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

1. 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.
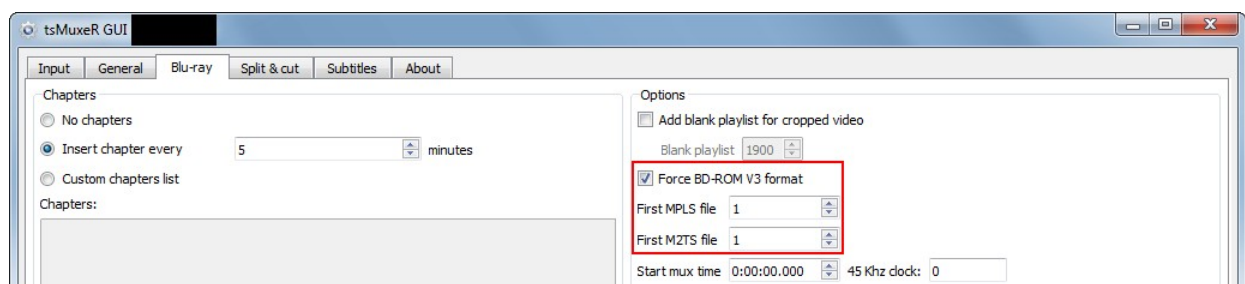   Note: Your 4k source file must be UHD BD compliant to work. Especially it must be HEVC and must not be cropped (full 3840x2160 resolution). Otherwise you need to fix this (by re-encoding) first.
   Note: The video quality of the 1080p file is not that important. Just remember that the thumbnails for the menus are created from this file.
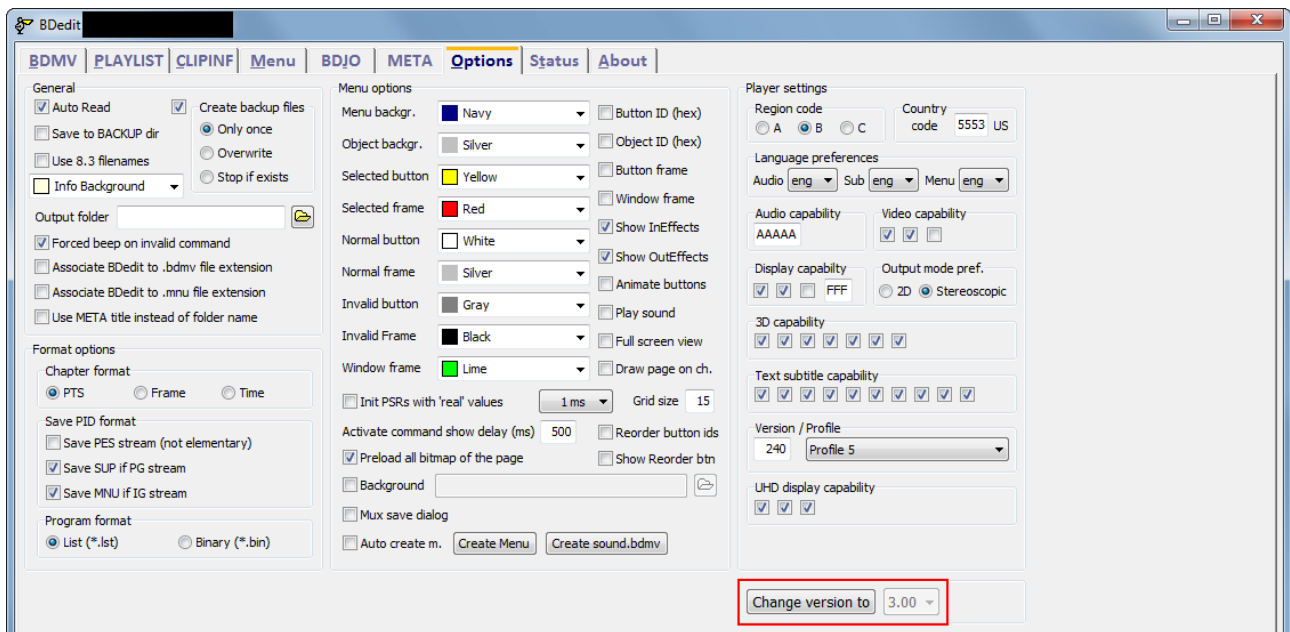
Note: The audio format must also be (UHD) Blu-Ray compliant. Pure EAC3 usually works but something completely different like AAC or also MP2 (that could be included on DVDs) won't.

