

Thank you for using the *Fraunhofer IIS MPEG-H Authoring Plug-In* (*MHAPI*). This manual will help you become familiar with MPEG-H, the *MPEG-H Authoring Plug-In* and the creation of MPEG-H metadata.

The *MPEG-H Authoring Plug-In* allows you to create MPEG-H scenes and the related metadata with existing audio content in post-production. You can configure metadata parameters, instantly listen to your changes and later export these settings in form of a Control Track. The Control Track is a mono PCM audio signal, which is distributed together with the audio content over conventional audio signal paths to transfer your scene configuration metadata to an MPEG-H encoder.

For live content creation you will need a dedicated hardware device, called an Audio Monitoring and Authoring Unit (AMAU), which is able to generate the metadata "on the fly" during live broadcasting. However, within the *MPEG-H Authoring Plug-In*, you are able to create MPEG-H scene configuration data, which can be used by any MPEG-H live production device.

For further information, please visit

- https://www.iis.fraunhofer.de/en/ff/amm/dl/software/MHAPI.html

- http://www.mpeg-h.com/

- http://www.mpeghaa.com/

- http://www.iis.fraunhofer.de/audio

or contact

- productiontools-techsupport@iis.fraunhofer.de

1.1 Basic information about MPEG-H

MPEG-H is a group of standards developed by the ISO/IEC Moving Picture Experts Group (MPEG) which contains (among others) a digital media transport standard, a video compression standard, an audio compression standard and a 3D audio compression standard. The focus of this documentation is related to MPEG-H Part 3: 3D-Audio, which is a unified system for carriage of channel-based, object-based, and Higher Order Ambisonics (HOA)-based content. Objects may be used alone or in combination with channels or HOA Components. The use of audio objects allows for interactivity or personalization of a program by adjusting the gain or position of the objects during rendering in the MPEG-H decoder. Channels, objects, and HOA Components may be used to transmit immersive sound as well as conventional mono, stereo, or surround sound. Please note: Ambisonics is not supported in this version of the *MPEG-H Authoring Plug-In*.

The MPEG-H TV-Audio System is designed to offer broadcasters and content producers a system to create and distribute interactive and immersive audio. The system includes MPEG-H Audio encoders (normally included in video encoding equipment), MPEG-H Audio decoders (included in professional IRDs or consumer receivers) and MPEG-H Monitoring Units for real-time monitoring and content authoring.

The MPEG-H 3D Audio decoder renders the bit stream to a number of standard speaker configurations (layouts are specified by Codec Independent Code Points, CICP, see 8). Binaural sound rendering for 3D headphone reproduction is also supported. Compared to legacy audio compression standards in TV broadcast such as AAC, MPEG-H Audio offers four main advantages:

- 3D-Audio using channels, objects, Ambisonics, or a combination of all three

- Object-based interactive audio

- Universal delivery through different distribution networks (TV set, tablet, mobile phone, etc.)

- More efficient data compression algorithms

The MPEG-H metadata contains all relevant information for reproduction and rendering in arbitrary reproduction layouts. Together with video and audio, metadata is used for encoding and later on for decoding on the receiver side.

Separate audio tracks or sound events and their associated metadata are called audio elements in MPEG-H. Audio elements are structured in so-called audio scenes, using the concepts of "Components", "Switch Groups" and "Presets" (described in chapters 4.2 and 4.3, see Figure 1). Dynamic metadata define object trajectories with high resolution in time. This allows for an accurate reproduction of rapid object movements, as well as interactive object positions.
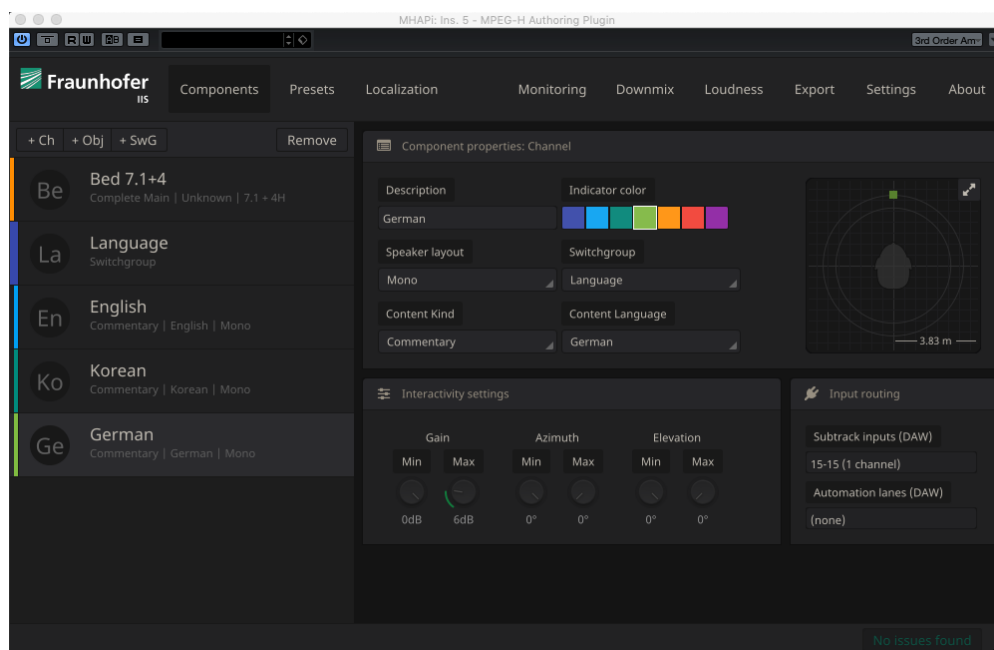

Figure 1: *MPEG-H Authoring Plug-In* GUI with a scene, consisting of a 7.1+4 bed Component and three language Components which are combined in a Switch Group.

In a very basic MPEG-H post-production workflow, video and audio content can be produced in a conventional way. The final step before MPEG-H encoding would be MPEG-H authoring.

Depending on the distribution workflow, metadata created during authoring can be exported as a Control Track. Usually, Control Track and audio content are contained in the same multichannel WAV file for maximum convenience (see chapter 4.8). However, for more specialized workflows, metadata can be exported separately from the audio content as an XML file.

1.2 About this manual

This manual was written to help you to become familiar with the Fraunhofer MPEG-H Authoring Plug-In. If you have any feedback or questions about the plug-in, or suggestions on topics that should be covered in this manual, please contact us. See 11 for details.

This manual was written in April 2019 by Fraunhofer IIS, SoundLab Group and refers to software version 2.0.0 on macOS 10.14.

1.3 Terms and conditions

1.3.1 Description and user qualification

The *MPEG-H Authoring Plug-In* is freely available software created by *Fraunhofer IIS* for authoring of MPEG-H audio scenes. It is intended for professional use. It creates MPEG-H audio metadata which can be used as the input for an MPEG-H audio encoder and allows monitoring of the authored scenes on standard computer hardware. It is available for Windows and MacOS operating systems.

Fraunhofer preserves the right to deliver the software only to qualified users. Qualification is dependent on professional use and on conformance to the German export control laws. To check the individual qualification, additional information of the user as requested below is mandatory.

1.3.2 Software license type

- The software license is for permanent use as described in §3 Art. 2 of the general terms and conditions.

- The license is a multi-user license for 2-5 workplaces.

- Modifications, changes and re-engineering of the software are forbidden.

1.3.3 Third-party software

The *MPEG-H Authoring Plug-In* includes Third-Party Software toolkits to enable compatible interfaces to audio production tools. These toolkits will be licensed by the respective copyright owners which define the rights of use. The Fraunhofer general terms and conditions do not apply for these software parts.

The *MPEG-H Authoring Plug-In* is compatible with VST$^®$. VST is a trademark of Steinberg Media Technologies GmbH, registered in Europe and other countries.

The *MPEG-H Authoring Plug-In* is compatible with AAX by using the Avid AAX-SDK 2.3.0 for connecting the plug-in to the AAX-Interface.

1.3.4 Open source software

The *MPEG-H Authoring Plug-In* includes Open Source Software (OSS). These OSS will be licensed by the respective copyright owners which define the rights of use. The Fraunhofer general terms and conditions do not apply for these OSS. Details about the used OSS and its licensing conditions and copyright terms can be found here.

2 Installation

To install the *MPEG-H Authoring Plug-In*, simply drag the .vst3 and/or .aaxplugin files into your plug-in folder.

2.1 Installation of VST3 on Apple macOS

By default, VST3 plug-ins are located on your system drive under

Library/Audio/Plug-ins/VST3

2.2 Installation of AAX on Apple macOS

By default, AAX plug-ins are located on your system drive under

Library/Application Support/Avid/Audio/Plug-ins

2.3 Installation of VST3 on Microsoft Windows

The VST3 plug-in folder is usually located on your system drive under

C:\Program Files\Common Files\VST3

If in doubt, refer to your DAW's settings on VST plug-in management or the user manual. If you require a VST2 version of the plug-in (which is needed for use in Pyramix, for example), please contact us. See 11 for details.

2.4 Installation of AAX on Microsoft Windows

The AAX plug-in folder is usually located on your system drive under

C:\Program Files\Common Files\Avid\Audio\Plug-ins

2.5 Installation of Noto Sans CJK TC Font

The Noto Sans CJK TC font is required to display labels in Korean, Chinese and Japanese. If you plan on adding labels in these languages, you will have to move the provided files to the Fonts folder on your PC (C:\Windows\Fonts) or Mac (Library/Fonts). More info on the font can be found here.

