English version is derived from the [x264](https://www.nazorip.site/archives/63) x265 Ultimate Tutorial Project by same author iAvoe

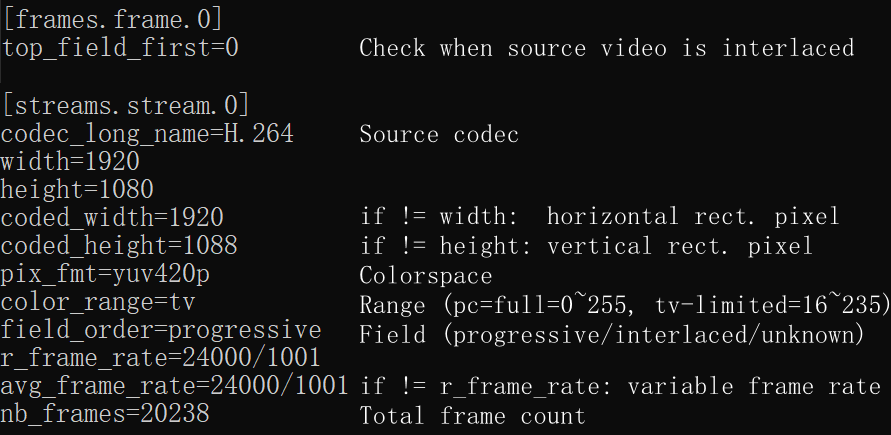
|  |  |
| --- | --- |
| [**LigH**](http://www.mediafire.com/?6lfp2jlygogwa) | .hevc GCC10 [single .exe 8-10-12bit] w/ x86 w/ libx265.dll |
| [**Rigaya**](https://drive.google.com/drive/u/0/folders/0BzA4dIFteM2dWEpvWGZXV3ZhdTA) | .hevc GCC 9.3 [8-10-12bit] w/ x86 |
| [**Patman**](http://www.mediafire.com/folder/arv5xmdqyiczc) | .hevc GCC 11+MSVC1925 [8-10-12bit] |
| [**ShortKatz**](https://forum.doom9.org/showthread.php?p=1937773#post1937773) | arm64~64e with x86 ? [?] macOS compiling needed |
| **[DJATOM-aMod](https://github.com/DJATOM/x265-aMod/releases/)** | Intel, AMD zen1~2 [10bit], zen3 [10-12bit] GCC 10.2.1+GCC10.3 |
| **[MeteorRain-yuuki](https://down.7086.in/)** | lsmash.mkv/mp4或.hevc [lavf isn't as reliable as pipe acc. rumor] GCC 9.3+ICC 1900+MSVC 1916 [8][10][12bit]+[8-10-12bit] |
| [**ffmpeg**](http://ffmpeg.org/download.html) all OS compatible. backup link: ottverse.com/ffmpeg-builds | |
| [**mpv**](https://mpv.io/installation/) **player** a small sized opensource video player with no color issues afaik | |
| [**x265GuiEx**](https://drive.google.com/drive/folders/0BzA4dIFteM2dRkRzWXZMT0lkM2M) **(Rigaya)** 日本語, compiles by auto-setup, [link](https://aviutl.info/x265guiex/#toc4) for tutorial | |
| [**Voukoder**; **V-Connector**](https://www.voukoder.org/)free Premiere/Vegas/AE/Davinci Studio with libx264, libx265 presets from this tutorial loaded, currently the best exp. solution | |

### x265.exe command line for new users

[Download ffmpeg & x265 to a memorable path, in screenshot they are at D:\]

[Open Windows CMD/PowerShell or Linux/MacOS Bash/Terminal, write path & ffmpeg.exe, ffprobe.exe, x265.exe and enter; makesure all program exists]

[ffmpeg build ver.] C:\folder\ffmpeg.exe; [x265 build ver.] C:\folder\x265.exe -V

[CMD auto-filling] Write PATH/filename partially, and hit [Tab]

### Get source video metadata w/ ffprobe:

ffprobe.exe -i ".\video.mp4" -select\_streams v:0 -v error -hide\_banner -show\_streams -show\_frames -read\_intervals "%+#1" -show\_entries frame=top\_field\_first:stream=codec\_long\_name,width,coded\_width,height,coded\_height,pix\_fmt,color\_range,field\_order,r\_frame\_rate,avg\_frame\_rate,nb\_frames -of ini