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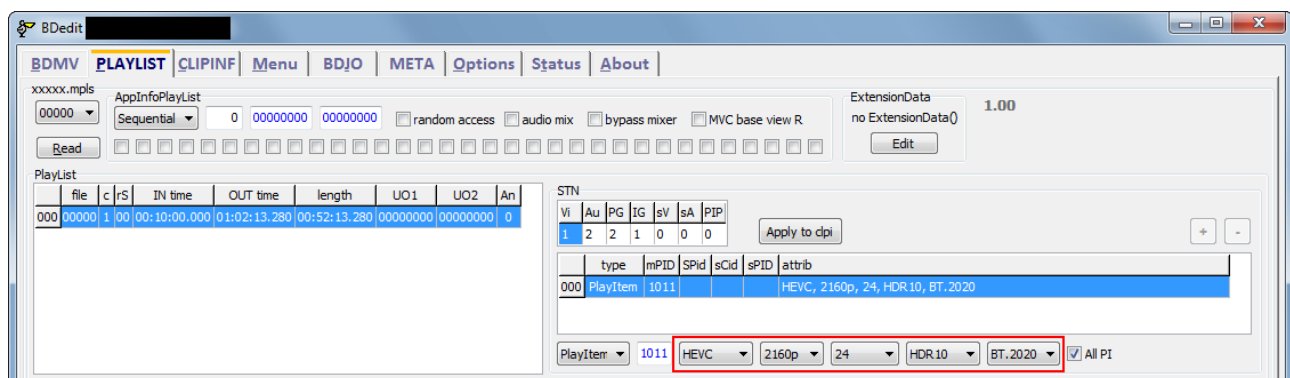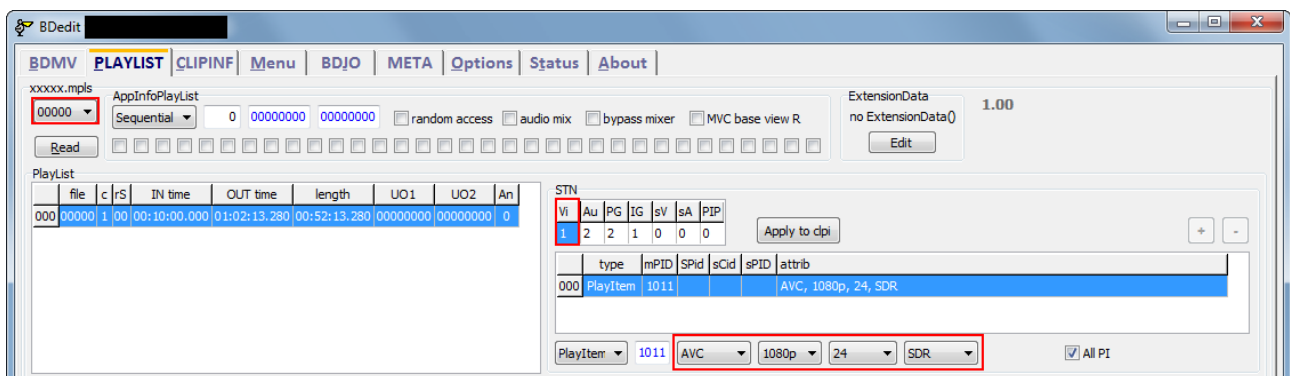
Note: tsMuxeR uses different settings for subtitles. The default settings result in small subs. You likely want to adapt this. MultiAVCHD uses: Trebuchet MS, size 45, bold, 2 pixels border and 45 pixels offset from the bottom. I suggest increasing the font size even more for UHD.
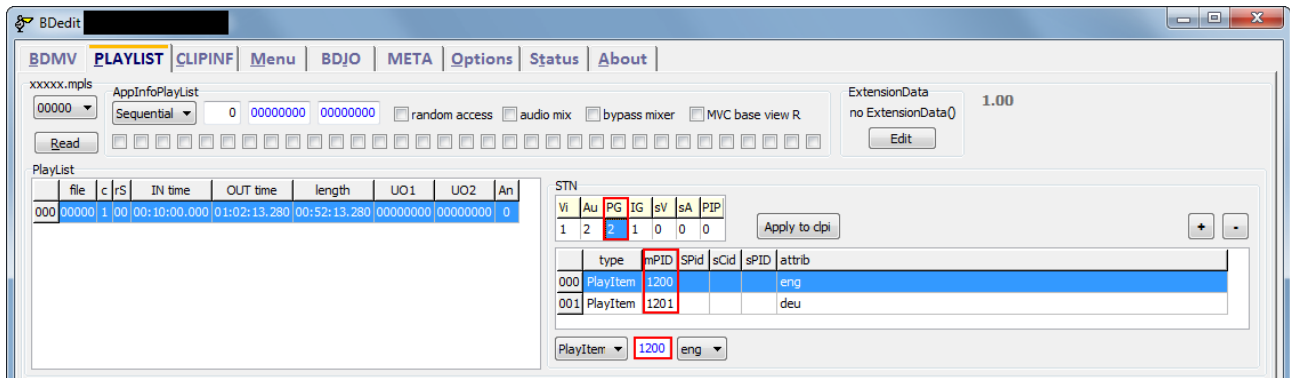

4. Copy the resulting M2TS file from the STREAM directory to the STREAM directory of your MultiAVCHD Blu-Ray. Copy the CLPI file from the CLIPINF directory to the CLIPINF of your MultiAVCHD Blu-Ray. Replace existing files. Do NOT copy the playlist!

5. Open BDEdit and load the MultiAVCHD Blu-Ray folder. Go to options and convert to version 3.00.

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.

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.

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.