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Media system configuration guideline

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Date: 03/2022

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1 Media format use case overview

Use Cases					
ID	**Use Case**	**Actor (User / Provider)**	**CIs Interface**	**Resolution**	**Comment**
UC1	Bring your own device - HDMI	Passenger Tour Guide or Driver Fleet Operator	HDMI (CM-P)	720p @ 30 fps 1080p @ 30 fps	Cable or adapter required.
UC2	Bring your own content - USB	Passenger Tour Guide or Driver	USB (CM-P)	720p @ 30 fps 1080p @ 25 fps	Pre-processed content according to media format conversion guideline.
UC3	Webserver (Pre-Processed Content) - USB	Passenger Tour Guide or Driver Fleet Operator or Service Provider	USB (CM-R)	720p @ 30 fps 1080p @ 25 fps	Pre-processed content according to media format conversion guideline.
UC4	Mediathek (DRM) - USB	Passenger Fleet Operator or Service Provider	USB (CM-R)	720p @ 30 fps 1080p @ 25 fps	Pre-processed content according to service provider specification.

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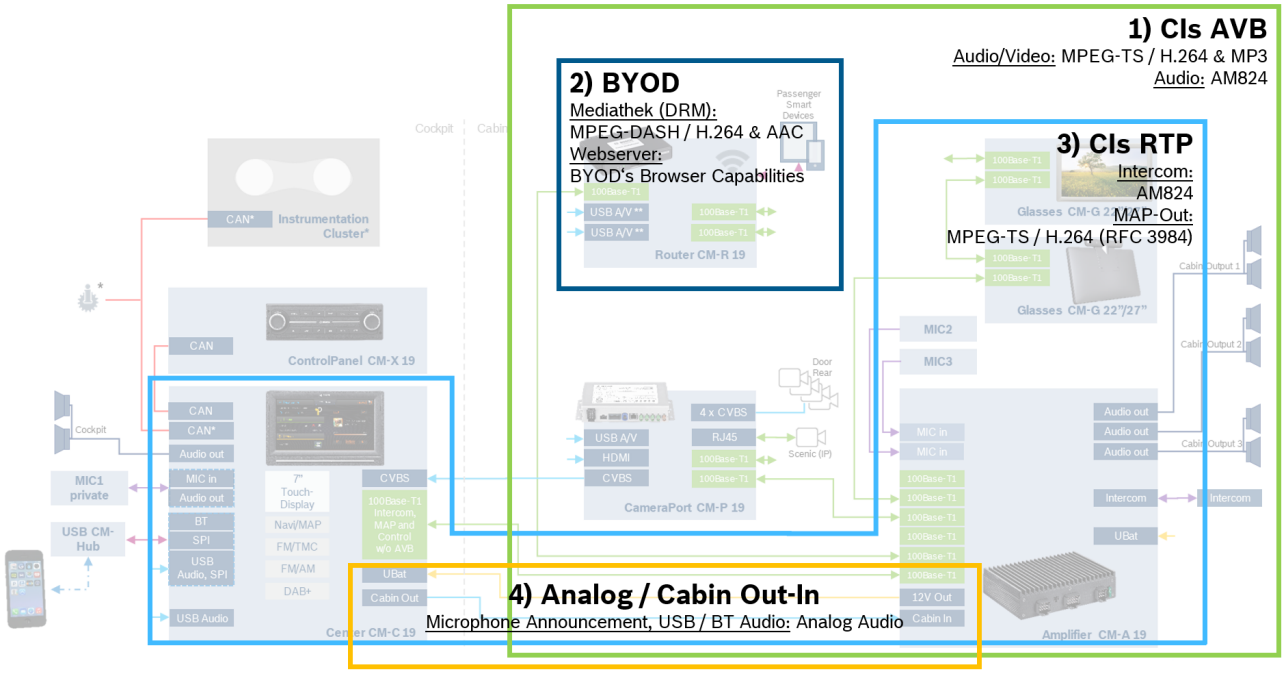
2 Media domains



