Video Coding Standardization: JCT-VC HEVC

for Internal Lab seminar

June 09 2016

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Department of Computer Engineering
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Organization

• ISO/IEC JTC1 SC29 MPEG
  • ISO (International Organization for Standardization)
  • IEC (International Electrotechnical Commission)
  • JTC 1/SC 29 (Subcommittee of the Joint Technical Committee); Topic: Coding of audio, picture, multimedia and hypermedia information
  • MPEG (Moving Picture Experts Group)

• ITU-T VCEG
  • ITU (International Telecommunication Union)
  • ITU-T (ITU Telecommunication Standardization Sector)
  • VCEG (Video Coding Experts Group)

• Joint Collaboration Effort (MPEG with VCEG)
  • JVT (Joint Video Team): H.264/AVC, MPEG-4 Part 10
  • JCT-VC (Joint Collaborative Team on Video Coding)
    • MPEG-H Part 2, H.265/HEVC
  • JVET (Joint Video Exploration Team)
    • FVC (Future Video Coding)
JCT-VC Document Management System

- URL: [http://phenix.int-evry.fr/jct/](http://phenix.int-evry.fr/jct/)
Service Menus

- **All Meetings**

- **Next Meeting**
  - [Proposal template download](#)

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**JCT-VC DOCUMENT MANAGEMENT SYSTEM**

**All Meetings**

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Document Register System Details

• JCTVC-(Meeting Letter) (Document Number)
  • e.g. JCTVC-X0001
• Also provides MPEG number: m (document number)
  • e.g. m28763
• AHG(Ad-hoc group) and CE (Core Experiment) Reports: Normally with documents number 0001 ~ 002X
• Overall Meeting Report and Standard Draft by Editors: Normally with documents number 1000 ~ 102X
• well…Strategy? (could ruin the fair competition system)
  • Registration with vague proposal title first.
  • Update the proposal title and upload documents on meeting.
Document Types and Example

- Technical Proposal
  - For future patent licensing / own product protecting
  - CTC (Common Test Condition) proposal
- Cross Check Document
  - To verify the proposal from other company/institute
  - Experiment multiple test sets / check proposal documents consistency

Zip compressed file
- Proposal Document (.docx)
- Presentation Slides (.ppt)
- Excel spread sheets with experimental results (.xls)

Presentation Slides

Proposal Documents with Patent rights declaration

1 Problem Statement

In video compression and transmission, packet prioritization is of utmost importance for the role it plays in UEP (Uncompressed Error Protection), packet dropping for bandwidth adaptation, as well as QP (Quantization Parameter) control for enhanced video quality, to name a few. As such, packet priority is essential for optimal QoS handling in applications such as video streaming. However, the current HEVC draft specification [1] does not provide sufficient information for prioritization. For example, priority ID is not specified. And although temporal ID [temp ID] in the NAL unit header is provided, video packets with the same temporal ID could have different priorities.

1.1 Uniform Prioritization

4 Patent rights declaration(s)

InterDigital Communications, Inc. may have IPR relating to the technology described in this contribution and, conditioned on reciprocity, is prepared to grant licenses under reasonable and non-discriminatory terms as necessary for implementation of the resulting ITU-T Recommendation | ISO/IEC International Standard (per box 2 of the ITU-T/ITU-R/ISO/IEC patent statement and licensing declaration form).
Common Test Condition (CTC) - HEVC

- Huge test points
  - 24 Test sequences (Class A ~ F) x 3 coding structure (AI, RA, LD-B, LD-P (option)) x 4 QPs x 2 (Results of proposed and control groups)
  - Early days, there were High / Low profiles in HEVC (later, only Main profile): x2 times

- Currently, main profile and High efficiency (10 bit) profile
  - Intra, main
  - Intra, high efficiency, 10 bit
  - Random access, main
  - Random access, high efficiency, 10 bit
  - Low delay, main
  - Low delay, high efficiency, 10 bit
  - Low delay, main, P slices only (optional)
  - Low delay, high efficiency, P slices only, 10 bit (optional)

