 ISO/IEC JTC 1/SC 29/WG 2 N00432

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**ISO/IEC JTC 1/SC 29/WG 2**

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**Geneva, Switzerland – January 2025**

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# Introduction

This document is a Call for Proposals (CfP) on Lenslet Video Coding (LVC) technologies for light field video content captured by real plenoptic cameras or synthetically generated lenslet videos. This is the first phase, where the focus will be on the technologies, namely Codec Agnostic LVC Tools (hereafter LVC tools), compatible with Versatile Video Coding (VVC) [1]. These technologies achieve higher compression efficiency for lenslet video and ensure that at least a sub-bitstream remains decodable by VVC decoder. The encoding and decoding process for LVC is described in Fig. 1.

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Figure 1. Encoding and decoding process for LVC.

# Purpose and procedure

Companies and organizations that have developed LVC tools which they believe to be complying with the requirements in document [2] are invited to submit proposals in response to this CfP.

There will be two key criteria to evaluate the proposed LVC compression technologies:

1. The first criterion will be compression efficiency, evaluated using BD rate [3] criterion, where the quality is based on an objective quality metric, Peak Signal to Noise Ratio (PSNR) described in Annex A. 1.
2. The second criterion will be compression efficiency, where the quality is evaluated using formal subjective test. Formal subjective test will be conducted according to guidelines specified in Annex A. 2.

Results of these tests will be made public without direct identification of the proponents. Prior to having evaluated the results of the tests, no commitment to any action regarding the proposed technology can be made.

The response timeline is specified in Section 3. The requirements of the responses are specified in Section 5.

# Timeline

The timeline of the CfP is as follows:

* 2025. 01. 31: Anchors made available
* 2025. 01. 31: Formal registration period opens
* 2025. 04. 30: Formal registration period ends
* 2025. 05. 05: Execution of offer for paid visual tests
* 2025. 05. 11: Coded test material listed in Section 5 A) shall be received by the Test Coordinators
* 2025. 05. 12: Pose-traces announce
* 2025. 05. 18: Pose-trace videos shall be received by the Test Coordinators
* 2025. 05. 26: Subjective test begins
* 2025. 06. 20: Subjective test ends
* 2025. 06. 23: Document registration and submission ends
* 2025. 06. 30-2025. 07. 04: Evaluation of proposals at MPEG meeting

Anticipated tentative timeline after CfP:

* 2025. 07: Test Model
* 2025. 10: WD
* 2026. 07: CD
* 2026. 10: DIS
* 2027. 04: FDIS
* 2027. 10: IS

# Anchors, test conditions and evaluation methodology for the responses

### 4.1 Anchors

Anchors used in CfP are generated by directly encoding and decoding test sequences with VVC Test Model (VTM) version 11.0 (hereafter VTM-11.0) according to the test conditions defined in Section 4.2. Anchor data include:

* Compressed bitstreams
* PSNR of lenslet video in YUV 4:2:0 (hereafter Lenslet-PSNR) at each rate point
* PSNR averaged over the rendered multiview videos in YUV 4:2:0 (hereafter Multiview-PSNR) at each rate point
* Bitrates

Anchors will be available at https://content.mpeg.expert/data/CfP/LVC/Anchors/ before the due date defined in Section 3.

### 4.2 Test conditions

Proponents test their codec agnostic tool using the test sequences listed in Table B-1.

VVC encoder and decoder used in this CfP is: VTM-11.0, including

* VTM Encoder Version 11.0 [Linux][GCC 9.4.0][64 bit] [SIMD=AVX2]
* VTM Decoder Version 11.0 [Linux][GCC 9.4.0][64 bit] [SIMD=AVX2]

The download link of VTM-11.0 is: https://vcgit.hhi.fraunhofer.de/jvet/VVCSoftware\_VTM/-/tree/VTM-11.0?ref\_type=tags.

VVC encoder works in Random Access mode in this CfP. The configuration file of Random Access is provided at

https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Configs/encoder\_randomaccess\_vtm.cfg.

Per dataset configuration files are provided at

https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Configs/<sequence name>/<sequence name>.cfg.