1. **CIs AVB domain:**
   - The Coach Infotainment series (CIs) Audio Video Bridging (AVB) domain is the core domain for passenger entertainment. It enables the presentation of various audio or video sources to passengers via loudspeakers at the Amplifier CM-A 19 and displays of the Glasses CM-G.
2. **BYOD domain:**
   - The Bring-Your-Own-Device (BYOD) domain is provided by the Router CM-R 19 and accessible via WLAN.
   - Mediathek (DRM): The fleet operator/service provider may prepare an USB drive including DRM protected content for presentation to the passenger via the mediathek.
   - Webserver: The driver/tour guide or the fleet operator/service provider may prepare an USB drive for presentation to the passenger device via the webbrowser.
3. **CIs RTP domain:**
   - The Coach Infotainment series (CIs) Realtime Protocol (RTP) domain is used for dedicated use cases: bi-directional voice transmission for the intra-coach communication system (Intercom) and to stream the current location based on Center CM-C 19 navigation data to passenger monitors.
4. **Analog domain:**
   - The Analog domain is used for dedicated use cases: voice transmission for driver microphone announcements to passengers and general audio transmision from CM-C into the passenger cabin (e.g. Radio, USB Audio, BT Audio).

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3 Media format support

To assure proper pre-processing of files to be distributed and played in the CIs system, refer to the following sections and follow the media format conversion guideline.

3.1 Media format support per device

For an overview of all supported media formats per device (audio and video) refer to the respective user manual:

- Center CM-C 19
- CameraPort CM-P 19
- Router CM-R 19
- Amplifier CM-A 19

3.2 Video in CIs AVB domain

Video	
Codec	**Quality**
h264	Preferred Encoder: x264 Maximum Resolution: 1920x1080 px Maximum Framerate: 25 fps, Constant Maximum Encoder Profile: High Maximum Encoder Level: 4.1 Chroma: yuv420p Advanced Encoder Parameters: • bframes=0 • vbv-maxrate=10000 • vbv-bufsize=6000 Recommended Quality Parameter (CRF): 22
other	Not Supported

Video		Framerate (fps)			
Codec	**Resolution**	**<=24 fps**	**<=25 fps**	**<=30 fps**	**>30 fps**
h264	up to 1366x720	Yes	Yes	Yes	No
	up to 1920x1080	Yes	Yes	No	No
	beyond 1920x1080	No	No	No	No
other	any	No	No	No	No

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3.3 Audio in CIs AVB domain

Audio	
Codec	**Quality**
mp3	Preferred Encoder: libmp3lame Channels: 2 (stereo) Recommended Sampling Frequency: 44100 Hz Recommended Quality Parameter: 2
other	Not Supported

3.4 Container in CIs AVB domain

Container
mp4

3.5 Playlist file formats

Playlist file formats (e.g. M3U, PLS, ...) are not supported.

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4 Metadata support

- Title
- Artist
- Composer
- Album
- Genre
- Language: Refer to 3.1. Languages.
- Episode: Refer to 3.2. Chapters and Episodes.

The metadata database supports grouping by folder structure based on filesystem information.

4.1 Languages

The system supports alphanumeric 3-letter terminological codes according to ISO 639-2 assigned to an audio stream via the "language" metadata tag.

639-2 (Code T)	639-1	Language name(s) from ISO 639-2	Native name(s)
ces	cs	Czech	čeština; český jazyk
dan	da	Danish	dansk
deu	de	German	Deutsch
ell	el	Greek, Modern (1453–)	Νέα Ελληνικά Néa Ellêniká
eng	en	English	English
fra	fr	French	français
hun	hu	Hungarian	magyar nyelv
ita	it	Italian	italiano; lingua italiana
nld	nl	Dutch; Flemish	Nederlands; Vlaams
nor	no	Norwegian	norsk
pol	pl	Polish	Język polski
por	pt	Portuguese	português
rus	ru	Russian	русский язык russkiĭ âzık
spa	es	Spanish; Castilian	español; castellano
swe	sv	Swedish	svenska
tur	tr	Turkish	Türkçe

If another metadata tag than "language" is used, it is not associated with the audio on the stream level or the content of the "language"-tag is not according to the ISO 692-2 (Code T) the following metadata will be associated with this audio stream: "und" (abbr. for undetermined). The following tags from the ISO 639-2 standard are unsupported by the mediaplayer:

- mis, for "uncoded languages";

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- mul, for "multiple languages";
- qaa-qtz, a range reserved for local use.
- zxx, for "no linguistic content; not applicable";

4.2 Chapters and episodes

Chapters

Chapters via metadata are not supported. Tools with split-by-chapter feature may be used to achieve the same functionality, to jump to the last or next chapter..

