RTP Payload Format for High Efficiency Video Coding draft-schierl-payload-rtp-h265-00.txt

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High Efficiency Video Coding (HEVC)

- HEVC under development by JCT-VC –
  Joint Collaborative Team on Video Coding of ITU-T and ISO/IEC
  - 300+ people, meeting every 3 months for 10 days; up to 1000 proposal docs per meeting.
- Draft standard is now at Committee Draft (CD) level
  - Finalization planned for late 2012 as “MPEG-H Video” and “ITU-T Rec. H.265”
- Performance target: Bitrate reduction by 50% compared to H.264 High Profile
- Standard optimized for resolutions beyond “HD” (i.e. 4k, 8k)
- Use cases:
  - Video Conferencing
  - Internet video streaming
  - high bit-rate entertainment-quality video…
- Extensions are expected for 3D and Scalable Coding

High Efficiency Video Coding (HEVC) (cont.)

- Hybrid video codec approach of predictive transform and entropy coding
- At present: Main Profile, and many Levels supporting QCIF to 8k and beyond; profile/level discussion not finished
- Conceptual split between Video Coding Layer (VCL) and Network Abstraction Layer (NAL)
- Higher coding efficiency in VCL achieved by…
  - Bigger Block sizes (up to 64x64)
  - Large sets of transforms
  - Decoupling of prediction block size and transform block size, quadtree structure approach
  - Additional in-loop filters (Deblocking, Sample-Adaptive Offset, and Adaptive Loop Filter)

HEVC Network Abstraction Layer

- NAL unit header (two octets length, *different wrt. H.264!*)
  - Co-serves as payload header
  - Forbidden bit – 1bit
  - NAL reference idc – 1bit
  - NAL unit type – 6bit
  - TID – Temporal Level Indicator – 3bit (similar to SVC/RFC6190)
- Parameter Sets:
  - Sequence Parameter Sets (SPS)
  - Picture Parameter Sets (PPS)
  - Adaptation Parameter Sets (APS) (*new wrt. H.264!*)
- Random Access via..
  - IDR - Instantaneous Decoder Refresh (IDR)
  - CRA – Clean Random Access (Open GOP) (*new wrt. H.264!*)
  - TLA – Temporal Layer Access (similar to SVC)
- SEI concept

HEVC Parallelization features

- HEVC acknowledges decoding complexity and high-level parallel decoding architecture through its syntax.
- Profiling of parallel processing tools not yet finalized in JCT-VC
- We expect that the payload format need to provide support for signaling of parallelization approach in SDP.
- Goal: Efficient use of multi-processor/core platforms
- Slices
- Tiles (*different wrt. H.264!*)
  - Rectangular parts of the picture, borders defined in parameter sets
  - Change in scan order; prediction is interrupted across tile boundaries
- Wavefront Parallel Processing (WPP, *different wrt. H.264!*)
  - Syntax support for a common decoding implementation strategy based on block lines

HEVC payload draft overview

- Based on H.264 payload format RFC 3984 and successors
- Packet Types:
  - Single NAL unit packet (“Type A” only)
  - Single Time Aggregation Packet (Type A and B)
  - Fragmentation Unit (Type A and B)
- Packetization modes:
  - Mode 1: Transmission in decoding order
  - Mode 2: Transmission out of decoding order
- Draft registers new media sub type: “H265”
- Simple SDP example:

```
m=video 49170 RTP/AVP 98
 a=rtpmap:98 H265/90000
 a=fmtp:98 profile-level-id=UVWXYZ;packetization-mode=1;sprop-parameter-sets=<…>
```

Questions to the WG

- Is anyone here interested in “Simple” packetization mode?
  - Mode was introduced in RFC 3984 for compatibility with ITU-T Rec. H.241, which incorporated the text of an early draft to RFC 3984.
  - ITU couldn’t wait for IETF, decided to publish text themselves
  - IETF decided to include simple packetization mode for backward compatibility
- Tradeoff
  - “Force” implementers to implement all packet types (1000 lines of code?)
  - One fewer negotiated parameter of payload format