The target rate points are listed in Table 1.

Table 1. Target rate points (RPs).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sequences** | **Target RP [Kbps]** | | | |
| **RP1** | **RP2** | **RP3** | **RP4** |
| Origami | 574 | 1159 | 2352 | 4806 |
| Fujita2 | 267 | 527 | 1000 | 1939 |
| TempleBoatGiantR32 | 484 | 1007 | 1983 | 3729 |
| Boxer-IrishMan-Gladiator2 | 354 | 573 | 899 | 1375 |
| Boys2 | 820 | 1436 | 2390 | 3894 |
| Matryoshka | 154 | 272 | 471 | 786 |
| Motherboard2 | 682 | 1355 | 2519 | 3911 |
| HandTools | 604 | 1126 | 2128 | 4695 |
| MiniGarden2 | 310 | 591 | 1130 | 2632 |

Encoding command line files for anchor generation of all test sequences and rate points are provided at

https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Encode\_Command\_Lines.sh.

25 views per test point are rendered by Reference Lenslet content Converter (RLC-4.0, available at https://gitlab.com/mpeg-dense-light-field/rlc) for performance evaluation defined in Section 4.4. The configuration files for RLC include <sequence name>\_param.cfg and <sequence name>\_calib.xml, which are available at

https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Configs/<sequence name>/.

Calibration files <sequence name>\_calib.xml are provided for test sequences.

Test sequences Origami, Boys2, Motherboard2, HandTools, and MiniGarden2 are evaluated in a subjective test.

### 4.3 LVC encoding and LVC decoding process

A general LVC encoding and LVC decoding process is shown in Fig.2. The input of the LVC encoder is lenslet video. The LVC encoder consists of codec agnostic module and VVC encoder. LVC bitstream includes sub-bitstreams of VVC bitstream. The LVC decoder consists of VVC decoder and codec agnostic module. LVC decoder consumes the LVC bitstream and reconstruct the decoded lenslet video.

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Figure 2. LVC Encoding and LVC Decoding process.

An example of the encoding procedure for Boys2 is provided as follows:

EncoderAppStatic -c encoder\_randomaccess\_vtm.cfg -c Boys2.cfg –FramesToBeEncoded=300 --QP=32 -i Boys2\_3976x2956\_300frames\_8bit\_yuv420.yuv -b Boys2\_qp32.bin -o Boys2\_qp32\_3976x2956\_300frames\_8bit\_yuv420.yuv

**Boys2.cfg** for VTM-11.0**：**

InputFile : Boys2\_3976x2956\_300frames\_8bit\_yuv420.yuv

InputBitDepth : 8

InputChromaFormat : 420

FrameRate : 30

FrameSkip : 0

SourceWidth : 3976

SourceHeight : 2956

FramesToBeEncoded : 300

OutputBitDepth : 8

Level : 6.2

ConformanceMode : 1

### 4.4 Evaluation methodology

The evaluation for compression performance is performed by means of objective test and a formal subjective test. The evaluation procedure is illustrated in Fig. 3. Fig. 4 provides details of the *Multiview Renderer* module of Fig.3.

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Figure 3. Evaluation procedure for objective and subjective tests.

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Figure 4. *Multiview Renderer* module of Fig.3.

For the objective test, Lenslet-PSNR and Multiview-PSNR are measured for lenslet video and for the multiview video rendered by RLC-4.0 at each test point, respectively. The Lenslet-PSNR and Multiview-PSNR calculation method is defined in Annex A.1. An example of rendering and calculating Multiview-PSNR for one dataset is provided in Annex A.3. Command line files for anchor generation for all test sequences and bitrates are provided at https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Rendering\_Command\_Lines.sh.

Bitrate is calculated for the corresponding LVC bitstream. Then, two BD-rate [3] results, for decoded lenslet video and rendered multiview video, can be calculated using the datasheet available at

https://content.mpeg.expert/data/CfP/LVC/DataSheet/DataSheet.xlsm.