Episodes

Files may be associated with each other via the "episode" metadata tag.

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5 Media format conversion guideline

Refer to the media format conversion guideline for instructions to generate pre-procesed content compatible to the CIs system.

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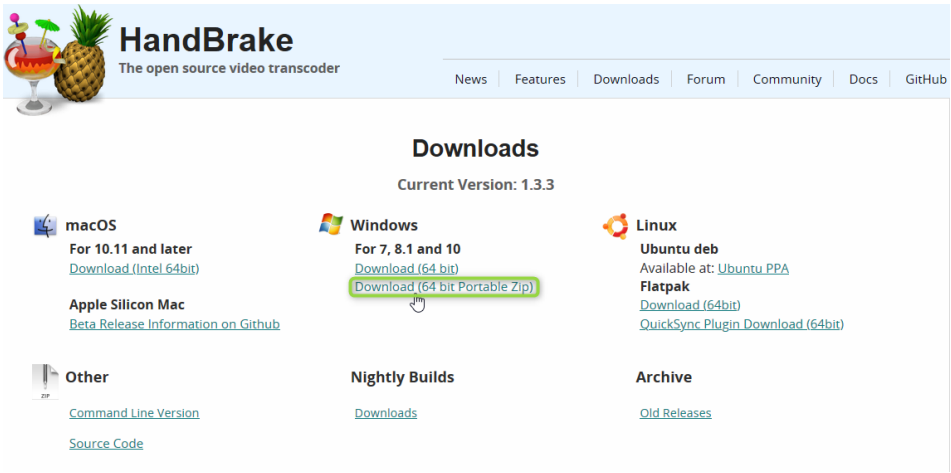
6 Media format conversion guideline (Tools: HandBrake)

Devices of the Coach Infotainment series are unable to transcode the various number of video file formats available on the market, because of performance restrictions of the system hardware. Therefore the multimedia must be pre-processed into a suitable format.

Motivation of the instructions: Re-encode video files of any quality (e.g. 4K) into a suitable, compatible format for playback within the Coach Infotainment series.

Step	Name	Description
1	Download HandBrake	Go to https://handbrake.fr/downloads.php and download the version of HandBrake relevant for your platform.  For Windows, preferably use the **64-bit Portable Zip**. It will also run directly from an USB stick without an installation.
2	Download conversion preset file	Go to https://www.bosch-professional-systems.com and download the conversion preset file relevant for your product platform (e.g. CIs, SmartSeries,...). CIs: cis-preset-4.0.json. smartSeries: smart-preset-1.0.json