### Variable framerate:

Used on mobile devices to save battery, causing compatibility issues. Add ffmpeg option -vsync cfr to convert to cfr

### Rectangular pixel:

old & unsupported lossy compression. Swap src video if possible

### Encoding duration

number of frames÷encoding speed (fps)=required time(second)

### x265's required info:

ffmpeg -pix\_fmt<given by src video, similar as picture above>

### ffmpeg-pipe-x265 example:

D:\ffmpeg.exe -i F:\video.mov -an -pix\_fmt yuv420p10 -f yuv4mpegpipe -strict unofficial - | D:\x265-10bit.exe --preset slow --me umh --subme 5 --merange 48 --weightb --aq-mode 4 --bframes 5 --ref 3 --hash 2 --allow-non-conformance --qg-size 16 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --splitrd-skip --no-sao --tskip --colorprim bt2020 --colormatrix bt2020nc --transfer smpte2084 --y4m - --output F:\done.hevc 2>D:\Desktop\ffmpeg\_or\_x265\_error\_logs.txt

### ffmpeg, VS, avs2yuv pipe

ffmpeg -i video\_in.mp4 -an -f yuv4mpegpipe -strict unofficial - | x265 --y4m - --output

ffmpeg -i video\_in.mp4 -an -f rawvideo - | x265.exe --input-res <WxH> --fps <int/flo/frac> - --output

-format, -an bypass audio, -strict unofficial lift std. restrictions, --y4m stands for "YUV for MPEG", both "-" passes stream through the Unix pipe

VSpipe.exe [script].vpy --y4m - | x265.exe - --y4m --output

VSpipe/avs2yuv [script].vpy - | x265.exe --input-res [WxH] --fps [] - --output

avs2yuv.exe [script].avs -raw - | x265.exe --input-res [WxH] --fps [] - --output

### ffmpeg built-in scaling:

-sws\_flags bicubic bitexact gauss neighbor bicublin lanczos spline +full\_chroma\_int +full\_chroma\_inp +accurate\_rnd

Example:

-sws\_flags bitexact+full\_chroma\_int+full\_chroma\_inp+accurate\_rnd)

### ffmpeg multiplex all tracks (container format depends on output extension)

* ffmpeg.exe -i ".\v\_in.hevc" -an -c:v copy -i ".\audio\_in.aac" -c:a copy -i ".\subtitle\_in.srt" -c:s copy "mux\_out.mkv"
* ffmpeg.exe -i ".\v\_in.hevc" -an -c:v copy -i ".\audio1.aac" -c:a copy -i ".\aud2.aac" -c:a copy -i ".\sub1.ass" -c:s copy -i ".\sub2.ass" -c:s copy "mux\_out.mkv"

### Subtitle support of different container formats:

[Wikipedia - Subtitle formats support](https://en.wikipedia.org/wiki/Comparison_of_video_container_formats)

### ffmpeg replace audio track, itoffset±seconds to align:

* ffmpeg.exe -i ".\mux\_in.mov" -i ".\new\_audio.aac" -c:v copy -map 0:v:0 -map 1:a:0 -c:a copy -itsoffset 0 ".\new\_mux\_out.mov"

**ffmpeg: small thread\_queue\_size warning:**

* -thread\_queue\_size<(avg src bitrate kbps+1000)/usable CPU core cnt.>

### Batch: keep CMD prompt on finish:

cmd /k

### + show windows build version:

cmd -k

### ffmpeg restore movie 24fps from NTSC 3:2 pulldown 60fps:

* ffmpeg.exe -i ".\60fps\_interlaced\_NTSC\_source.vob" -map 0:v:0 -vf "fieldmatch=order=auto:mode=pc\_n\_ub:field=auto:cthresh=8:combmatch=full:blockx=16:blocky=24:combpel=128,nnedi=weights=C:\[download\_from\_here\nnedi3\_weights.bin](https://github.com/dubhater/vapoursynth-nnedi3/blob/master/src/nnedi3_weights.bin):field=af:nsize=s48x6:nns=n128:qual=slow:etype=mse:pscrn=new3" -fps 24 [other options]

### HDR Tags

**Color**

Primaries

--master-display <manually tagging for instruct video players or decoders to correctly play HDR sources