For the subjective test, a formal subjective assessment process will be conducted at the full resolution of the pose trace video at each test point using the DSIS (Double Stimulus Impairment Scale) and providing a MOS value together with the Confidence Interval. The DSIS method and the definition of pose trace are described in Annex A.2. Pose trace generator version 1.0 is available at https://gitlab.com/mpeg-dense-light-field/pose-trace-generation. For the subjective test, a pose trace video is rendered from the multiview video. The pose trace videos are in YUV 4:2:0 format according to ITU-R BT.709 with a resolution 1920×1080 pixels and a frame rate of 30 Hz.

LVC encoding and LVC decoding time are measured for both anchor and proposal.

# Requirements on Submissions

Responses to the CfP shall obey the following constraints:

* Descriptions of proposals shall be registered as input documents to MPEG meeting 151 in Daejeon (June 30 – July 04, 2025) (see the timeline in Section 3).
* Proponents shall attend this meeting to present their proposals.
* Proponents shall test their codec agnostic tool usingallthe test sequences listed in Table B-1 with all the rate points defined in Table 1.
* Submitted LVC decoder shall be able to be executed on Ubuntu 22.04.5 LTS.
* Submitted LVC bitstream shall not exceed the target bit rate defined in Table 1.
* Sub-bitstream of the submitted LVC bitstreams shall be compliant to VVC.
* VVC encoder and VVC decoder shall be VTM-11.0.
* VVC encoder should utilize Random Access Config File provided at https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/encode\_randomaccess\_vtm.cfg and Per Sequence Config File provided at https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Configs/<sequence name>/<sequence name>.cfg.
* Proponents should not change configuration files for VTM encoding. If there is any change in the configuration file for VTM encoder, those changes and the impact shall be reported in detail in their proposal.
* Quantization settings shall be kept static except at most one-time change of the quantization settings to meet the target bit rate per rate point per sequence. When any change of quantization is applied, a description of the one-time change shall be provided.
* Proponents shall not optimize encoding parameters or any processing steps using non-automatic means.
* Proponents shall follow the procedure in Fig. 3 to test the objective and subjective performance of their proposed agnostic tools.
* Proponents shall not change configuration files for performance evaluation with respect to Fig. 3 and Fig. 4.
* Each test point shall be measured by Lenslet-PSNR and Multiview-PSNR. The rendered views are rendered by RLC-4.0 according to Section 4.2.
* All Lenslet-PSNR, Multiview-PSNR and bitrates shall be reported using the datasheet.
* LVC encoding and LVC decoding time shall be provided for both anchor and proposal. They shall be reported using the datasheet.
* Proponent shall participate in the crosscheck coordinated by the Test Coordinator.

Files of decoded sequences and bitstreams shall follow the naming conventions as specified in Table 2.

Proponents shall provide the following materials. Incomplete proposals will not be considered as a valid response to the CfP:

1. Coded test materials submitted by May 11, 2025, including:
2. LVC bitstreams for all specified rate points of all sequences, in Table 1.
3. Binary executable decoder.
4. A tool to extract the VVC bitstream out of the LVC bitstream for crosscheck purposes.
5. Script to decode the LVC bitstream using the executable binary executable decoder.
6. MD5 checksum files for bitstreams, decoded and rendered-multiview videos for all test points.
7. Rendered pose trace videos submitted by May 18, 2025, including

1. Pose trace videos from the rendered multiview videos for all test points.

2. MD5 checksum files for all pose trace videos.

1. Crosschecked coded test materials to be brought to the MPEG meeting 151 in Daejeon (June 30 – July 04, 2025), including:
2. All the materials in A) and B) shall be brought to the meeting on a USB storage labeled with proposal ID that will be dedicated after registration.
3. Document submitted to the MPEG document system by June 23, 2025 containing:
4. A technical description of the proposal sufficient for full conceptual understanding and generation of equivalent performance results by experts and for conveying the degree of optimization required to replicate the performance. This description shall include all data processing paths and individual data processing components used to generate the bitstreams.
5. The technical description shall also contain a statement about the programming language and platform to be compiled for. The software is recommended to be written in C/C++ and compiled to be run on Linux operating system.6

Proponents are encouraged (but not required) to allow other committee participants to have access, on a temporary or permanent basis, to their encoded bitstreams and binary executables or source code.