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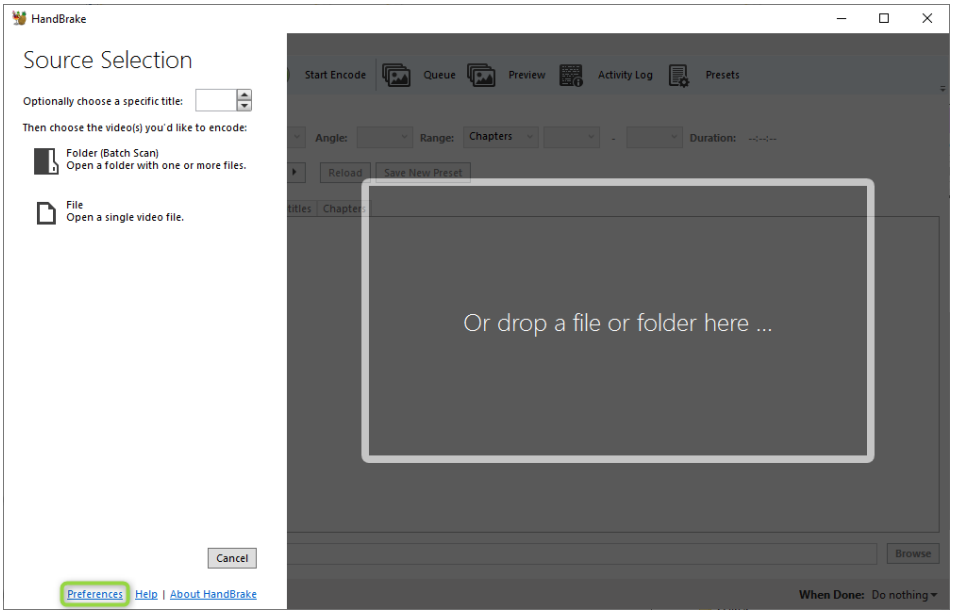
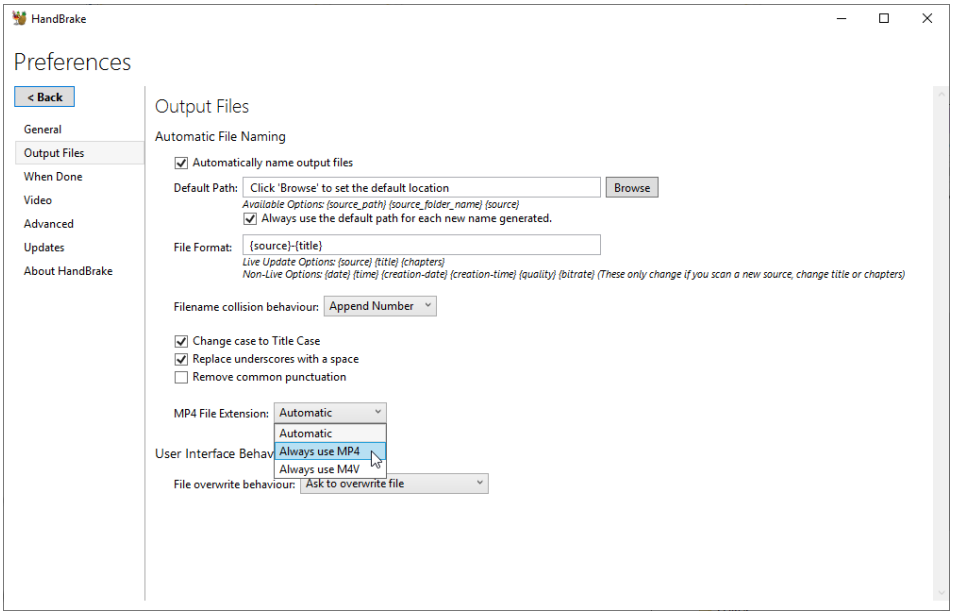
Step	Name	Description
3	HandBrake Preferences	Go to "Tools" >> "Preferences" >> "Output Files" and set "MP4 File Extension" to "Always use MP4". Please use the "< Back" button to return to the start screen.  