3 Getting started

Insert the *MPEG-H Authoring Plug-In* on the output bus or on a bus at your signal chain in your DAW. The *MPEG-H Authoring Plug-In* is designed to work with most major DAWs such as AVID Pro Tools, Steinberg Nuendo, Cockos Reaper and any DAW that supports multi-channel tracks and VST3 plug-ins.

While the process of setting up your session will differ between DAWs, the general concepts remain the same.

For more help, see 5 or use one of the provided session templates to get started.

3.1 Use of the MPEG-H Authoring Plug-In

The *MPEG-H Authoring Plug-In* is usually placed as an insert on a multi-channel bus, group track or the multi-channel output in your authoring session.

Make sure the bus size where the *MPEG-H Authoring Plug-In* is inserted is big enough to accommodate all of your audio elements.
We recommend using Pro Tools 2018's 3rd Order Ambisonics Bus or Nuendo's 3rd Order Ambisonics or 22.2 group channel.
NOTE: In Nuendo, you will have to switch the panner type to the default panner. Right-click the panner section in the MixConsole window and select Surround MixConverter (not MixConvert V6 or the AmbiDecoder, which are selected by default).
In Reaper, just set the channel count to 16 in the track's routing window.

NOTE: To remain compatible with current SDI infrastructure, the maximum channel count when exporting to MPEG-H Production Format (MPF), a 16 channel wav file, is 16.

Send the outputs of your channels to the sub-paths/child-busses of your MPEG-H Authoring Plug-In bus in ascending order. Then, set the output of the MPEG-H Authoring Plug-In bus to your hardware outputs for monitoring.

Keep in mind, the output signal of this bus is determined by your settings in the Monitoring section (see 4.3) of the *MPEG-H Authoring Plug-In*.

Also, this monitoring path does not include the Control Track (audio channel carrying the metadata for your MPEG-H scene). Your final MPEG-H export including metadata will be created through the plug-ins export section (see 4.8).

NOTE: This version of the *MPEG-H Authoring Plug-In* requires your session's sampling rate to be set to 48 kHz.

4 MPEG-H authoring

The *MPEG-H Authoring Plug-In*s user interface (UI) consists of several tabs for navigating the plug-in. The main pages from left to right are: Components, Presets, Localization, Monitoring, Downmix, Loudness and Export, as well as a Settings tab and the About button (see Figure 1).

4.1 Scene concept and terminology

An MPEG-H audio scene is made up of Components, Switch Groups and Presets. A Component is made from one or more related sound elements (e.g. the six audio tracks of a 5.1 mix may form one Component.)

Components which do not change their position in space during playback are channel based Components, also called static objects. This could be multichannel audio as well as mono signals such as speech elements.

Components which are intended to change their position over time or can be moved by the viewer are referred to as dynamic objects.

Components which are not permitted to be played simultaneously, but should have either/or characteristics, can be placed in a Switch Group. An application for such a Switch Group could be a commentary track in several language versions, which may be selected by the consumer during playback.

To provide the user with convenient and direct access to appropriate playback configurations, Components, Switch Groups and their respective levels are combined into Presets. For example, a sports event could be presented using three Presets: "Default" for the standard configuration, "Dialog+" for enhanced intelligibility and "Venue" for ambience only. The Preset labels can be chosen freely by the content creator and will appear on the MPEG-H on-screen display

4.2 Components

Your incoming audio signals are assigned to Components. The number of channels per Component can be set under "Speaker layout" in the Component properties (see Figure 1 on page 5).

In the above example, 15 channels of audio are sent to the *MPEG-H Authoring Plug-In* bus. Channels 1-12 are assigned to the first Component ("Bed 7.1+4") by setting the speaker layout to 7.1+4.

Channels 13-15 contain mono commentary tracks in different languages. Those three commentary tracks are all assigned to a Switch Group, which lets consumers choose their preferred language.

To create entries in the Component list on the left-hand side of the UI, click the [+Ch], [+Obj] or [+SwG] buttons above the list. This will create a new channel-based Com-

ponent, Dynamic Object or a new Switch Group, respectively. Select a Component to display its properties on the right-hand side of the UI.

From the Components tab, you can access the [Expand Panner] button in the top right corner (see Figure 2). This button will open the 3D Panner in a separate window, that can be used to position all of the dynamic objects contained within your MPEG-H scene. From this window, any position data is graphically represented by color coded dots (see Figure 3). Additionally, any automation data will be graphically reproduced during playback, so that you can visualise your 3D mix in real-time. It is also possible to write automation data in this window, by using the standard automation controls within your DAW and then moving the knobs or dots in the panner.

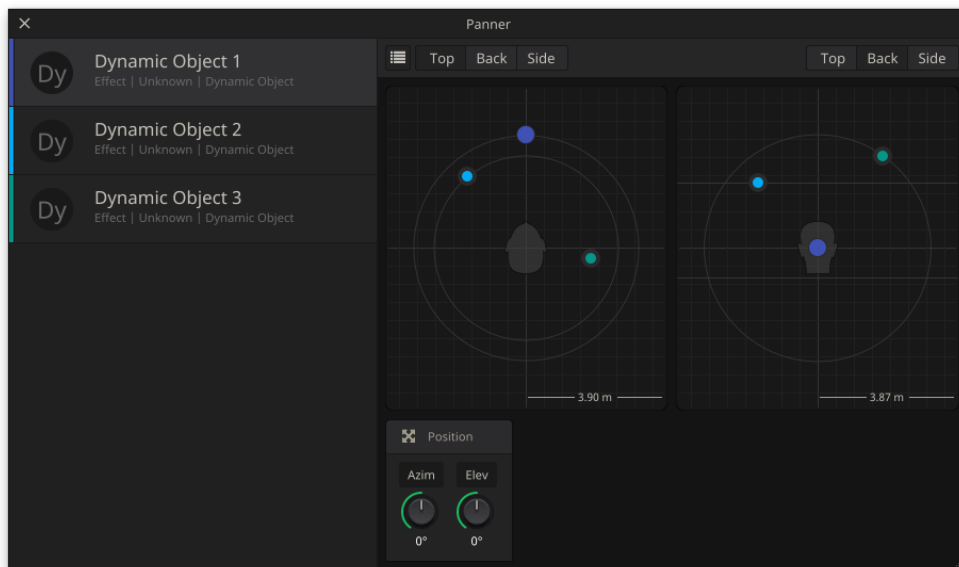**Figure 2:** Expand Panner button on the Components tab of the *MPEG-H Authoring Plug-In*.

Figure 3: Panner window of the *MPEG-H Authoring Plug-In*.

Parameter Type	Description
Description	Description lets you name the Component. This label will be visible to the consumer, if the Component has any kind of interactivity enabled or is part of a Switch Group. All UTF-8 characters can be used. Label entries are limited to a 19 bytes long expression.
Speaker Layout	This defines the channel count and channel layout of your Component. The corresponding number of input channels on your *MPEG-H Authoring Plug-In* bus will be assigned to this Component. In the above example, the first Component in the list has a 7.1+4 speaker layout, so bus input channels 1 through 12 will be used for this Component. A commentary track would usually be set to mono and there-by assigned to the center speaker.
Content Kind	Selection of predefined content kinds. Meta-information for consumer decoders (e.g. decoder switches to audio description if selected). See chapter 9 for more information.
Indicator Color	Color codes the entries in your Component list.
Switch Group	Select a Switch Group from the drop-down menu to assign the selected Component to that Switch Group. IMPORTANT: Make sure that the perceived loudness of all switch group members is approximately the same and within 3LU. This allows seamless switching without loudness level jumps. The integrated loudness of the first Component in the Switch Group will be taken as the reference value for further processing. All other Switch Group members are assumed to have the same loudness value as the first one.
Content Language	Definition of language. This information is important for the decoder to activate the right language audio track according to the user's settings.
Interactivity Settings	The upper and lower limits of gain [dB] and panorama [degrees] interactivity can be defined here. IMPORTANT: While "Azimuth" refers to the horizontal plane, "Elevation" refers to the vertical plane. Left/Down positions are designated with negative degree values. Position interactivity is only possible on dynamic objects. All members of a Switch Group must have the same interactivity ranges. These values are set in the Switch Group's parameters. NOTE: This only defines the interactivity ranges. User interactivity must be enabled on a per preset basis in the Preset section of the plug-in. Also, these settings can only be edited directly, if you set the Interactivity mode on the Settings page to "Set ranges manually". On "Auto-adapt ranges" mode, the ranges will be set to contain the limits of the Component parameters within your presets. Refer to 4.9 and 6.4 for more information.

A status field at the bottom right informs you about the validity of your authoring and switch from an orange "Errors detected" to a green "No issues found" label, as soon as you have set up a flawless MPEG-H scene. The initial state after loading a template may be "Errors detected", as no audio file has been linked to the Components and no Presets have been created. By clicking on the status field, you will get more specific information about which parameters are invalid.

4.3 Presets

Presets combine the previously defined Components and Switch Groups into predefined audio scenes. If multiple Presets are set up, the consumer can choose between different representations of the audio content. For example, a sports match between two teams could have several Presets with different stadium ambiences or commentaries, one in favour of the home team, one in favour of the guest team and one neutral. The combination of presets and metadata allows the user to select a personalized audio scene which is adjusted to his/her needs, e.g. by enhancing the dialog volume, selecting a different language track or even moving audio objects.