DCI-P3: G(13250,34500)B(7500,3000)R(34000,16000)WP(15635,16450)L(maxCLL×10000,1)

bt709: G(15000,30000)B(7500,3000)R(32000,16500)WP(15635,16450)L(maxCLL×10000,1)

bt2020: G(8500,39850)B(6550,2300)R(35400,14600)WP(15635,16450)L(maxCLL×10000,1)

* Check HDR source's metadata for color space，then copy the corresponding settings above as param value
* max for L has no standards，which means every video could be different, check your source stream

DCI-P3: G(x0.265, y0.690), B(x0.150, y0.060), R(x0.680, y0.320), WP(x0.3127, y0.329)

bt709: G(x0.30, y0.60), B(x0.150, y0.060), R(x0.640, y0.330), WP(x0.3127,y0.329)

bt2020: G(x0.170, y0.797), B(x0.131, y0.046), R(x0.708, y0.292), WP(x0.3127,y0.329)>

--max-cll <maxCLL,maxFALL>max, average pel intensity. Skip if MediaInfo doesn't get those values out

--colormatrix <as src, e.g.: gbr bt709 fcc bt470bg smpte170m YCgCo bt2020nc bt2020c smpte2084 ictcp>

--transfer <as source, e.g.: gbr bt709 fcc bt470bg smpte170m YCgCo bt2020nc bt2020c smpte2084 ictcp>

**Dolby vision**

: DV-MEL (BL+RPU) & DV-FEL (BL+EL+RPU), x265 support 3 profiles of DV-MEL

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Profile | Codec | BL:EL resolution | x265 supported | Gamma | Space |
| 4 | 10bit hevc | 1:1/4 |  | SDR | YCbCr |
| 5 | BL only (DV-MEL) | √ |  | ICtCp |
| 7 | 4K=1:1/4; 1920x1080=1:1 |  | UHD BluRay | YCbCr |
| 8.1 | BL only (DV-MEL) | √ | HDR10 |
| 8.2 | √ | SDR |
| 8.4 |  | HLG |
| 9 | 8bit avc | BL only (DV-MEL) |  | SDR | YCbCr |

--dolby-vision-profile

<select 5/8.1 (HDR10)/8.2>8.1 needs --master-display & --hdr10-opt

--dolby-vision-rpu

<path>specify path to input RPU binary (.bin)

# Encoding speed reference

**Processor:** R7 5800X all core 4.5Ghz OC, 67°C under FS140, avg 15440pts under CbR23 (PBO2 4.85Ghz minus 30 curve offset, 86°C under FC140, only raises 2%, thus unused)

### Memory:

Hynix MFR 2×2R×8GB/2x16GB, 3000Mhz 15-17-17-35 1T 1.44V, F-U-MCLK 1:1:1 sync

**src1:**

1920x1080 yuv420p8 24000/1001fps 312MB low-Q h.264 film src, high contrast complex foreground texture, static low contrast background, 20238 frames. 10bit crf 28 adds depth error, low quality src reduces result difference, high contrast texture adds difficulty to MEMC

### preset slow:

16m 27s, avg~20.5fps, results in 217MB, visible quality loss (more visible in HQ source)

General:

24m 48s, avg~13.6fps, 1.5x slower than top, in 159MB, visible quality loss

Anime-HC:

36m 36s, avg~9.21fps, 2.2x slower than top, in 145MB, visible quality loss (film src)

Film-HC:

78m 57s, avg~4.27fps, 4.8x slower than top, in 189MB, very small loss

### preset veryslow:

133m 16s, avg~2.53fps, 8.1x slower than top, in 221MB, very small loss

**src2:**

3840x2160 yuv444p12 24fps 37GB PQ ProRes4444XQ src, high texture, 6314 frames. M: enlarge speed difference, check stability introduced by 4k12bit 4:4:4 high motion high texture difficult source. More difficult to encode than common high-budget anime

Gn-CRF16:

75m21s 1.4fps 1159MB,

CRF18:

73m19s 1.44fps 902MB,

CRF20:

69m58s 1.5fps 698MB,

CRF22:

failed halfway due to low stability, can be concatenated later

Note: hist-scenecut failed on all of them

**src3:**

1920x1080 yuv420p10 24000/1001fps 1.9GB h.264, 34095 frames. Detecting speed diff. from low-complexity, low budget anime source in 4:2:0

检测低成本动漫上, 4:2:0的压制速度. (空间-时间复杂度简单的源)

Anime-HC:

46m43s, avg~12fps

**src4:**

1920x1080 yuv444p10 24000/1001fps 2.9GB h.264, 40920 frames. Detecting speed diff. from mid-complexity, high budget anime source in 4:4:4

检测高成本动漫, 4:4:4上的压制速度. (空间-时间复杂度较为困难的源)

Anime-HC:

97m30s, avg~6.99fps

# Gen-Purpose·Simple·LQ

no more configurable options for simplicity, only a few fps slower than top

**splt-trans**

**me-mc**

**adpt quant**

**rate control**

**io**

**tgt. depth**

**multi node**

**others**

**colorspace**

--preset slow

--me umh --subme 5 --merange 48 --weightb

--aq-mode 4

--bframes 5 --ref 3

--hash 2 --allow-non-conformance

-D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

--pools ,,,, (e.g.: "-,+"states PC w/ 2 nodes & use the 2nd only, using both nodes causes mem. delay)

crop: --display-window < integer "←,↑,→,↓" pixels >, ≥16 core cpu opt.:--pme, interlaced: --field, pixel depth reduction quality+:--dither, begin; ending frame:--seek; --frames, crf/abr resist noise factor:--rc-grain

ffmpeg -pix\_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

(ffmpeg pipe) x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\导入.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --preset slow --me umh --subme 5 --merange 48 --weightb --aq-mode 4 --bframes 5 --ref 3 --hash 2 --allow-non-conformance --y4m - --output ".\输出.hevc"

libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt<ffprobe pix\_fmt> -x265-params "preset=slow:me=umh:subme=5:merange=48:weightb=1:bframes=5:ref=3:hash=2:allow-non-conformance=1" -c:a copy ".\v\_out.mp4"

### libkvazaar CLI (in dev, crf mode missing)

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libkvazaar -pix\_fmt<ffprobe pix\_fmt> -kvazaar-params "limit-tu=1:tr-depth-intra=2:pu-depth-intra=4:pu-depth-inter=3:smp=1:amp=1:bipred=1:me=tz:subme=4:merange=48:me-early-termination=off:max-merge=2:ref=3:open-gop=0:period=360:gop=16:transform-skip=1:qp=16:fast-residual-cost=1:early-skip=1:max-merge=4:rd=3:mv-rdo=1:rdoq-skip=1:intra-rdo-et=1:sao=edge:hash=checksum" -c:a copy ".\v\_out.mp4"

### ffmpeg multiplex all tracks (container format depends on output extension)

* ffmpeg.exe -i ".\v\_in.hevc" -an -c:v copy -i ".\audio\_in.aac" -c:a copy -i ".\subtitle\_in.srt" -c:s copy "mux\_out.mkv"
* ffmpeg.exe -i ".\v\_in.hevc" -an -c:v copy -i ".\audio1.aac" -c:a copy -i ".\aud2.aac" -c:a copy -i ".\sub1.ass" -c:s copy -i ".\sub2.ass" -c:s copy "mux\_out.mkv"

### Subtitle support of different container formats:

[Wikipedia - Subtitle formats support](https://en.wikipedia.org/wiki/Comparison_of_video_container_formats)

### ffmpeg replace audio track, itoffset<±seconds> to align:

* ffmpeg.exe -i ".\mux\_in.mov" -i ".\new\_audio.aac" -c:v copy -map 0:v:0 -map 1:a:0 -c:a copy -itsoffset 0 ".\new\_mux\_out.mov"

### batch: back to normal CMD prompt when finish + show windows build version:

cmd -k

# Standard.

Lots of custom options for optimizations

--tu-intra-depth 3 --tu-inter-depth 3 --limit-tu 1 --rdpenalty 1

--me umh --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange 48 --weightb

--ref 3 --max-merge <2fast, 3, 4slow> --early-skip --no-open-gop --min-keyint 5 --keyint <9×fps> --fades --bframes 8 --b-adapt 2 --radl 3 <sharp source: --pbratio 1.2>

<fast: --fast-intra / mid: leave blank / slow: --b-intra / slower: --constrained-intra >

--crf <18~20 HQ 19 ~22 HD> --crqpoffs -3 --cbqpoffs -1

--rdoq-level <1fast，2slow>

<anime source: --hevc-aq, remove aq-mode> --aq-mode 4 --aq-strength <flat=0.8, edgy=1>

--rd 3 --limit-modes --limit-refs 1 --rskip <3fast, 2mid, 1slow> --rc-lookahead <3×fps> --tskip-fast --rect <veryslow: --amp>