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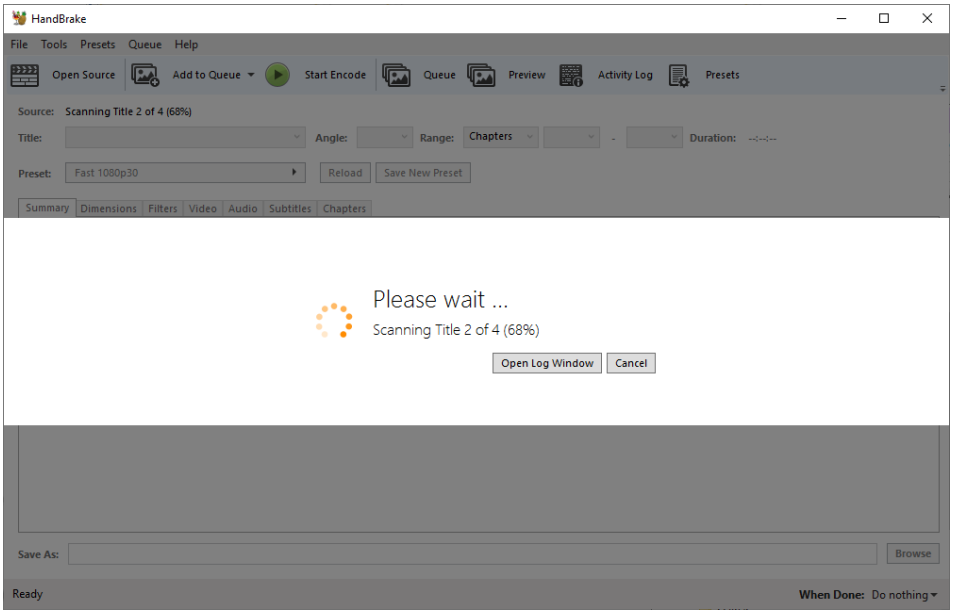
Step	Name	Description
4	HandBrake Source Selection	Use one of the various variants to select files for conversion. The fastest approach is to put all files for conversion into a single directory and do a "Folder (Batch Scan)". Handbrake will take some time to pre-analyse the files regarding their encoder parameters. 

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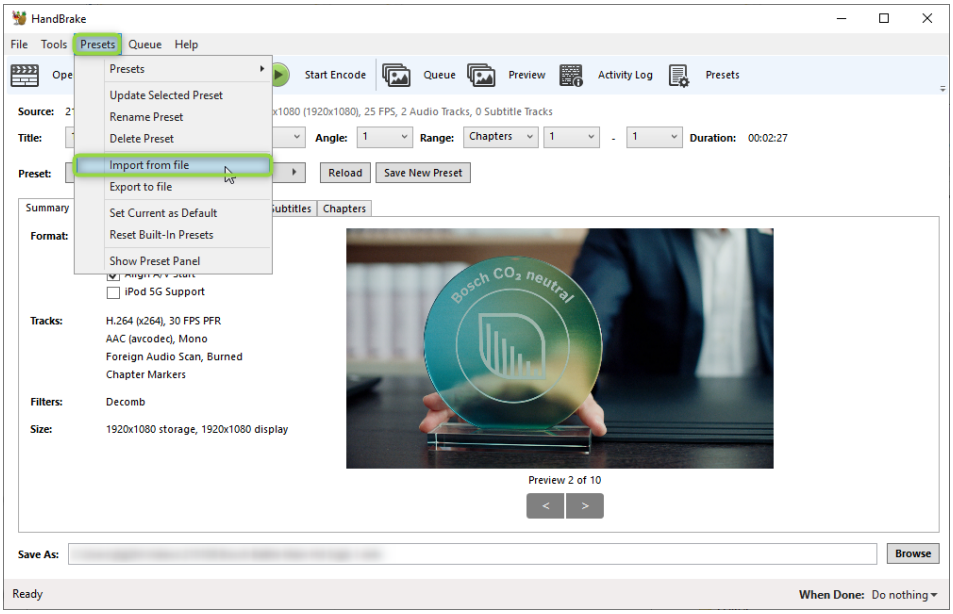
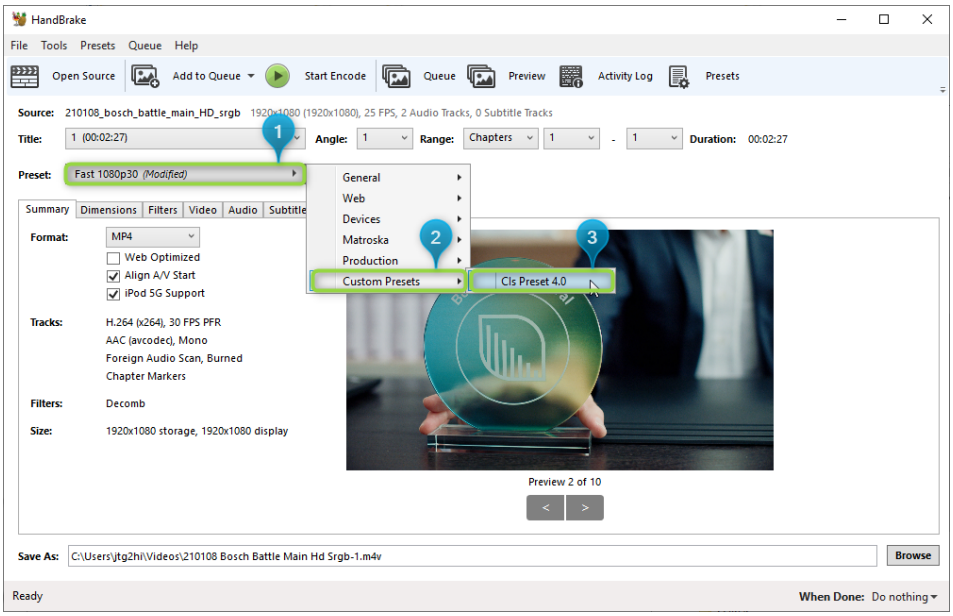
Step	Name	Description
5	HandBrake Preset	Import the conversion preset downloaded at step 2.  Select the latest conversion preset downloaded at step 2.  For simplicity the next time you are going to prepare files for CIs compatibility: Make the conversion preset your default.