# Subsequent provision of Source Code and IPR consideration

By responding to the CfP, the proponent affirms their willingness to make source code available for use as the starting point for collaborative standardization.

It is the responsibility of the proponent to obtain any necessary internal approvals in a timely manner, otherwise more readily available source code may be selected.

Furthermore, proponents are advised that this CfP is being made subject to the common patent policy of ITU-T/ITU-R/ISO/IEC (refer to www.itu.int/ITU-T/dbase/patent/patent-policy.html or Appendix I of ISO/IEC Directives Part 1).

# Test sites and delivery of test materials

The proposals submission material will be evaluated by means of a formal subjective assessment process. The tests will be conducted by the Test Coordinator.

The Test Coordinator will share upload site information and credentials to each proponent after they register for the CfP.

Alternatively, if the upload site encounters problems, proponents are encouraged to provide a private link for the Test Coordinator to download their data before the deadline.

Proponents shall deliver their submission in the form described in this section. Note that submissions deviating from that format cannot be properly evaluated.

The directory shall contain six (6) folders under the root of the upload site as described in Table 2.

Table 2. Submission package structure.

|  |  |
| --- | --- |
| Folder | Contents |
| app/ | A script named as “decode.sh” shall be provided to allow a single click to decode all the bitstreams by the Test Coordinator. No command line parameters are allowed to run the script “decode.sh”.  A script named as “render.sh” shall be provided to allow a single click to render the multiview videos for all the decoded lenslet videos.  Any decoder executable or binary library (Linux) – precompiled if applicable, supporting scripts (if required), and usage documentation for decoding the bitstreams. |
| enc/ | All encoded bitstreams provided by the proponent.  A text file md5check.txt provided by the proponent containing the md5 number of all bitstreams, all decoded lenslet video frames and all rendered multiview videos. |
| dec/ | Empty directory for all decoded lenslet videos decoded by “decode.sh” . |
| rec\_mv/ | Empty directory for all multiview videos rendered by “render.sh” . |
| pose\_trace/ | All pose trace videos provided by the proponent. |
| cfg/ | Configuration files (if needed). |

Note that the delivery of the material follows the timeline as described in Section 3 of this document.

### Description of Folder app/

To facilitate the evaluation and the decoding processes, proponents shall provide a bash script decode.sh (without parameters) in the app/ directory to decompress the encoded bitstreams. The decoding script takes bitstreams from enc/, and store the decoded lenslet videos into the reserved folder dec/. Proponents shall provide a bash script render.sh (without parameters) in the app/ directory to render the multiview videos from the decoded lenslet videos. The rendering script takes decoded videos from dec/, and store the rendered multiview videos into the reserved folder rec\_mv/.

### Description of Folder enc/

Folder enc/ hosts the encoded bitstreams from the proponents for all sequences and all RPs. A subfolder is created per sequence. The files shall follow the rules:

* enc/<Seq>/enc\_RP<%d>.lvc
* enc/<Seq>/md5check.txt contains the md5 checksum of the bitstream, decoded lenslet video frames and all rendered multiview videos.

### Description of Folder dec/

Folder dec/ is reserved to host the decoded lenslet videos. By launching the decoding script app/decode.sh, the decoded lenslet videos shall be put under folder dec/. The file naming follows the same rule as the decoded lenslet videos under folder enc/, i.e., dec/<seq>/dec\_RP<%d>.yuv.

### Description of Folder rec\_mv/

Folder rec\_mv/ is reserved to host the rendered multiview videos. By launching the rendering script app/render.sh, the rendered multiview videos shall be put under folder rec\_mv/. The file naming follows the same rule as the rendered multiview videos under folder enc/, i.e., rec\_mv/<Seq>/rec\_mv\_<V-%d>\_RP<%d>.yuv.

### Description of Folder pose\_trace/

Folder pose\_trace/ is reserved to host the pose trace videos. The file naming follows the same rule as the rendered multiview videos under folder enc/, i.e., pose\_trace/<Seq>/ pose\_trace\_RP<%d>.yuv.