You can create one or more presets by pressing the [+] button above the Preset properties section in the *MPEG-H Authoring Plug-In* UI (see Figure 4).
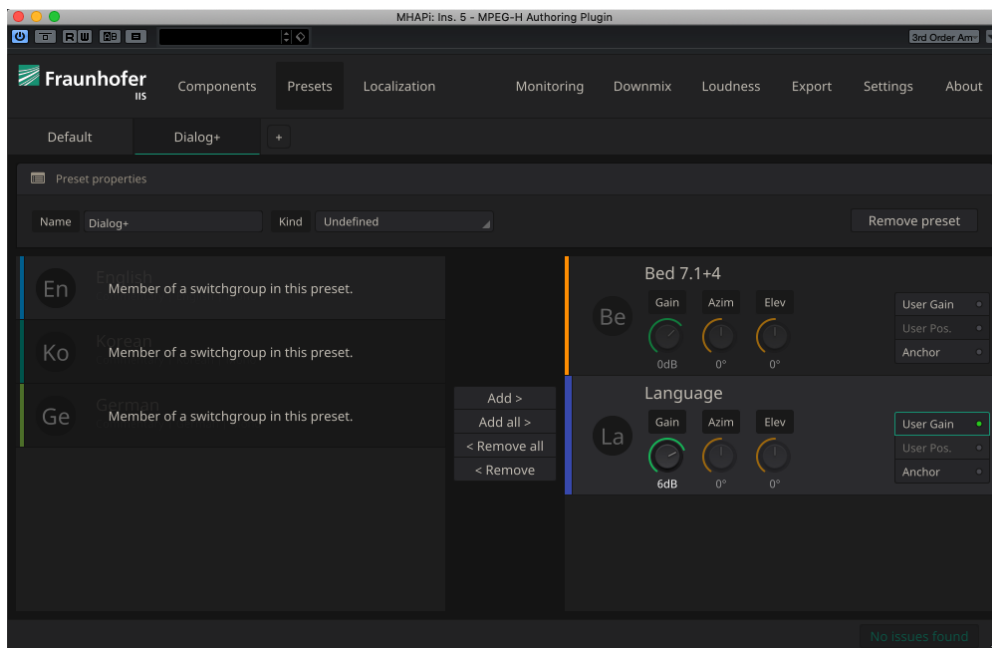
Figure 4: Preset tab of the *MPEG-H Authoring Plug-In*.

After you have created a new preset you can add the desired Components from the list on the left-hand side of the UI to the preset by selecting it and clicking the [Add] button in the center column of the plug-in. Enter a descriptive name for each preset, as this name will be displayed to the consumer via the on-screen interactive menu. Select a preset in the row above the preset properties section to display and edit its properties on the right-hand side.

Parameter Type	Description
Gain	This adds a static gain offset in dB to the specific Component within a preset e.g. to create a preset with increased dialog level. The audio file itself always stays untouched. The overall target loudness will be adjusted using metadata.
Azim./Elev.	Sets a static azimuth or elevation offset.
User Pos.	Enable or disable the user interactivity on the position of dynamic objects, inside the ranges specified in the Components section (see chapter 4.2).
User Gain	Enable or disable user interactivity on the playback gain of the respective Component, inside the ranges specified in the Components section (see chapter 4.2). The overall loudness of the current audio scene will be preserved but the prominence of the referred component will be increased or decreased according to consumer adjustments.
Anchor (loudness)	This checkbox defines the respective Components as the only source for the integrated loudness measurement. Moreover, it centers the MPEG-H dynamic range compression of all Components around this element's loudness. NOTE: This should be left turned off in most cases.

Please note:

- You have to define at least one preset within an MPEG-H scene.

- The first preset shall act as the default audio mix with neutral gain settings.

- An MPEG-H scene can contain up to eight presets.

- The *MPEG-H Authoring Plug-In* will calculate the loudness for each preset individually and adjust the playback volume in the decoder accordingly to guarantee preset switching without loudness jumps. NOTE: This requires to measure loudness in advance (see section 4.7).

- Make sure that no audio file has a true peak higher than -0.1 dB. Otherwise the scene export will be rejected.

After the definition of Components, Switch Groups (if intended) and Presets, the MPEG-H scene is completed and monitoring and exporting can be conducted. Chapters 4.5 and 4.8 describe the monitoring and export windows. Check for potential issues indicated by the status icon at the bottom right of the plug-in window, if monitoring and/or export options are not available.

NOTE: Monitoring will not be possible if there are empty Presets. The MPEG-H Authoring Plug-In prevents configuration of invalid MPEG-H scenes.

4.4 Localization

With MPEG-H, you have the option to set up object and preset labels in several languages, to make your content more accessible to viewers across different languages (see Figure 5). The Presets, Switch Groups and other interactivity options on the viewers' OSD will be displayed in their preferred language, if available. If their preferred language is not among those you have added to the session, the device will default to English. With the current version of *MHAPI*, up to four sets of labels can be added to an MPEG-H authoring session.
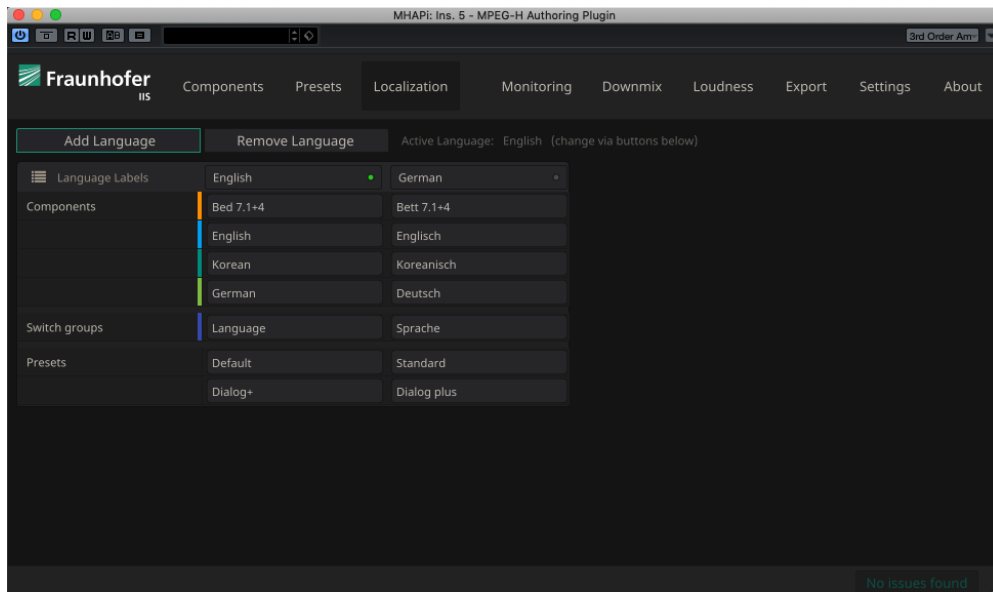

Figure 5: The Localization tab of the *MPEG-H Authoring Plug-In* GUI.

4.5 Monitoring

The Monitoring section of the plug-in offers a preview of your presets and interactivity settings and allows you to listen to your audio scene in different output speaker layouts (see Figure 6).

Please note that for correct playback and loudness compensated preset switching you will have to run a loudness measurement (see chapter 4.7) once you set up the session and every time when the loudness of a Component signal coming into the plug-in could have changed.

Switch between presets via the drop-down menu below the *Fraunhofer IIS* logo on the top left side of the UI.

The speaker layout selected at the bottom center of the monitoring tab determines the output signal on your *MPEG-H Authoring Plug-In* bus. This does not change the reference layout of your audio scene (which is set up on first opening of the plug-in and can be changed via the settings tab).
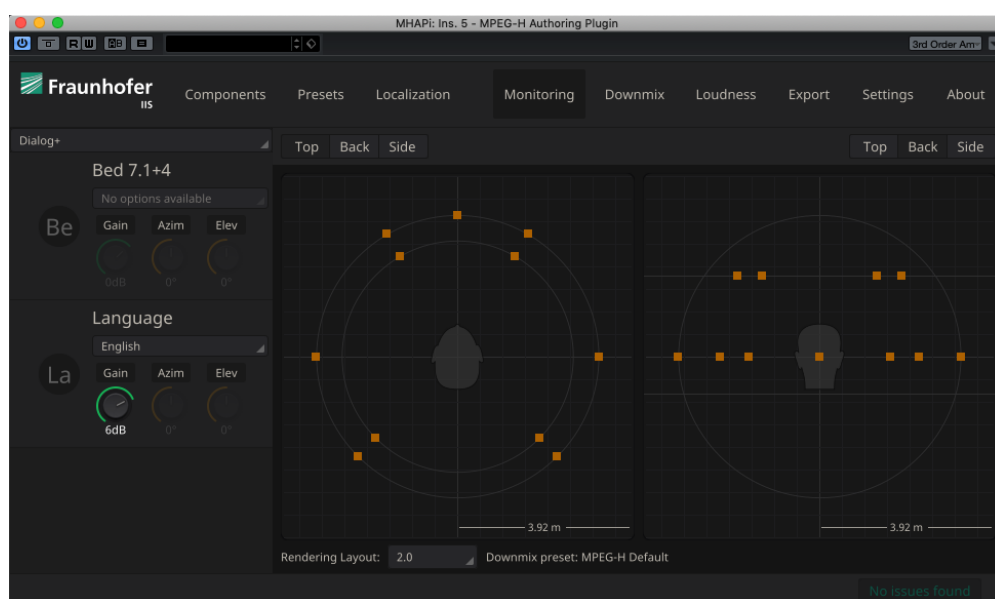
Figure 6: The monitoring tab of the *MPEG-H Authoring Plug-In*

4.6 Downmix

MPEG-H content can be played back on a large number of devices, from an AVR with dedicated speakers in an immersive 3D layout, soundbars, stereo speakers on TV sets, to headphones or mobile devices. If a downmix of immersive content is necessary, the MPEG-H audio system will automatically render channels and objects to the appropriate layout. While the default MPEG-H downmix settings are designed to cover a vast range of content, you may want to deviate from them for certain applications.

