Creating 4k UHD Blu-Ray Discs With (Almost) Free Software

Prequel

This guide has been tested with a Panasonic DP-UB824 ONLY. Panasonic players are known to be picky so hopefully it will work in other players too. A huge issue was EAC3 playback. Newer versions of tsMuxeR did not create any playable result. The issue has been found and fixed. However, pure EAC3 like used in streaming is not Blu-Ray compliant. Most UHD players should also support streaming or USB / network playback and therefore be able to handle such audio of at least bitstream it to your receiver / soundbar. If you have a completely unsupported audio format (like AAC), you MUST convert it to get a playable result. The same of course goes for unsupported UHD video formats like AV1. And no, this will not work even if your player theoretically knows the format because the playlist and clipinfo simply have no values specified for those formats.

Software Needed

- BDEdit >=0.54 (Donation Version)
- MediaInfo
- MKVToolnix
- MultiAVCHD
- tsMuxeR (GIT/Nightly Build, 2023-03-25 or newer)
- Video Converter of your choice

Instructions

 Convert your (HEVC) UHD video file to AVC 1080p. You MUST include all streams you want to have in you final disc and they MUST be in the same order for both versions (1080p and UHD). Some video converters remove some streams. In that case re-multiplex with MKVToolnix after conversion.

Note: Your 4k source file must be UHD BD compliant to work. Especially it must be HEVC and must not be cropped (full 3840x2160 resolution). Otherwise you need to fix this (by re-encoding) first.

Note: The video quality of the 1080p file is not that important. Just remember that the thumbnails for the menus are created from this file.

Note: The audio format must also be (UHD) Blu-Ray compliant. Pure EAC3 usually works but something completely different like AAC or also MP2 (that could be included on DVDs) won't.

- 2. Create your Blu-Ray in MultiAVCHD with the 1080p AVC files. There are many tutorials for MultiAVCHD. This will not be covered here.
- 3. Multiplex your UHD files with tsMuxeR. Remember to put the streams in the correct order. MultiAVCHD sometimes messes up the subtitle order if you add external subtitles, so double check. The file number can be set in the "Blu-Ray" tab. Default is to create 00000.m2ts. Change the number accordingly. "Force BD-ROM V3 format" should be set automatically on HEVC videos.

Note: tsMuxeR uses different settings for subtitles. The default settings result in small subs. You likely want to adapt this. MultiAVCHD uses: Trebuchet MS, size 45, bold, 2 pixels border and 45 pixels offset from the bottom. I suggest increasing the font size even more for UHD.

© tsMuxeR GUI	
Input General Blu-ray Split & cut Subtitles About	
Chapters Chapters No chapters Insert chapter every Custom chapters list	Options Add blank playlist for cropped video Blank playlist 1900 V Force BD-ROM V3 format
Chapters:	First M2LS file 1 * First M2TS file 1 * Start mux time 0:00:00.000 * 45 Khz dock: 0

- 4. Copy the resulting M2TS file from the STREAM directory to the STREAM directory of your MultiAVCHD Blu-Ray. Copy the CLPI file from the CLIPINF directory to the CLIPINF of your MultiAVCHD Blu-Ray. Replace existing files. Do NOT copy the playlist!
- 5. Open BDEdit and load the MultiAVCHD Blu-Ray folder. Go to options and convert to version 3.00.

IV <u>P</u> LAYLIST <u>C</u> LIPINF <u>M</u> enu I	BDJO META Options Status 4	bout
al Create backup files we to BACKUP dir we 8.3 filenames fo Background ut folder creed beep on invalid command sociate BDedit to .bdmv file extension isociate BDedit to .mnu file extension we META title instead of folder name	Menu options Menu backgr. Navy Object backgr. Silver Selected button Yellow Selected frame Red Normal button White Invalid button Gray Gray Selected frame Silver Silv	Button ID (hex) Player settings Button ID (hex) A @ B C Code 5553 US Object ID (hex) Language preferences Button frame Audio eng V Sub eng V Menu eng V Window frame Audio capability Show InEffects AAAAA Show OutEffects Display capability Animate buttons V P FFF Player settings Country code 5553 US
at options spter format PTS Frame Time The PID format Save PES stream (not elementary) Save SUP if PG stream Save MNU if IG stream gram format List (*.ist) Binary (*.bin)	Window frame Line Vindow frame Line Init PSRs with 'real' values Activate command show delay (ms) 500	Full screen view If I screen view Draw page on ch. Text subtitle capability Grid size 15 Reorder button ids If I I I I I I I I I I I I I I I I I I

6. For each replaced stream open the playlist and set the video parameters so that they match the actual file. Use MediaInfo to get the details.

🜮 BDedit	
BDMV PLAYLIST CLIPINF Menu BDJO META Options Status About	
xxxxxx.mpls AppInfoPlayList ExtensionData no ExtensionData 00000 6 6 6 6 Read 6 6 6 6 6	
PlayList file c rS IN time OUT time length UO1 UO2 An 000 00000 1 00 00:10:00.000 01:02:13.280 00:000000 0 0 0 Au PG IS STN 1 2 2 1 0 0 0 Apply to clpi type mPID SPid SCid SPID attrib 000 PlayList 000 PlayList AVC, 1080p, 24, SDR AVC, 1080p, 24, SDR <td>* •</td>	* •
PlayItem v 1011 AVC v 1080p v 24 v SDR v	🖉 All PI
BDedit	
BDMV PLAYLIST CLIPINF Menu BDJO META Options Status About	
BDMV PLAYLIST CLIPINF Menu BDJO META Options Status About xxxxx.mpls AppInfoPlayList 0 000000000000000000000000000000000000	
BDMV PLAYLIST CLIPINF Menu BDJO META Options Status About xxxxx.mpls AppInfoPlayList	+ •

7. Check the PIDs for audio and subtitles. I had to adjust the subtitle PIDs from 120x to 12Ax. Also use MediaInfo here to check the PIDs.

🐉 BDedit		- • ×
BDMV PLAYLIST CLIPINF Menu BDJO META Options St	tatus About	
xxxxx.mpls AppInfoPlayList 00000 v Sequential v 0 000000000 random access audi Read audi	io mix bypass mixer MVC base view R no ExtensionData 1.00	
PlayList file c rS IN time OUT time length UO1 UO2 An 000 00000 1 00 000:52:13.280 00000000 00000000 0	Vi Au PG IG sX PIP 1 2 2 1 0 0 Apply to dpi type mPID SPid sCid sPID attrib 000 PlayItem 1201 eng eng 001 PlayItem 1201 deu	••

- 8. Don't forget to click "Save" on the lower left for each Playlist!
- 9. Copy the directories CLIPINF and PLAYLIST into the BACKUP directory and replace all files / directories. You may delete the .backup files first.
- 10. Check the result in PowerDVD or any other software player. However, PowerDVD seems to be very picky and crashes often, so it is good for testing.
- 11. Burn to BD-R (or BD-RE first) and re-test in your standalone player. Note: 4k UHD Blu-Rays usually use a different physical format then regular Blu-Rays. This allows for a higher capacity and bitrate. Those are not available for sale as BD-R with the exception of crazy expensive BD-XL 100GB and 128GB. However, those seem to have playback issues in most players beyond the second layer. I just use "normal" BD25 or BD50 discs. As long as the bitrate does not exceed the specification for those formats, they SHOULD play fine.

Thanks to Pel9 for providing a new version of BDEdit with the ability to covert files to the UHD V3 format and to jcdr428 from the tsMuxeR developer team for his patience and help in figuring out the EAC3 muxing issue in the open source version.