--psy-rd <film=1.6，anime=0.6, +0.6 if ctu=64, -0.6 if ctu=16> --splitrd-skip <EXP: --qp-adaptation-range 3>

--limit-sao --sao-non-deblock --deblock 0:-1

--hash 2 --allow-non-conformance <NAS streaming: --idr-recovery-sei>

-D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

--pools ,,,, (e.g.: "-,+"states PC with 2 nodes & use the 2nd only, using both nodes causes mem. delay)

crop:--display-window < integer "←,↑,→,↓" pixels >, ≥16 core cpu opt.:--pme, interlaced: --field, pixel depth reduction quality+:--dither, begin; ending frame:--seek; --frames, crf/abr resist noise factor:--rc-grain

ffmpeg -pix\_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

**splt-trans**

**me-mc**

**ref-rateol**

**intra coding**

**quantization**

**rdoq**

**adapt quant**

**md decision**

**rdo**

**deblock-sao**

**io**

**tgt. depth**

**multi node**

**others**

**colorspace**

(ffmpeg pipe) x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --ctu 〇 --min-cu-size 16 --tu-intra-depth 3 --tu-inter-depth 3 --limit-tu 1 --rdpenalty 1 --me umh --subme 〇 --merange 48 --weightb --ref 3 --max-merge 〇 --early-skip --no-open-gop --min-keyint 5 --fades --bframes 8 --b-adapt 2 --radl 3 --pbratio 1.2 --fast-intra --b-intra --constrained-intra --crf 〇 --crqpoffs -3 --crqpoffs -1 --rdoq-level 〇 --aq-mode 4 --aq-strength 〇 --rd 3 --limit-modes --limit-refs 1 --rskip 〇 --rc-lookahead 〇 --tskip-fast --rect --amp --psy-rd 〇 --splitrd-skip --qp-adaptation-range 4 --limit-sao --sao-non-deblock --deblock 0:-1 --hash 2 --allow-non-conformance --y4m - --output ".\v\_out.hevc"

libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt<ffprobe pix\_fmt> -x265-params "ctu=〇:min-cu-size=16:tu-intra-depth=3:tu-inter-depth=3:limit-tu=1:rdpenalty=1:me=umh:subme=〇:merange=48:weightb=1:ref=3:max-merge=〇:early-skip=1:open-gop=0:min-keyint=5:fades=1:bframes=8:b-adapt=2:radl=3:pbratio=1.2:fast-intra=1:b-intra=1:constrained-intra=1:crf=〇:crqpoffs=-3:cbqpoffs=-1:rdoq-level=〇:aq-mode=4:aq-strength=〇:rd=3:limit-modes=1:limit-refs=1:rskip=〇:rc-lookahead=〇:tskip-fast=1:rect=1:amp=1:psy-rd=〇:splitrd-skip=1:qp-adaptation-range=4:limit-sao=1:sao-non-deblock=1:deblock=0,-1:hash=2:allow-non-conformance=1" -c:a copy ".\v\_out.hevc"

High Compression·Film·HQ Source

--ctu 64 --tu-intra-depth 4 --tu-inter-depth 4 --limit-tu 1

--me star --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange 48 --weightb

--ref 3 --max-merge 4 --no-open-gop --min-keyint 3 --keyint 310 --fades --bframes 8 --b-adapt 2 --radl 3

--constrained-intra --b-intra

--crf 21.8 --qpmin 8 --crqpoffs -3 --ipratio 1.2 --pbratio 1.5

--rdoq-level 2

--aq-mode 4 --aq-strength <clean source=0.8，film=1> --qg-size 8

--rd 3 --limit-refs 0 --rskip 0 --rc-lookahead <1.8×fps> --rect --amp

--psy-rd <film=1.6, animation=0.6, +0.6 if ctu=64, -0.6 if ctu=16> <EXP: --qp-adaptation-range 3>

--deblock 0:0

--limit-sao --sao-non-deblock --selective-sao 3

--hash 2 --allow-non-conformance --nr-inter 8 <NAS streaming: --idr-recovery-sei>