### Description of Folder cfg/

The configuration files required to run the decoder shall be stored under cfg/ folder. Only global parameters are allowed to be stored.

### Examples

For example, for each proponent, the folder of each contribution would have the structure as shown in Table 3:

Table 3. Folder structure of a submission.

|  |  |  |
| --- | --- | --- |
| P05/ | app/ | decode.sh |
| render.sh |
| … |
| enc/ | Boys2/enc\_RP1.lvc |
| Boys2/md5check.txt |
| … |
| dec/ | Boys2/dec\_RP1.yuv |
| … |
| rec\_mv/ | Boys2/rec\_mv-0\_RP1.yuv |
| pose\_trace/ | Boys2/pose\_trace\_RP1.yuv. |
| cfg/ | … |

# CfP participation

For registration, proponent shall contact Call Administrator in Section 9 before the due date in Section 3. After the registration of each proposal, an ID number is dedicated to each proponent.

Proponents will be charged a fee per each response before their response goes through full process of evaluation. The fee will be EUR 4,000 per response. Such fee will cover the logistical costs without any profit. The fee is non-refundable after the formal registration is made.

Further information about logistic steps to attend the meeting can be obtained from the listed Call Administrators, in Section 9.

# Call Administrator

For registration and any questions related to this CfP please contact the Call administrators:

Igor Curcio (WG 2 Convenor)

Bell Labs Fellow and Director of International Standards, CTO

Nokia Technologies

email: [igor.curcio@nokia.com](mailto:igor.curcio@nokia.com)

Lu Yu (WG 4 Convenor)

Director of the Institute of Information and Communication Networks Engineering

Zhejiang University, China

Tel. +86 571 87953107, email: yul@zju.edu.cn

# Test Administrator

The subjective test is coordinated by

Mathias Wien (AG 5 Convenor)

RWTH Aachen University

Lehrstuhl für Bildverarbeitung

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The objective test is coordinated by

Yiyi Liao

Zhejiang University

Zheda Road 38, Hangzhou

China

Tel. +86-182-5843-1220, email: yiyi.liao@zju.edu.cn

# References

[1] ITU-T H.266/ISO/IEC 23090-3, “Versatile Video Coding (VVC)”.

[2] “Use cases and requirements for Lenslet Video Coding”, ISO/IEC JTC1/SC29/WG02 N360, Apr. 2024, Rennes, France.

[3] ITU-T HSTP-VID-WPOM - Working practices using objective metrics for evaluation of video coding efficiency experiments, 2020, http://handle.itu.int/11.1002/pub/8160e8da-en.

# Annex A – Objective and Subjective Test for Responses

### A.1. Objective Test method: BD rate

Objective evaluation is conducted in lenslet video and multiview video using BD rate [3] criteria.

The multiview video need to be rendered from the uncompressed/decompressed lenslet video using RLC-4.0.

The PSNR of a lenslet video frame/view *I* (in dB) is defined as

where *MAXI* is the maximum possible pixel value of the image *I*. When the pixels are represented using 8 bits per sample, *MAXI* is 255. For detail calculation of *MSE* refer to Eq. (1) in reference [3].

PSNR is measured in YUV 4:2:0 that includes Y-PSNR, U-PSNR, and V-PSNR.

Lenslet-PSNR is the average of PSNR over all frames of a lenslet video.

Multiview-PSNR is the average PSNR over all rendered view videos of a lenslet video.

### A.2. Subjective Test method: DSIS - Double Stimulus Impairment Scale

For subjective test, pose trace videos are used. The pose traces are assigned to each proponent by the test coordinator as scheduled in Section 3.The Formal Subjective Assessment of the pose trace video received from the Proponents will be visually assessed for quality using the DSIS (Double Stimulus Impairment Scale) test method as specified in this Section by sweeping over all views on a 2D display (no integral photography display).

Pose trace video is generated by sweeping views following a path defined for 5×5 multiview video, synthesized by RLC-4.0 from the decoded lenslet video. In this case, viewing content starts with frame 0 following the path until the frame 299. When synthesizing a pose trace video, per viewpoint, equal number of frames shall be assigned. Fig. A-1 shows examples of pose traces for subjective evaluation.