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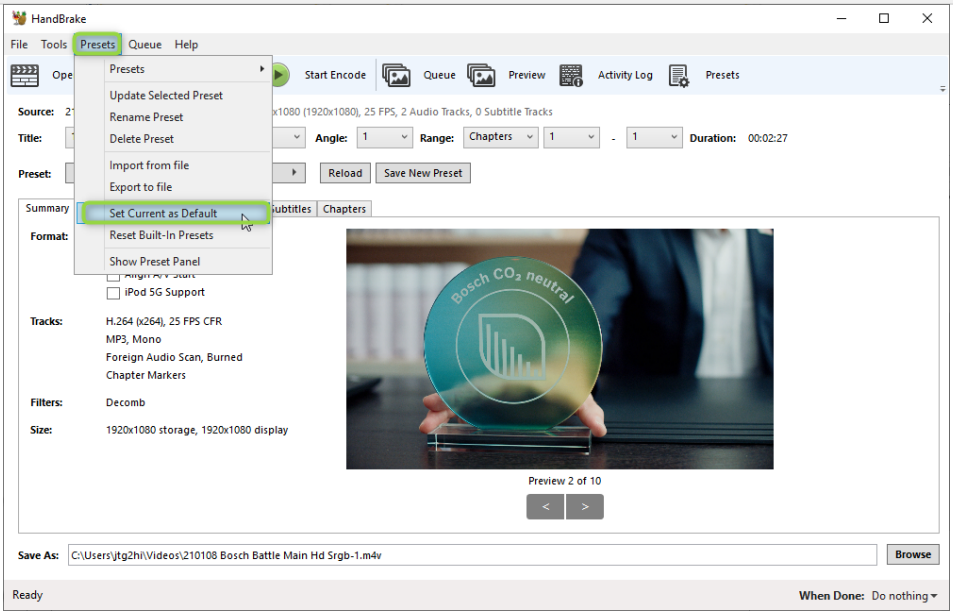
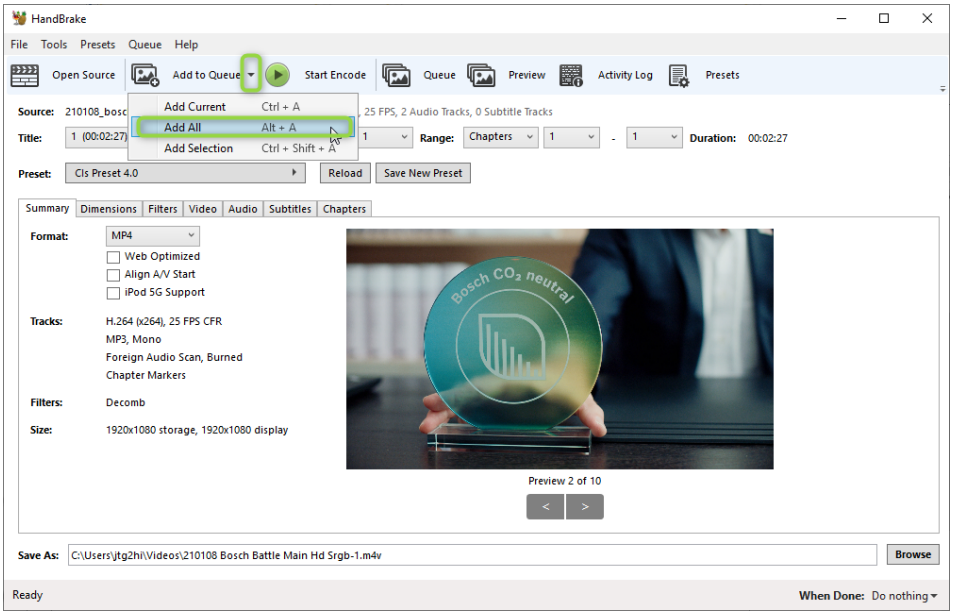
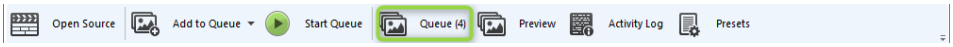
Step	Name	Description
		