Click [Add 2.0 configuration] or [Add 5.1. configuration] and select the values that best fit your production.

The values will be written into the metadata and applied on playback, if necessary.

Table 1: Default MPEG-H downmix coefficients

LAYOUT	Center -> L/R	Surround -> Front	Upper Front -> Down	Upper Surround -> Down	LFE -> L/R
2.0	-3.01 dB	-1.94 dB	-1.41 dB	-1.41 dB	-3.01 dB
5.1	-3.01 dB	-1.94 dB	-1.41 dB	-1.41 dB	-3.01 dB

An example, where custom downmix coefficients are beneficial, is the authoring of an orchestral recording captured with a 3D microphone setup. Depending on the recording, the microphones for surround and height layer may be too prominent in a 2.0 downmix of that 3D session. By selecting the Classics preset, the downmix coefficients will be adjusted to prevent that. Preview the current downmix settings by selecting the corresponding layout on the Monitoring page of the plugin.

4.7 Loudness

Click the [Measure Loudness] button on the bottom right of the Loudness tab to bring up the loudness measurement dialog (see **Figure 6**).
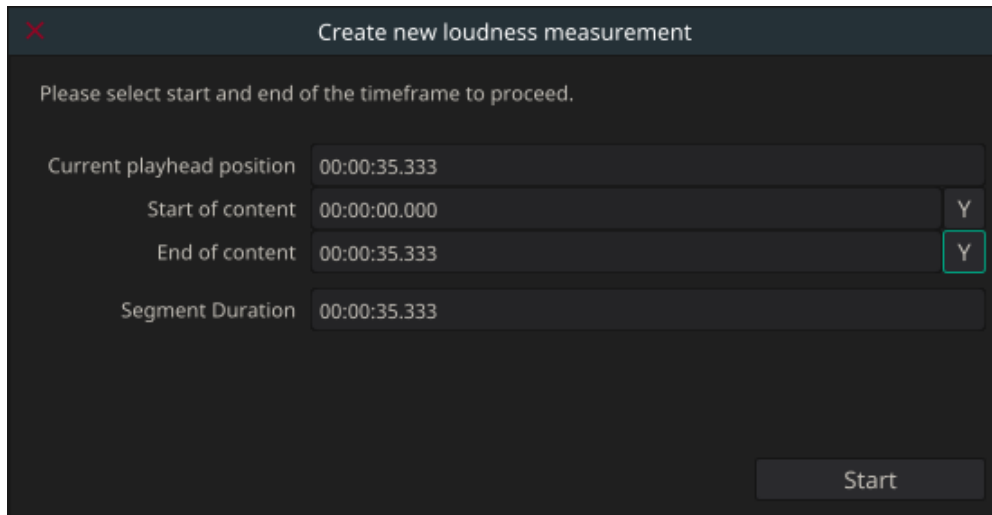

Figure 7: Starting the loudness measurement process.

Follow the on-screen instructions to set the time selection to cover the length of your content. Place the playhead at the beginning of your content and click [Y], then do the same for the out position. It is recommended to place the in and out positions on the video frame borders, to retain sync with video content. Set the DAW's grid to the video fps to ensure proper placement. Markers will help to relocate the start and end for reliable export ranges. Now place your playhead at or before the start of your content, click [Start] in the Loudness measurement dialog and commence playback in your DAW.

A pop-up window will track your progress and display the loudness values after the measurement is completed. If you interrupt playback during measurement, the *MPEG-H Authoring Plug-In* will remember the progress, so you can resume your measurement by restarting playback at that position (unless you press [Cancel]).

NOTE: In case the audio file of a Component has changed or other audio processing, such as compressor plug-ins or clip level changes have been applied to the signals going into the *MPEG-H Authoring Plug-In*, loudness needs to be measured again in order to monitor correct loudness. The *MPEG-H Authoring Plug-In* cannot track level changes that happen outside of the plug-in.

4.8 Export

Once you have completed the authoring and monitoring of the audio scene, you need to export the MPEG-H metadata in the form of a modulated audio signal, called "Control Track". Some devices may need an XML file, instead, which can be exported as well. Please make sure that there are no issues detected before starting the export process.

To export your MPEG-H audio scene, select an export file format (see Figure 8). The *MPEG-H Authoring Plug-In* currently supports export of the metadata as an .xml file, an export of the audio content and the Control Track as a multichannel WAV file and as BWF64/ADM. Multichannel WAV file including Control Track (also referred to as MPEG-H Production Format, MPF) is recommended for most applications. The Control Track, an audio track carrying all metadata, will usually occupy channel 16 of the resulting WAV file.

Choose a target folder and filename using the [. . .] button on the right-hand side of the plug-in window, select the desired bit depth (24 bit is recommended unless limiting factors such as certain playback devices are involved) and click [Start] to open the export dialog.
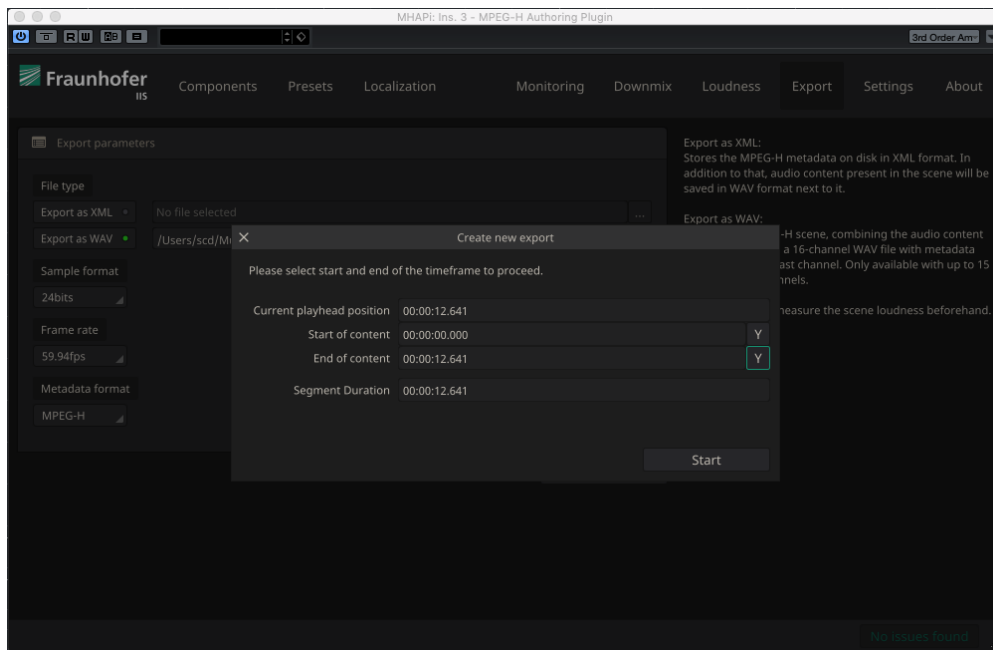
Figure 8: Export window of the *MPEG-H Authoring Plug-In*

The export workflow is the same as the loudness measurement: Set the exact start and end timecodes of your content, press [Start] and start playback in your DAW. Do not close the plug-in window during the export process or loudness measurement process.

NOTE:
The *MPEG-H Authoring Plug-In* supports export to *MPEG-H Production Format (MPF)* as well as export to Broadcast ADM. To export to Broadcast ADM, select BWF/ADM from the Metadata format dropdown menu.

IMPORTANT INFORMATION ON BWF/ADM EXPORT:

- Component gain offsets are not supported in the current BWF/ADM standard, as defined in ITU BS.2076-1. Setting values other than 0dB for component gains on the Preset page will disable ADM export to prevent invalid exports.

- Multi-language labels for components are not supported in ADM. When exporting a scene with multi-language labels to ADM, only the default label set is exported, additional label languages will be ignored.

- Setting custom downmix configurations is also not possible in the current ADM specification. If custom downmixes are set in your MPEG-H scene, these settings will be ignored when exporting to ADM.

- In ADM, there is no way to enable or disable user interactivity of a component on a per-preset basis like there is in MPEG-H. Therefore, user interactivity is always on, if a range for the values is defined.

NOTE:
If the export progress indicator stops counting towards 100, you can stop playback in your DAW, go back to somewhere before the drop out and commence playback. The plug-in will pick up the export process where it was lost, so there is no need to re-do the entire export.

4.9 Settings

Reference Layout
You are prompted to set this up when you first start the authoring process. If you want to change the reference layout of your session at any time during authoring, choose the proper layout from this menu. Usually, it should be set to the size of the biggest Component. If a 5.1+4 bed plus additional objects is used, the reference layout should be set to 5.1+4.

Interactivity range adaption
When set to "Auto-adapt ranges" the plug-in automatically adjusts the Component and Switch Group gain ranges (knobs on the Components page) such that they always include the preset gains set by the user. The ranges are always set to the minimum possible ranges, that contain all preset gains set for the affected Component or Switch Group. If Automatic mode is turned on, gain ranges of a Component are set automatically if the user adds the Component to an existing Switch Group.