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Figure A-1. Sample pose traces for subjective evaluation.

The DSIS method will be used under the schema of evaluation of the impairment, using an 11 grades impairment scale, ranging from "0" (lowest quality) to "10" (highest quality).

The structure of the Basic Test Cell (BTC) of the DSIS method is made by two consecutive presentations of the video clip under test; at first the original version of the video clip (SRC, Source Reference Content) is displayed, announced by the letter “A” on a mid-grey screen (half a second), immediately afterwards the coded version of the video clip (PVS, Processed Video Sequence), announced by the letter “B” on a mid-grey screen (half a second), is presented; then a message displays for 5 seconds asking the viewers to vote (see Fig. A-2).



Figure A-2. DSIS BTC.

***Voting***

The viewers will be asked to express their vote by putting a number in a box on a scoring sheet.

The scoring sheet for a DSIS test is made of a section for each BTC; each section is made of a numbered box (see Fig. A-3). The viewers will write a number in the box that corresponds to the number of the message “***Vote N***” that is shown on the screen. When writing "10", the subject will declare that he/she saw no difference between the SRC and the PVS; when writing "0" the subject will declare that he/she saw a significant and clearly visible amount of difference between the SRC and the PVS across the entire observed image. The vote has to be written when the message "Vote N" appears on the screen. The number "N" is a numerical progressive indication on the screen aiming to help the viewing subjects to use the appropriate column of the scoring sheet.



Figure A-3. Example of DSIS test method scoring sheet.

***Training and stabilization phase***

The viewing subjects shall be trained by means of a short practice (training) session. The video material used for the training session will be carefully selected from those of the test, taking care to represent as much as possible the extent of visual quality and the kind of impairment expected to appear during the test.

A “stabilization phase” made of three BTCs is located at the beginning of each test session; the stabilization BTCs will be selected representing best, mid and worst quality. In this way, the viewing subjects will have an indication of the range of quality they are expected to evaluate during that session. The scores of the stabilization phase are discarded. Consistency of the behaviour of the subjects will be checked inserting in the session a BTC in which the uncompressed pose trace video (SRC) is compared to itself.

***Laboratory setup***

The laboratory for a subjective assessment is planned to be quiet, far from any external light source and in a room whose walls, ceiling and floor will be made of non reflective material. High quality TV sets will be used as monitors. All internal local post processing TV features will be disabled. The video server and SW will be able to play the pose trace video at 30 frames per second, without any limitation, or without introducing any additional temporal or visual artefacts.

***Viewing distance, seats and monitor size***

Commercially available OLED TV of size 65” and 55” set will be used. Two viewers will be seats in front of each TV. The viewing distance will be 3H, where H is equal to the height of the active part of the screen.

***Viewing environment***

The test area will be protected from external visual or audio pollution. Internal general light will be low (just enough to allow the viewing subjects to fill out the scoring sheets) and a uniform light has to be placed behind the monitor; this light will have an intensity of maximum 30 nits. No light source has to be directed to the screen or create reflections; ceiling, floor and walls of the laboratory have to be made of non-reflecting black or dark grey material (e.g. carpet or velvet).

***Statistical analysis and presentation of the results***

The data collected from the score sheets, filled out by the viewing subjects, will be stored in an Excel spread-sheet. For each coding condition the Mean Opinion Score (MOS) and associated Confidence Interval (CI) values will be given in the spread-sheets. The MOS and CI values will be used to draw graphs. The graphs will be drawn grouping the results for each video test sequence. No graph grouping results from different video sequences will be considered.

### A.3. Example of rendering and calculating Multiview-PSNR

This is the example of Boys2 evaluation procedure. Command line files for all the test sequences and bitrates are provided on the server (https://content.mpeg.expert/data/CfP/LVC/ConfigFiles/Rendering\_Command\_Lines.sh). They were used for anchor generation.