6	HandBrake Queue	To use HandBrake for file conversion, you will have to fill its queue with work items for each of your files. The fastest approach is to use the "Add All" function. For every file pre-loaded on source selection (step 4) an entry to convert the file according to the current preset will be created:  If everything worked, you will see that all of your files have been added to the queue: 

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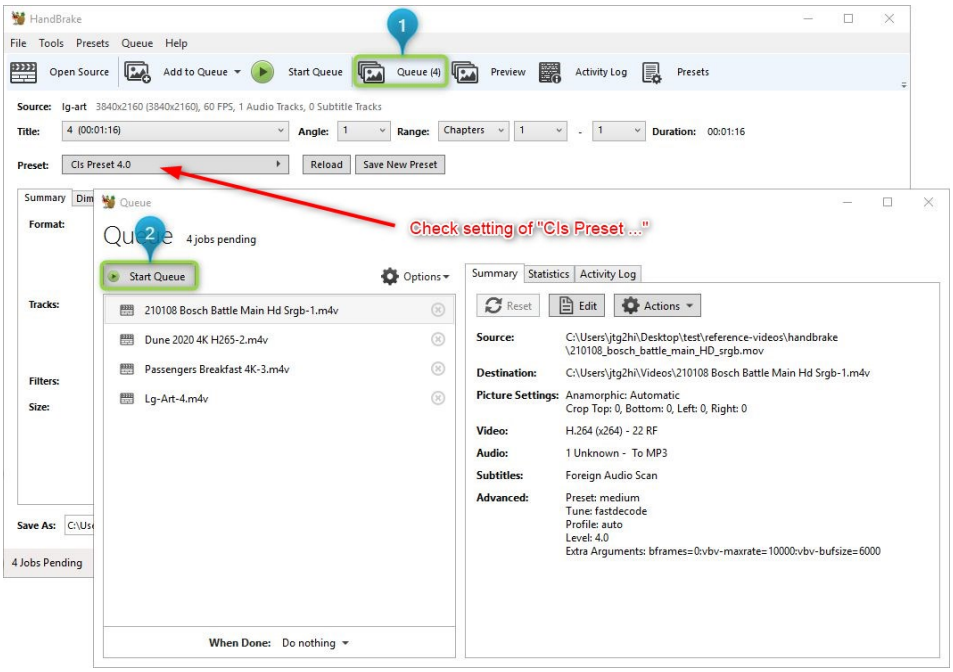
Step	Name	Description
7	Conversion	Because the conversion process may take a lot of time per file, it is recommended to open the "Queue" (1) window and start the encoding process from there via "Start Queue" (2). 

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