Note, that in auto-mode you cannot manually set the gain ranges on the Components/Switch-Group page. Manual access is only possible if the auto-mode is deactivated. Once you activate the auto-mode again, all ranges will be set to the minimum required ranges to include all preset gains.

From a content creators perspective the interactivity ranges are only relevant if "user gain" in at least one preset is activated. Interactivity slider will be shown on the TVs Display (OSD). If "user gain" is active, the content creator may want to change the slider range by manually editing the gain ranges on the Components view. To do so, "Set ranges manually" has to be selected. For further information, see examples in the Walkthrough chapter on page 24.

Loudness
Option to allow manual override of measured loudness values. While this may be necessary for certain content types, it is recommended to keep it turned off. For further information, see examples in the Walkthrough Chapter 6.

5 Session Setup

For this guide, we will assume you have already mixed and exported your content, as this should be the typical situation for MPEG-H authoring. But the same principle applies when setting up the plug-in in your mixing session.

It is recommended to export the multichannel Components of your mix as multiple mono files (as this does not require dealing with different types of subbusses in your DAW).

NOTE: Template Sessions for Nuendo, Pro Tools and Reaper are provided in the plug-in download.

5.1 Nuendo step-by-step setup

1. Create a new Nuendo session and import your audio files to mono audio tracks
2. Add a new 22.2 or 3rd Order Ambisonics Group Channel.
   NOTE: You will have to switch the panner type in Nuendo to the default panner. Right-click the panner section in the MixConsole window and select Surround MixConverter (not MixConvert V6 or the AmbiDecoder, which are selected by default). This will bring up a blank window named Standard Panner, which can just be closed.
3. Add all mono child busses to this Group Channel track, by going to Studio → Audio Connections → Group/FX, then right click on the Group Channel and go to 'Add Child Bus to Channel' → 'Add All Mono Child Busses'.
4. Insert the plug-in on the Group Channel track and route to a suitable output.
5. Route the audio tracks of your channel-bed to the plug-in bus following the channel order specified in chapter Channel Layouts and Speaker Positions, followed by audio signals for audio objects.
   The most convenient way to do this, is by getting the audio tracks in the right order, then selecting all tracks for routing. As you set the output of the first track to the first sub bus of the *MHAPI* bus, hold down the Shift key. This will route the subsequent tracks to the following sub busses in ascending order.
6. You are now ready to begin creating a scene in the *MHAPI*.

5.2 Pro Tools step-by-step setup

NOTE:
Due to bus size restrictions in Pro Tools, *MHAPI* is only supported for use in Pro Tools 2018.x, since it utilizes the 3rd Order Ambisonics bus (not available in previous versions).

Signalflow overview:
The *MPEG-H Authoring Plug-In* is placed on a 3rd Order Ambisonics Aux input. Audio content is sent to that plug-in bus via mono- or multichannel sub busses. For monitoring, route the output of the plug-in bus to your speakers and select the matching monitoring setup on the plug-in's Monitoring page.

1. Create a new Pro Tools session and import your audio files to mono audio tracks. For routing convenience, put the channels of your bed in the order specified in

Channel Layouts and Speaker Positions, followed by the tracks for audio objects.

2. Go to Setup → I/O → Bus and create two new 3rd Order Ambisonics Busses. Make sure to select "auto-create sub paths".
   One of these busses will be the input of the *MHAPI* bus, one will be its output. The extra output bus is optional but helps when setting up sessions with multiple monitoring formats. We will label the busses "to MHAPI" and "from MHAPI".

3. On the output bus, create sub paths according to your desired monitoring setups. If you are using multichannel tracks for your audio, create the corresponding sub paths in the "to MHAPI" bus. If you use mono tracks as recommended here, the default 16 mono sub paths are all you need.

4. Add a new 3rd Order Ambisonics Aux input and insert the *MPEG-H Authoring Plug-In* (Multichannel Plug in → Sound Field → MPEG-H Authoring Plug-In 3rd Order Ambisonic).

5. Use the "to MHAPI" bus as the input and the "from MHAPI" bus as the output of the Aux channel.

6. To route multiple mono channels to the individual sub paths of the *MHAPI* bus in ascending order, select the audio tracks, hold Option+Command+Shift (on Mac) and select the first "to MHAPI" sub path as the output for the first audio track.

7. Create Aux inputs according to your desired monitoring options and connect them to the corresponding sub paths of your "from MHAPI" bus.

8. You are now ready to begin creating a scene in the *MPEG-H Authoring Plug-In*.

5.3 Reaper step-by-step setup

Signalflow overview:
The *MPEG-H Authoring Plug-In* is placed on a track with 16 or more track channels. In the TrackTemplates, that come with this plug in, the plug-in bus is set up as a parent track to the tracks carrying the audio. Also, the audio tracks in these templates only send their left channel to the plug-in, as it is set up to host individual mono tracks. If you prefer to use multi-channel audio tracks (e.g. stereo), remember to adjust the routing or use Item → Item processing → Explode multichannel audio or MIDI items to new one-channel items and distribute those single channel items to the different tracks. You could also use Sends to send audio to the Plug-in track. In that case, remember to un-check "Parent send" on the audio tracks.

1. Create a new Reaper session and import your audio files to audio tracks. For routing convenience, put the single channel files of your bed in the order specified in Channel Layouts and Speaker Positions, followed by the tracks for audio objects.

2. Create another track, make it the parent track to the audio tracks and set it to 16 channel tracks or more.

3. Select all your audio tracks and pan them hard left. Make sure they are at 100 percent L.

4. Now go through the individual routing windows and assign them to ascending parent channels. 1/2, 2/3, 3/4,...

5. Make sure your master track has at least as many track channels as there are speakers in your production layout (e.g. 12 channels for a 7.1+4H setup)

6. Insert the *MPEG-H Authoring Plug-In* on the parent track.

7. You are now ready to begin creating a scene in the *MPEG-H Authoring Plug-In*.

8. Optional: After routing, select your audio tracks and parent track, right click and select save tracks as track template. Or use one of the provided TrackTemplates as a starting point.

5.4 Pyramix step-by-step setup

You will need the VST2 version of the *MPEG-H Authoring Plug-In*. This version is currently unsupported but if you want to use it anyway, please contact us and we will send you the file.

1. Install the VST2 version of the *MPEG-H Authoring Plug-In*
2. Create a new Pyramix session. Make sure that the project's sample rate is set to 48kHz.
3. In the Mixer window, switch to the Configure tab and add a number of mono channel strips.
4. Add a new Mix Bus. Choose Custom from the Channels Mapping menu and set the Number of Channels to 16.
5. Switch to the Mix! tab of the mixer window, and route the mono strips to the individual channels of the mix bus by activating the panner on each strip, then clicking on Pan to open the menu. Select Channel Router (hold Shift to do this for all of the strips at once).
6. Now use the Channel Router to send the mono channels to the individual channels of the multi-channel mix bus. For multi-channel Components, such as the bed, follow the channel order specified in Channel Layouts and Speaker Positions. It is recommended to sort bed-channels according to this order, followed by audio signals for audio objects (see Figure 9).
7. Insert the VST2 version of the plug-in on the mix bus and configure the output routing according to your setup.
8. If you are encountering any problems when sending audio to the plug-in, open the routing view of the plug-in window and make sure all required inputs and outputs are connected (see Figure 10).
9. You are now ready to begin creating a scene in the *MPEG-H Authoring Plug-In*.

If you are experiencing high VST loads during playback/export, set the VST buffer size to 512 samples or above. (All Settings→Hardware→MassCore→VST Plugins Engine)
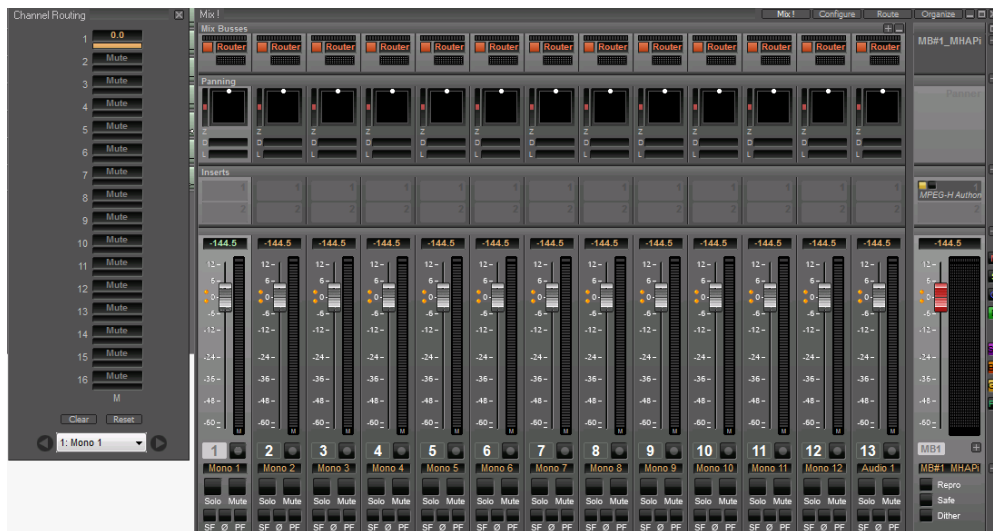