***From Lenslet Video to Input of RLC***

ffmpeg -s 3976x2956 -pix\_fmt yuv420p -i Boys2\_3976x2956\_300frames\_8bit\_yuv420.yuv -start\_number 0 Boys2/Image%03d.png -y

ffmpeg version: 7.0.1-static https://johnvansickle.com/ffmpeg/

built with gcc 8 (Debian 8.3.0-6), BT.601.

***RLC Execution***

RLC40 <sequence name>\_Param.cfg

**Boys2\_Param.cfg**:

method 2

viewNum 5

Calibration\_xml Boys2/Boys2\_calib.xml

RawImage\_Path Boys2/Image%03d.png

Output\_Path Boys2/Frame#%03d

start\_frame 0

end\_frame 299

height 2956

width 3976

upsample 2

psizeInflate 2.598076211353316

maxPsize 0.3

patternSize 0.325

psizeShortcutThreshold 4

***From RLC output to multiview Video***

ffmpeg -start\_number 0 -i Boys2/Frame#%03d/image\_001.png -vf format=yuv420p -frames:v 300 Boys2\_1.yuv -y

...

ffmpeg -start\_number 0 -i Boys2/Frame#%03d/image\_025.png -vf format=yuv420p -frames:v 300 Boys2\_25.yuv -y

***Multiview-PSNR calculation***

For two YUV sequences from the same perspective, the Multiview-PSNR is calculated with the following instruction.

ffmpeg -s 1098x800 -pix\_fmt yuv420p -i Boys2\_1.yuv -s 1098x800 -pix\_fmt yuv420p -i Boys2\_1\_qp32.yuv -lavfi psnr -f null -

...

ffmpeg -s 1098x800 -pix\_fmt yuv420p -i Boys2\_25.yuv -s 1098x800 -pix\_fmt yuv420p -i Boys2\_25\_qp32.yuv -lavfi psnr -f null -

The average of the 25 views is then calculated.

# Annex B – Description of test sequences

Table B-1. Sequence Specifications and Download Links

| Sequence name | Resolution | Frames | Frame rate | Chroma format | Bit depth | Download Links |
| --- | --- | --- | --- | --- | --- | --- |
| Origami | 2048×2048 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/Origami.zip |
| Fujita2 | 2048×2048 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/Fujita2.zip |
| TempleBoatGiantR32 | 6464×4852 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/TempleBoatGiantR32.zip |
| Boxer-IrishMan-Gladiator2 | 3840×2160 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/Boxer-IrishMan-Gladiator2.zip |
| Boys2 | 3976×2956 | 0-299 | 30 | 4:2:0 | 8 | [https://content.mpeg.expert/data/CfP/LVC/Sequences/Boys2.zip](https://content.mpeg.expert/data/CfP/LVC/LVC_test_sequences_CFP/Boys2.zip) |
| Matryoshka | 4040×3064 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/Matryoshka.zip |
| Motherboard2 | 4036×3064 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/Motherboard2.zip |
| HandTools | 4036×3064 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/HandTools.zip |
| MiniGarden2 | 4036×3064 | 0-299 | 30 | 4:2:0 | 8 | https://content.mpeg.expert/data/CfP/LVC/Sequences/MiniGarden2.zip |

Table B-2. Sequences sample central views

|  |  |  |
| --- | --- | --- |
| 屋内, テーブル, 座る, 覆い が含まれている画像  自動的に生成された説明  Origami | 屋内, 動物, 草, 座る が含まれている画像  自動的に生成された説明  Fujita2 | 屋内, 座る, おもちゃ, テーブル が含まれている画像  自動的に生成された説明  TempleBoatGiantR32 |
| image_001  Boxer-IrishMan-Gladiator2 | 落書きされた壁の前に座る男性たち  中程度の精度で自動的に生成された説明  Boys2 | 野球, テーブル, 座る, ブルー が含まれている画像  自動的に生成された説明  Matryoshka |
| 電子機器の内部  低い精度で自動的に生成された説明  Motherboard2 | 屋内, テーブル, 座る, 自転車 が含まれている画像  自動的に生成された説明  HandTools | 草, 花, テーブル, 座る が含まれている画像  自動的に生成された説明  MiniGarden2 |