- QP values: 22, 27, 32, and 37

*Document#: JCTVC-L1100
Common Test Condition (CTC) - SHVC

- Scalable HEVC
  - Spatial scalabilities (2x, 1.5x), and SNR scalabilities (using QPs) for both HEVC and AVC layers

| Mandatory test conditions | Intra, spatial 2x  
|                          | Intra, spatial 1.5x  
|                          | Random access, spatial 2x  
|                          | Random access, spatial 1.5x  
|                          | Random access, SNR  
|                          | Low delay, B slices, spatial 2x  
|                          | Low delay, B slices, spatial 1.5x  
|                          | Low delay, B slices, SNR  
| Optional test conditions | Low delay, P slices only, spatial 2x  
|                          | Low delay, P slices only, spatial 1.5x  
|                          | Low delay, P slices only, SNR  

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- QP values:

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* Document#: JCTVC-Q1009
Experimental Results under CTC

- Example: JCT-VC J0034 for Scalable HEVC by InterDigital
- Excel Spread Sheets under CTC (note: provides summary table and plots automatically)
- Decoding Time Results
Example of Meeting Notes

- JCTVC-W1000-v2
- Title: Meeting report of the 23rd meeting of the Joint Collaborative Team on Video Coding (JCT-VC), San Diego, US, 19–26 Feb. 2016
- Author: Gary Sullivan (Microsoft / VCEG side) and Jens-Rainer Ohm (RWTH Aachen University / MPEG side)

Proposal

Decision by chairs
HEVC Links (arranged by Fraunhofer HHI)

- HEVC webpage by HHI Fraunhofer (http://hevc.info/) – to be updated after meetings
- JCT-VC documents: http://phenix.int-evry.fr/jct/
- HEVC Reference SW (HM): https://hevc.hhi.fraunhofer.de/svn/svn_HEVCSoftware

Extra:
- Test Sequences (ID/password required): ftp://ftp.tnt.uni-hannover.de/testsequences
- (Extra) RTP Payload Format for HEVC by IETF: https://tools.ietf.org/html/rfc7798
- Github OpenHEVC Decoder SW: https://github.com/OpenHEVC/openHEVC
SHVC Links

- Same Repositories with HEVC.
- Login information is required for ftp sites.
- SHM (SHVC reference SW) repository: [https://hevc.hhi.fraunhofer.de/svn/svn_SHVCSoftware/](https://hevc.hhi.fraunhofer.de/svn/svn_SHVCSoftware/)
- Test sequences: [ftp://hevc@ftp.tnt.uni-hannover.de/testsequences/](ftp://hevc@ftp.tnt.uni-hannover.de/testsequences/) and [ftp://hevc@ftp.tnt.uni-hannover.de/scalable/sequences/](ftp://hevc@ftp.tnt.uni-hannover.de/scalable/sequences/)
- AVC base layer bitstreams: [ftp://hevc@ftp.tnt.uni-hannover.de/scalable/bitstreams/AVC_CTC](ftp://hevc@ftp.tnt.uni-hannover.de/scalable/bitstreams/AVC_CTC)
- Latest SHM SW version 12.0
- Simple usage:

```
TAppEncoder -c cfg/encoder_randomaccess_scalable.cfg -c cfg/per-sequence-svc/BasketballDrive-2x.cfg -c cfg/layers.cfg -q0 22 -q1 22 -b str/BasketballDrive.bin -o0 rec/BasketballDrive_l0_rec.yuv -o1 rec/BasketballDrive_l1_rec.yuv TAppDecoder -b str/BasketballDrive.bin -ls 2 -o0 rec/BasketballDrive_l0_drec.yuv -o1 rec/BasketballDrive_l1_drec.yuv For AVC base layer tests the following should be used: cfg/layers_avcbase.cfg configuration file -ibl <BLrecon.yuv> option to specify the reconstructed base layer input
```
Thank You