Figure 9: Pyramix Mixer configuration for use with the *MPEG-H Authoring Plug-In*
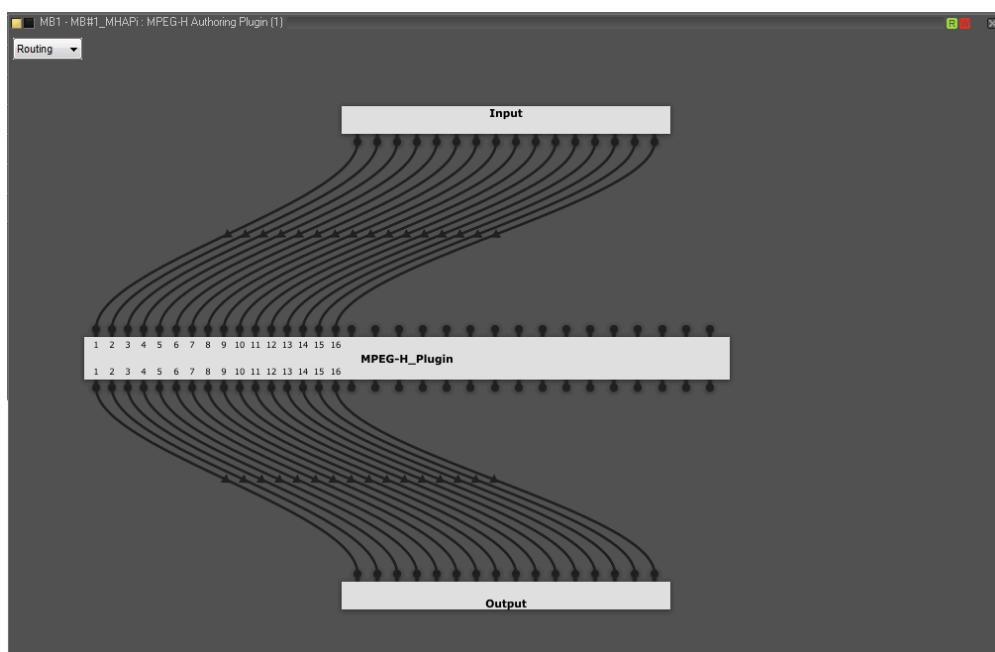
Figure 10: Routing view of the *MPEG-H Authoring Plug-In* in a 16 I/O configuration

6 Walkthrough: MPEG-H authoring

This chapter will walk you through the process of metadata creation, also referred to as authoring. The example session will consist of:

- 10 mono wave files for the 5.1+4H channel bed
- 3 mono commentary tracks, which we will organize in a Switch Group so the viewer can choose a preferred language.
- 2 mono files from a stereo pair which will be a dynamic stereo object that offers interactivity for the user.

6.1 Before you begin

Step 1 Set up the session following the guides in the previous chapters.
Step 2 Import the audio tracks in the following order:
  — Bed:
  01 Bed Left
  02 Bed Right
  03 Bed Center
  04 Bed LFE
  05 Bed Left Surround
  06 Bed Right Surround
  07 Bed Height Left
  08 Bed Height Right
  09 Bed Height Left Surround
  10 Bed Height Right Surround
  — Commentary Tracks:
  11 English
  12 German
  13 Korean
  — For Stereo Object:
  14 Object left channel
  15 Object right channel
Step 3 Instantiate the *MPEG-H Authoring Plug-In* (3rd Order Ambisonics version, if you're on Pro Tools) on the group bus. The plugin will ask you to select a reference layout. This usually is determined by the largest Component in the scene, 5.1+4H in this case.

6.2 Components

Step 4 Bed
  Go to the Components tab and add a channel based, static Component by clicking [+Ch]. Select the Component from the list so its properties are displayed on the right hand side of the plug-in window. First, select the proper speaker layout for your Component from the drop down menu (5.1 + 4H in this example). You will see the Subtrack inputs display on the bottom right has switched to 1-10 (10 channels).
  NOTE: It is important to set the correct layout before adding other channels or objects and metadata, because the input routing will change dynamically, possibly affecting the input routing of other Components!

Now add a description (e.g. 5.1+4H Bed), set the content kind to Mixed. Switch
Group and content language are not relevant for the bed, as it does not contain
a language track (those will be added as separate Components).
Interactivity settings are usually not set for Bed Components.

Step 5 Language tracks

Add three more channel based Components, one for each language. In this ex-
ample, those commentary tracks are mono, so no need to change the speaker
layout. Enter a description (e.g. English). This label will later be visible on the view-
ers on screen display (OSD) if he chooses to select a language. Select proper con-
tent kind and content language metadata (e.g. Commentary and English). These
settings will be analyzed by the decoder device (e.g. TV set) and the language
will be chosen according to the preferences set on that device (unless the viewer
decides to change it).

Step 6 Switch Group

Since we want the language tracks to have an either/or characteristic, we must
place them in a Switch Group. During playback, only one member of a Switch
Group can be selected at a time. To create a Switch Group, click the [+SwG] but-
ton above the list of Components. Select it and add a description (e.g. Language).
Select a commentary track and choose the newly created Switch Group from the
Switch Group drop down menu. Repeat for every language track. Note, that the
Components have been regrouped in the list to reflect which Switch Group they
are assigned to. Members of one Switch Group can not have a loudness diffe-
rence of more than 3dB.
NOTE: The interactivity settings are greyed out at the moment, because the auto-
adapt ranges mode of interactivity range adaption is selected by default. This can
be changed on the settings tab. More on that later.

Step 7 Objects (also referred to as dynamic objects)

Objects can have position automation and (if enabled during authoring) can be
moved around by the viewer using the OSD. They can be assigned any azimuth
and elevation and will be rendered to the reproduction layout (the speaker setup
available) during playback.
Click [+Obj] to create a new object and select it from the list. After adding a de-
scription, set the object count to 2 for this example, since we assume our object
is stereo. You will see the Automation lanes display on the bottom right has swit-
ched to 1,2. That means the first set of automation lanes will affect channel one,
the second set will affect channel two of our stereo object (see Figure 11).
By default all channels of one Component are in the azimuth 0 / elevation 0 po-
sition (center). This can be changed by either selecting and dragging the dots on
the small panning view on the Component page, by popping out the full panner
window (click the enlarge icon on the top right of the pan preview) or by enab-
ling and editing the values on the corresponding automation lanes in your DAW.
Set content kind (e.g. effect) and content language, if applicable.

6.3 Presets

A preset determines which combination of Components should be played back simul-
taneously, whether or not user interactivity is enabled on any of the Components and
contains additional metadata. There can also be offsets on the gain and position of
Components, which is set on a per preset basis. There can be up to eight presets in a
scene. Selecting one of the presets is the first and simplest level of user interactivity in
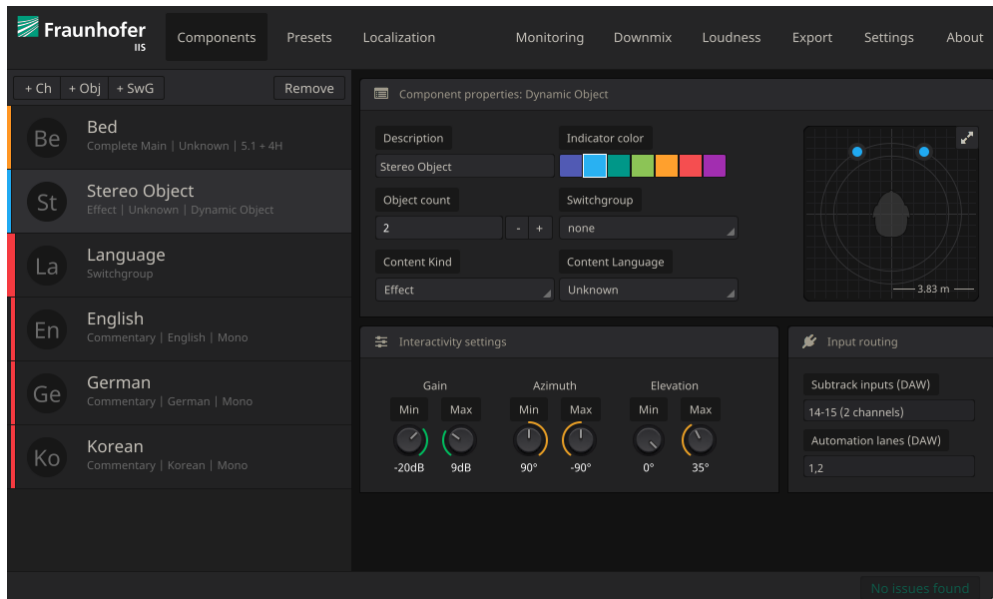an MPEG-H scene.

Figure 11: A possible configuration of MPEG-H Components

Step 8 Presets

Go to the presets tab of the plug-in and click the [+] icon to create a new preset, then set a name (e.g. Default) that will be visible on the viewer's OSD. On the left hand side there is a list of all the Components that could go into the preset, while the right hand side shows those that are already in the preset. Select the Components and click [Add] to add them to the preset or use [Add all] to add all the Components. Note how the language tracks will not be added individually but are represented by the Switch Group. The default preset is usually the standard broadcast mix, so just adding all the necessary Components is all it takes. Most of the time, this means adding everything except for special content such as audio description for the visually impaired or the PA announcer at a sports event. For special applications it often makes sense to create extra presets. One example for an extra preset is the dialog enhancement or Dialog+ preset. This shall have a gain offset on the commentary tracks to improve intelligibility for people who are hearing impaired. Click the [+] icon again to create a second preset, name it Dialog+ and add all Components, like before. From the Kind menu, select hearing impaired (light). That way, the playback device can always select this preset, if the user so chooses. To actually make the commentary track more prominent in the preset, apply an offset of +6dB to the language Switch Group, using the gain knob (Note: in auto-adapt ranges mode of interactivity range adaption, the interactivity range of this Component will be adjusted automatically. If you select Set ranges manually on the settings tab, you will have to make sure the interactivity ranges set in the Components tab cover the offset you want to set.) When switching between presets, the overall loudness of the scene will be retained, so you will mostly notice the background getting quieter, instead of the commentary getting louder. Add and populate more presets according to the contents of your scene (e.g. a venue preset, which does not contain the language Switch Group but instead another object containing the stadium announcer). Note that the azimuth and elevation knobs in each preset represent an offset on the actual position of the Component, not an absolute position. This offset is set individually per preset.