-D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

--pools ,,,, (e.g.: "-,+"states PC with 2 nodes & use the 2nd only, using both nodes causes mem. delay)

crop:--display-window < integer "←,↑,→,↓" pixels >, ≥16 core cpu opt.:--pme, interlaced: --field, pixel depth reduction quality+:--dither, begin; ending frame:--seek; --frames, crf/abr resist noise factor:--rc-grain

ffmpeg -pix\_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

**splt-trans**

**me-mc**

**ref-rateol**

**intra coding**

**quantization**

**rdoq**

**adapt.quant**

**md decision**

**rdo**

**deblock**

**sao**

**io**

**tgt. depth**

**multi node**

**others**

**colorspace**

(ffmpeg pipe) x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --ctu 64 --tu-intra-depth 4 --tu-inter-depth 4 --limit-tu 1 --me star --subme 〇 --merange 48 --weightb --ref 3 --max-merge 4 --no-open-gop --min-keyint 3 --keyint 310 --fades --bframes 8 --b-adapt 2 --radl 3 --constrained-intra --b-intra --crf 21.8 --qpmin 8 --crqpoffs -3 --ipratio 1.2 --pbratio 1.5 --rdoq-level 2 --aq-mode 4 --aq-strength 〇 --qg-size 8 --rd 3 --limit-refs 0 --rskip 0 --rc-lookahead 〇 --rect --amp --psy-rd 〇 --qp-adaptation-range 3 --deblock 0:-1 --limit-sao --sao-non-deblock --selective-sao 3 --hash 2 --allow-non-conformance --y4m - --output ".\v\_out.hevc"

libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt <ffprobe pix\_fmt> -x265-params "ctu=64:tu-intra-depth=4:tu-inter-depth=4:limit-tu=1:me=star:subme=〇:merange=48:weightb=1:ref=3:max-merge=4:open-gop=0:min-keyint=3:keyint=310:fades=1:bframes=8:b-adapt=2:radl=3:constrained-intra=1:b-intra=1:crf=21.8:qpmin=8:crqpoffs=-3:ipratio=1.2:pbratio=1.5:rdoq-level=2:aq-mode=4:aq-strength=〇:qg-size=8:rd=3:limit-refs=0:rskip=0:rc-lookahead=〇:rect=1:amp=1:psy-rd=〇:qp-adaptation-range=3:deblock=0,-1:limit-sao=1:sao-non-deblock=1:selective-sao=3:hash=2:allow-non-conformance=1" -c:a copy ".\v\_out.hevc"

Editing footage·Render & Reuse

--ctu 32

--me star --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange 48 --analyze-src-pics

--max-merge 4 --early-skip --b-intra

--no-open-gop --min-keyint 1 --keyint <7×fps>--ref 3 --fades --bframes 7 --b-adapt 2

--crf 17 --crqpoffs -3 --cbqpoffs -2

--rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead <4×fps>

--splitrd-skip

--deblock -1:-1

--hash 2 --allow-non-conformance

--tune grain

-D 8/10/12

crop:--display-window < integer "←,↑,→,↓" pixels >, ≥16 core cpu opt.:--pme, interlaced: --field, pixel depth reduction quality+:--dither, begin; ending frame:--seek; --frames, crf/abr resist noise factor:--rc-grain, multi-node: --pools ,,,,

ffmpeg -pix\_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

**block/unit spitting**

**motion est.&cmp**

**.**

**intraframe search**

**rate control**

**quantization**

**mode decision**

**R-D optimization**

**deblock**

**input output**

**tuning**

**tgt pixel bit depth**

**others**

**colorspace**

(ffmpeg pipe) x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --ctu 32 --me star --subme 〇 --merange 48 --analyze-src-pics --max-merge 4 --early-skip --b-intra --no-open-gop --min-keyint 1 --keyint 〇 --ref 3 --fades --bframes 7 --b-adapt 2 --crf 17 --crqpoffs -3 --cbqpoffs -2 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead 〇 --splitrd-skip --deblock -1:-1 --hash 2 --allow-non-conformance --tune grain --y4m - --output ".\v\_out.hevc"

libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt<ffprobe pix\_fmt> -x265-params "ctu=32:me=star:subme=〇:merange=48:analyze-src-pics=1:max-merge=4:early-skip=1:open-gop=0:min-keyint=1:keyint=〇:ref=3:fades=1:bframes=7:b-adapt=2:radl=3:constrained-intra=1:b-intra=1:crf=17:crqpoffs =-3:cbqpoffs=-2:rd=3:limit-modes=1:limit-refs=1:rskip=1:rc-lookahead=〇:splitrd-skip=1:deblock=-1,-1:hash=2:allow-non-conformance=1:tune=grain" -c:a copy ".\v\_out.mp4"