Now that we have created Components as well as one or more Presets and ha-

ve populated these presets, you will see the status indicator in the bottom right corner of the plug-in switch to green: No issues found.
Note: Before preset switching and interactivity can be properly auditioned, you will need to perform a loudness measurement of the scene.

6.4 User interactivity

If you want to add advanced interactivity options to your program that exceed simple selection of presets, you will have to set up the type and extent of these options. First, go to the settings tab and switch Interactivity range adaption to Set ranges manually. Then go to the Components tab, select a Component (e.g. the stereo object) and in interactivity settings adjust the range of interactivity you want the viewer to be able to use. E.g. you may want to set the playback gain of that object to be adjustable from -20dB to +9dB and the position by +/- 90°azimuth and +35°elevation (the height of the upper layer of the 5.1+4H layout). Now that the ranges are set, go to the presets tab to enable these parameters to the user (see Figure 12). This is done on a per preset basis. You may choose not to have any user interactivity enabled on the default preset but have an extra interactive mix preset. Or you could enable gain interactivity on the Dialog+ preset and set the gain range of the component on the Components page to +9dB. So if a user is not satisfied with our offset of +6dB on this preset, he could enhance the commentary by another 3dB. On the presets tab, select the preset you want to enable user interactivity on and turn on [User Gain] and/or [User Pos.] on the Components you want to be interactive.
NOTE: User position is only available on objects, not on channel based Components.
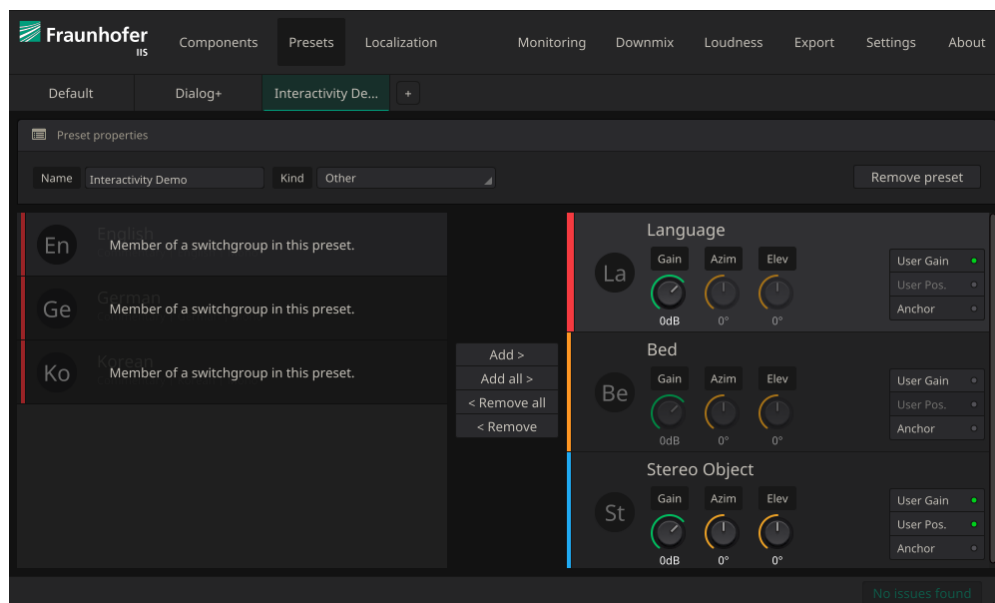

Figure 12: A possible configuration of MPEG-H presets

6.5 Loudness

Before scenes and presets can be auditioned correctly, a loudness measurement of the scene will have to be performed. The session will need to contain audio clips to do that and if this audio changes (e.g. more compression is applied) you will need to re-measure loudness to ensure correct playback during monitoring. To ensure the validity of your final delivery, loudness will be measured again during any export process.

Step 9 Loudness

Go to the loudness tab to perform a loudness measurement and get information on the loudness values of the Components and presets in the scene. Click the [Measure Loudness] button in the bottom right corner of the tab to bring up the create new loudness measurement dialog. To set the range for your loudness measurement, move the playhead to the desired start position and click the [Y] icon next to the corresponding time display. Do the same for the end position and click the [Start] button. The plug-in is now awaiting audio playback, so move the cursor to your start position or before and start playback. Note: The audio playback will not be passed through to your output during measurement. Just wait for the playback and measurement to finish.

Tip: On most DAWs you can get a quicker loudness measurement by doing a DAW export of the time line selection. The DAW will pass the audio through the plug-in so it will be able to calculate loudness values. Just delete the exported audio file after the measurement is done.

If the measurement is successful, you are ready to preview preset switching and interactivity. If not, please adjust your sessions according to the error message given. Playback during monitoring and final reproduction will automatically be loudness normalized to a value suitable for the type of device (AVR, TV, mobile device) or the selected DRC profile (default, noisy environment).

For special use cases, it may be necessary to override the measured loudness values, which is possible within a certain range. To enable this, go to the settings page and under loudness, enable [Allow manual override]. You can now set loudness values for presets manually (you will have to do a successful loudness measurement before you can modify them. Measured loudness values will be labelled 'accurate', see Figure 13). Setting a value that is louder than the one actually measured (e.g. -24 LKFS when the measured value is at -30 LKFS) will change the behavior of the decoder's loudness normalization and result in a quieter playback. This can be useful for content such as nature documentaries, that consist of mostly ambience sound that is deliberately low in volume.

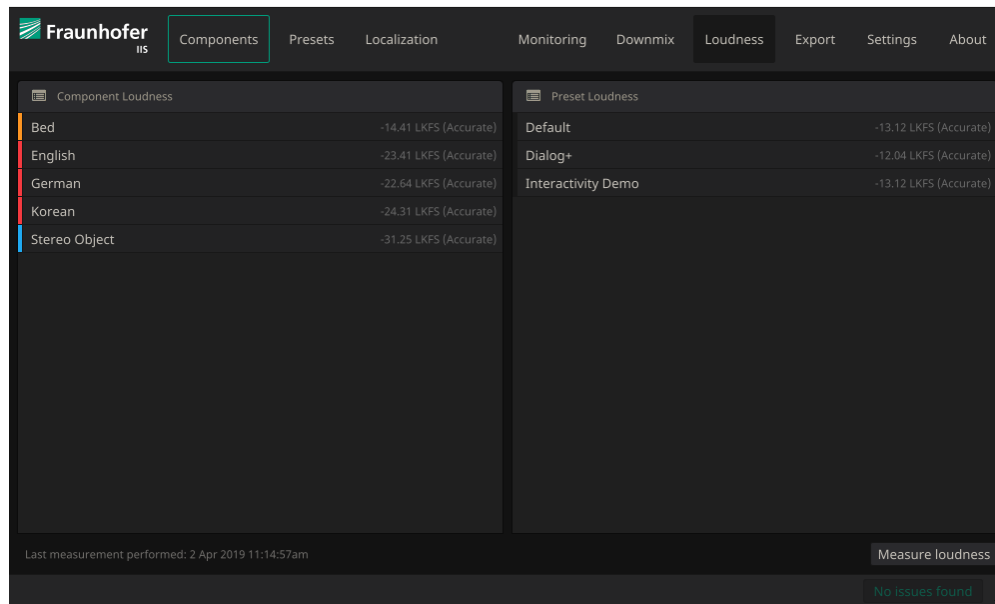NOTE: This option should be used very carefully!

Figure 13: The Loudness tab of *MHAPI*.

6.6 Localization

With MPEG-H, you have the option to set up object and preset labels in several languages, to make your content more accessible to viewers around the world. The playback device will select which language is displayed according to the viewer's preferred language settings. Click the [Add Language] button and select a language from the dialog, then add labels for this language. The green dot next to one of the languages indicates which language is currently active in your scene (see Figure 14). All other tabs within the plug-in will display labels following the active language. To remove a language, press the [Remove Language] button and select a language from the list. Make sure you have another language selected in the localization window, as you can not remove the active language. You can currently add up to four languages to an authoring session.

NOTE: The language selection emulates a consumer device's preferred language setting. Therefore, it will also affect which commentary language is treated as default.

6.7 Monitoring

Now that authoring is set up, it is time to start monitoring the scene, previewing user interactivity and downmixes etc.