Anime·High Compression·Subtitle Groups

--tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 16

--me umh --merange 48 --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --weightb <remove weightb for 80's anime that doesn't have lighting fades for performance> --max-merge 4 --early-skip

--ref 3 --no-open-gop --min-keyint 5 --keyint <12×fps> --fades --bframes 16 --b-adapt 2 --radl 3 --bframe-bias 20

--constrained-intra --b-intra

--crf 22 --crqpoffs -4 --cbqpoffs -2 --ipratio 1.6 --pbratio 1.3 --cu-lossless --tskip

--psy-rdoq 2.3 --rdoq-level 2

--hevc-aq --aq-strength 0.9 --qg-size 8

--rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead <2.5×fps> --rect --amp

--psy-rd 1.5 --splitrd-skip --rdpenalty 2 <EXP: --qp-adaptation-range 4>

--deblock 0:-1 --limit-sao --sao-non-deblock

--hash 2 --allow-non-conformance --single-sei <NAS streaming: --idr-recovery-sei>

-D 8/10/12 (default 8bit or lowest built in x265.exe, same or convert to lower depth only w/ --dither)

--pools ,,,, (e.g.: "-,+"states PC with 2 nodes & use the 2nd only, using both nodes causes mem. delay)

crop:--display-window < integer "←,↑,→,↓" pixels >, ≥16 core cpu opt.:--pme, interlaced: --field, pixel depth reduction quality+:--dither, begin; ending frame:--seek; --frames, crf/abr resist noise factor:--rc-grain

ffmpeg -pix\_fmt yuv420p / yuv422p / yuv444p / yuv420p10 / yuv422p10 / yuv444p10…

**splt-trans**

**me-mc**

**ref-rateol**

**intra coding**

**quantization**

**rdoq**

**aq**

**md**

**rdo**

**deblock -sao**

**io**

**tgt. depth**

**multi nodes**

**others**

**colorspace**

(ffmpeg pipe) x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 16 --me umh --subme 〇 --merange 48 --weightb --max-merge 4 --early-skip --ref 3 --no-open-gop --min-keyint 5 --keyint 〇 --fades --bframes 16 --b-adapt 2 --radl 3 --bframe-bias 20 --constrained-intra --b-intra --crf 22 --crqpoffs -4 --cbqpoffs -2 --ipratio 1.6 --pbratio 1.3 --cu-lossless --tskip --psy-rdoq 2.3 --rdoq-level 2 --hevc-aq --aq-strength 0.9 --qg-size 8 --rd 3 --limit-modes --limit-refs 1 --rskip 1 --rc-lookahead 〇 --rect --amp --psy-rd 1.5 --splitrd-skip --rdpenalty 2 --qp-adaptation-range 4 --deblock -1:0 --limit-sao --sao-non-deblock --hash 2 --allow-non-conformance --y4m - --output ".\v\_out.hevc"

libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt<ffprobe pix\_fmt> -x265-params "tu-intra-depth=4:tu-inter-depth=4:max-tu-size=16:me=umh:subme=〇:merange=48:weightb=1:max-merge=4:early-skip=1:ref=3:open-gop=0:min-keyint=5:keyint=〇:fades=1:bframes=16:b-adapt=2:radl=3:bframe-bias=20:constrained-intra=1:b-intra=1:crf=22:crqpoffs=-4:cbqpoffs=-2:ipratio=1.6:pbratio=1.3:cu-lossless=1:tskip=1:psy-rdoq=2.3:rdoq-level=2:hevc-aq=1:aq-strength=0.9:qg-size=8:rd=3:limit-modes=1:limit-refs=1:rskip=1:rc-lookahead=〇:rect=1:amp=1:psy-rd=1.5:splitrd-skip=1:rdpenalty=2:qp-adaptation-range=4:deblock=-1,0:limit-sao=1:sao-non-deblock=1:hash=2:allow-non-conformance=1" -c:a copy ".\v\_out.mp4"

Anime·ripper's cold war·HEDT+HQ Src Only

Paused dark flat scenes must look AS-IS, results less & slower compression than sub grps

--tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --limit-tu 1

--me star --subme <24fps=3, 48fps=4, 60fps=5, 100fps=6> --merange 52 --analyze-src-pics --weightb --max-merge 4

--ref 3 --no-open-gop --min-keyint 1 --keyint <12×fps> --fades --bframes 16 --b-adapt 2 --radl 2

--b-intra

--crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless

--psy-rdoq 2.5 --rdoq-level 2

<std. x265: --hevc-aq --aq-strength 1.4; Jpsdr mod: --aq-auto 10 --aq-bias-strength 1.3 --aq-strength-edge 1.4 --aq-bias-strength 1.1> --qg-size 8

--rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead <2.5×fps> --rect --amp --no-cutree

--psy-rd 1.5 --rdpenalty 2 <EXP: --qp-adaptation-range 5>

--deblock -2:-2

--limit-sao --sao-non-deblock --selective-sao 1

--hash 2 --allow-non-conformance --single-sei <NAS streaming: --idr-recovery-sei>

**splt-trans**

**me-mc**

**ref-rateol**

**intra coding**

**quantization**

**rdoq**

**aq**

**md**

**rdo**

**deblock**

**sao**

**io**

(ffmpeg pipe) std. x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --limit-tu 1 --me star --subme 〇 --merange 52 --analyze-src-pics --weightb --max-merge 4 --ref 3 --no-open-gop --min-keyint 1 --keyint 〇 --fades --bframes 16 --b-adapt 2 --radl 2 --b-intra --crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless --psy-rdoq 2.5 --rdoq-level 2 --hevc-aq --aq-strength 1.4 --qg-size 8 --rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead 〇 --rect --amp --no-cutree --psy-rd 1.5 --rdpenalty 2 --qp-adaptation-range 5 --deblock -2:-2 --limit-sao --sao-non-deblock --selective-sao 1 --hash 2 --allow-non-conformance --y4m - --output ".\v\_out.hevc"

(ffmpeg pipe) jpsdr mod x265 CLI parameters

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -an -f yuv4mpegpipe -strict unofficial -pix\_fmt<ffprobe pix\_fmt> - | x265.exe --tu-intra-depth 4 --tu-inter-depth 4 --max-tu-size 4 --limit-tu 1 --me star --subme 〇 --merange 52 --analyze-src-pics --weightb --max-merge 4 --ref 3 --no-open-gop --min-keyint 1 --keyint 〇 --fades --bframes 16 --b-adapt 2 --radl 2 --b-intra --crf 17.1 --crqpoffs -5 --cbqpoffs -2 --ipratio 1.67 --pbratio 1.33 --cu-lossless --psy-rdoq 2.5 --rdoq-level 2 --aq-auto 10 --aq-bias-strength 1.3 --aq-strength-edge 1.4 --aq-bias-strength 1.1 --qg-size 8 --rd 5 --limit-refs 0 --rskip 2 --rskip-edge-threshold 3 --rc-lookahead 〇 --rect --amp --no-cutree --psy-rd 1.5 --rdpenalty 2 --qp-adaptation-range 5 --deblock -2:-2 --limit-sao --sao-non-deblock --selective-sao 1 --hash 2 --allow-non-conformance --y4m - --output ".\v\_out.hevc"

std. libx265 CLI, compatible w/ libav fork

* ffmpeg.exe -loglevel 16 -hwaccel auto -y -hide\_banner -i ".\v\_in.mp4" -c:v libx265 -pix\_fmt<ffprobe pix\_fmt> -x265-params "tu-intra-depth=4:tu-inter-depth=4:max-tu-size=4:limit-tu=1:me=star:subme=〇:merange=52:analyze-src-pics=1:weightb=1:max-merge=4:mcstf=1:ref=3:open-gop=0:min-keyint=1:keyint=〇:fades=1:bframes=16:b-adapt=2:radl=2:b-intra=1:crf=17.1:crqpoffs=-5:cbqpoffs=-2:ipratio=1.6:pbratio=1.33:cu-lossless=1:psy-rdoq=2.5:rdoq-level=2:hevc-aq=1:aq-strength=1.4:qg-size=8:rd=5:limit-refs=0:rskip=2:rskip-edge-threshold=3:rc-lookahead=〇:rect=1:amp=1:cutree=0:psy-rd=1.5:rdpenalty=2:qp-adaptation-range=5:deblock=-2:-2:limit-sao=1:sao-non-deblock=1:selective-sao=1:hash=2:allow-non-conformance=1" -c:a copy ".\v\_out.mp4"