10 Monitoring
    Go to the Monitoring tab and select the rendering layout matching your speaker setup. Hit play on your DAW to start monitoring the scene. Listen to the different Presets by selecting them from the drop-down menu, check members of Switch Groups, verify the interactivity ranges you set, audition different downmixes etc. Once you are happy with the results, proceed to the Export section and create an export in your preferred delivery format.
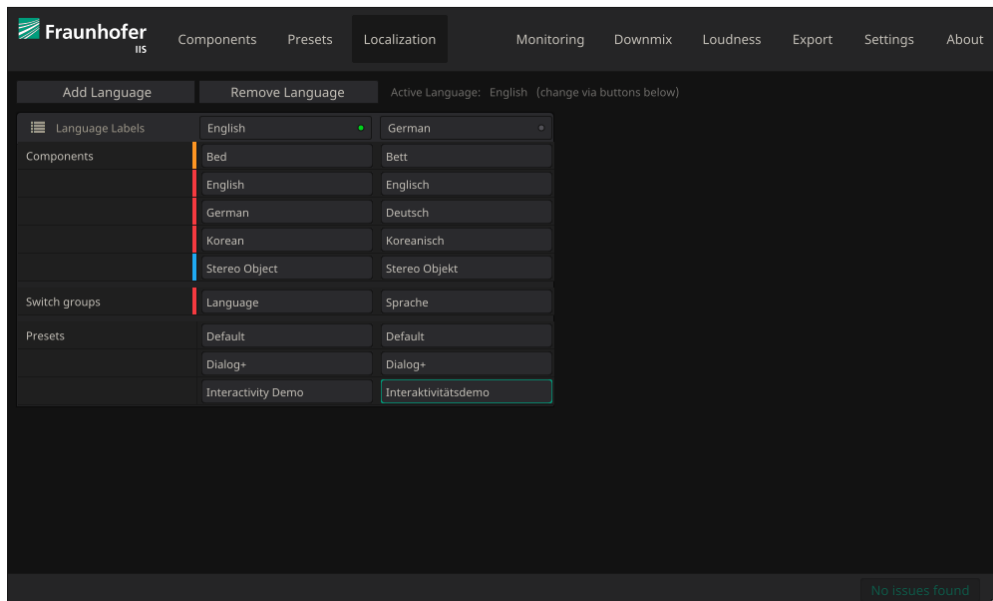
Figure 14: Component labels for English and German.

7 Good to know...

- Adding an empty audio track (track without audio signal) will affect the loudness measurement (according to standards, LFE signals are not taken into account during loudness measurement).

- On most DAWs you can get a quicker loudness measurement by doing a DAW export of the time selection. The DAW will pass the audio through the plug-in so it will be able to calculate loudness values. Just delete the exported audio file after the measurement is done.

- Make sure that no audio file has a true peak higher than -0.1 dB. Otherwise the metadata export will be rejected.

- Make sure that all Components which are members of a Switch Group have the same perceived loudness to allow seamless switching. Only the first Switch Group member is being taken as reference in loudness calculations, differences between the members are not being compensated.

- You have to define at least one preset within an MPEG-H scene.

- A maximum number of eight presets is allowed in this version of *MHAPI*.

- The *MPEG-H Authoring Plug-In* will calculate the loudness for each preset individually and adjust the playback volume in the decoder accordingly to guarantee preset switching without loudness jumps.

- The arrangement of the preset labels on the consumer's screen menu is following their preset IDs, ascending from left to right. Changing the IDs is only possible by deleting all presets and recreating them in the desired order.

- Label entries are limited to a 19 bytes long expression. Some non-ASCII-characters need several bytes per letter and may cause a warning, although only few letters are visible. In this case, please reduce the amount of characters.

- When saving a plug-in user preset within a DAW, loudness measurement values will be saved and recalled. If you load a preset for use with different audio, remember to carry out another loudness measurement to accurately monitor your mix.

8 Channel layouts and speaker positions

Table 2: List of MPEG-H channel layouts and corresponding speaker positions.

LAYOUT	CHANNEL ORDER	SPEAKER POSITIONS
Mono	01: Center	M 000
2.0	01: Left	M L30
	01: Center	M 000
3.0	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
LRCS	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: Rear Center	M 180
5.0	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: Left Surround	M L110
	05: Right Surround	M R110
5.1	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
7.1 (5/2)	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Left Front Wide	M L60
	08: Right Front Wide	M R60
3.0 Surr	01: Left	M L30
	02: Right	M R30
	03: Rear Center	M 180
Quad	01: Left	M L30
	02: Right	M R30
	03: Left Surround	M L110
	04: Right Surround	M R110
5.1 + Back	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE

Table 2: List of MPEG-H channel layouts and corresponding speaker positions.

LAYOUT	CHANNEL ORDER	SPEAKER POSITIONS
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Rear Center	M 180
7.1 (3/4)	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Left Surround Rear	M L135
	08: Right Surround Rear	M R135
22.2	01: Left Front Wide	M L60
	02: Right Front Wide	M R60
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround Rear	M L135
	06: Right Surround Rear	M R135
	07: Left	M L30
	08: Right	M R30
	09: Rear Center	M 180
	10: LFE2	LFE2
	11: Left Surround Side	M L90
	12: Right Surround Side	M R90
	13: Upper Left Front Wide	U L45
	14: Upper Right Front Wide	U R45
	15: Upper Center	U 000
	16: Top (Voice of God)	T 000
	17: Upper Left Surround Rear	U L135
	18: Upper Right Surround Rear	U R135
	19: Upper Left Surround Side	U L90
	20: Upper Right Surround Side	U R90
	21: Upper Rear Center	U 180
	22: Lower Center	L 000
	23: Lower Left Wide	L L45
	24: Lower Right Wide	L R45
5.1 + 2H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Upper Left	U L30

Table 2: List of MPEG-H channel layouts and corresponding speaker positions.

LAYOUT	CHANNEL ORDER	SPEAKER POSITIONS
	08: Upper Right	U R30
7.2 + 3H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround Rear	M L135
	06: Right Surround Rear	M R135
	07: LFE2	LFE2
	08: Left Surround Side	M L90
	09: Right Surround Side	M R90
	10: Upper Left Wide	U L45
	11: Upper Right Wide	U R45
	12: Upper Rear Center	U 180
5.1 + 4H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Upper Left	U L30
	08: Upper Right	U R30
	09: Upper Left Surround	U L110
	10: Upper Right Surround	U R110
5.1 + 6H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Upper Left	U L30
	08: Upper Right	U R30
	09: Upper Center	U 000
	10: Upper Left Surround	U L110
	11: Upper Right Surround	U R110
	12: Top (Voice of God)	T 000
7.1 + 6H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround	M L110
	06: Right Surround	M R110
	07: Left Surround Rear	M L150
	08: Left Surround Rear	M R150

Table 2: List of MPEG-H channel layouts and corresponding speaker positions.

LAYOUT	CHANNEL ORDER	SPEAKER POSITIONS
	09: Upper Left	U L30
	10: Upper Right	U R30
	11: Upper Center	U 000
	12: Upper Left Surround	U L110
	13: Upper Right Surround	U R110
	14: Top (Voice of God)	T 000
7.1 + 4H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround Rear	M L135
	06: Right Surround Rear	M R135
	07: Left Surround Side	M L90
	08: Left Surround Side	M R90
	09: Upper Left	U L30
	10: Upper Right	U R30
	11: Upper Left Surround Rear	U L135
	12: Upper Right Surround Rear	U R135
9.1 + 4H	01: Left	M L30
	02: Right	M R30
	03: Center	M 000
	04: LFE	LFE
	05: Left Surround Rear	M L135
	06: Right Surround Rear	M R135
	07: Left Surround Side	M L90
	08: Right Surround Side	M R90
	09: Upper Left Wide	U L45
	10: Upper Right Wide	U R45
	11: Upper Left Surround Rear	U L135
	12: Upper Right Surround Rear	U R135
	13: Left Edge of Screen	M LSCR
	14: Right Edge of Screen	M RSCR

9 Use of the content kind parameter

In the *MPEG-H Authoring Plug-In*'s first tab, the Components shall be assigned to a selection of "Content Kind" types. This enables the consumer decoder to select the content according to the user's preferences. The list below gives a short overview of the parameter values:

Content Kind	Description
Unknown	Undefined state. To be avoided
Complete Main	Full mix including all speech elements
Dialog	On-screen speech elements
Music	Music elements
Effect	Sound design elements
Mixed	Mix without dialogue or voice over, sometimes also referred to as "international feed".
LFE	For low frequency effect signals only. As most of the multichannel layouts already contain an LFE track, a separate LFE Component is rarely necessary.
Voice Over	Off-screen speech elements
Spoken Subtitle	Subtitles spoken by a human or text-to-speech process
Audio Description	Spoken description of the visual plot for visually impaired persons. Usually in pauses between dialogue elements
Commentary	Off-screen speech elements
Hearing Impaired	Enhanced mix for better speech intelligibility
Emergency	Special flag for content with highest priority. Reserved for public emergency announcements.

10 Known issues

- In ProTools there are occasional issues where loudness measurement does not start on the first try. To ensure proper loudness measurement and export please turn off Dynamic Plug-in Processing in the Setup > Playback Engine window.
- On Reaper, the space bar is passed to the DAW by default. So if you want to use whitespace in the plug-in, press Shift+Spacebar or right-click on the plug-in in the effects list and enable the Send all keyboard input to plug-in option.
- Do not try to initiate more than one instance of the plug-in within a DAW session.
- 64-bit systems are supported, only.
- If a scene has been created, the loudness will always be measured during export. When monitoring after exporting, loudness has to be measured again for correct monitoring.

11 Support, Contact and Bug Reports

Thank you for using the *MPEG-H Authoring Plug-In*!
Please send your feedback, suggestions or bug reports to the following contact, we're looking forward to hearing from you:

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