VVC 표준 동향 및 VVC 표준 특허 발굴 사례

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Mainstream Video Codec in the market

SD Video

디지털 TV 방송(SD급)
DVD 서비스
ATSC 표준에 사용

MPEG-2(1995)

HD Video

케이블 TV
지상파 HDTV
Blueray disk
Video streaming
Mobile video

H.264/MPEG4 AVC (2003)

UHD Video

4K UHD
Mobile video
Video streaming
HDR/WCG

HEVC/H.265 (2013)

Versatile Video

8K UHD
Panoramic video
VR walkthrough
360 video

VVC/H.266 (2020)

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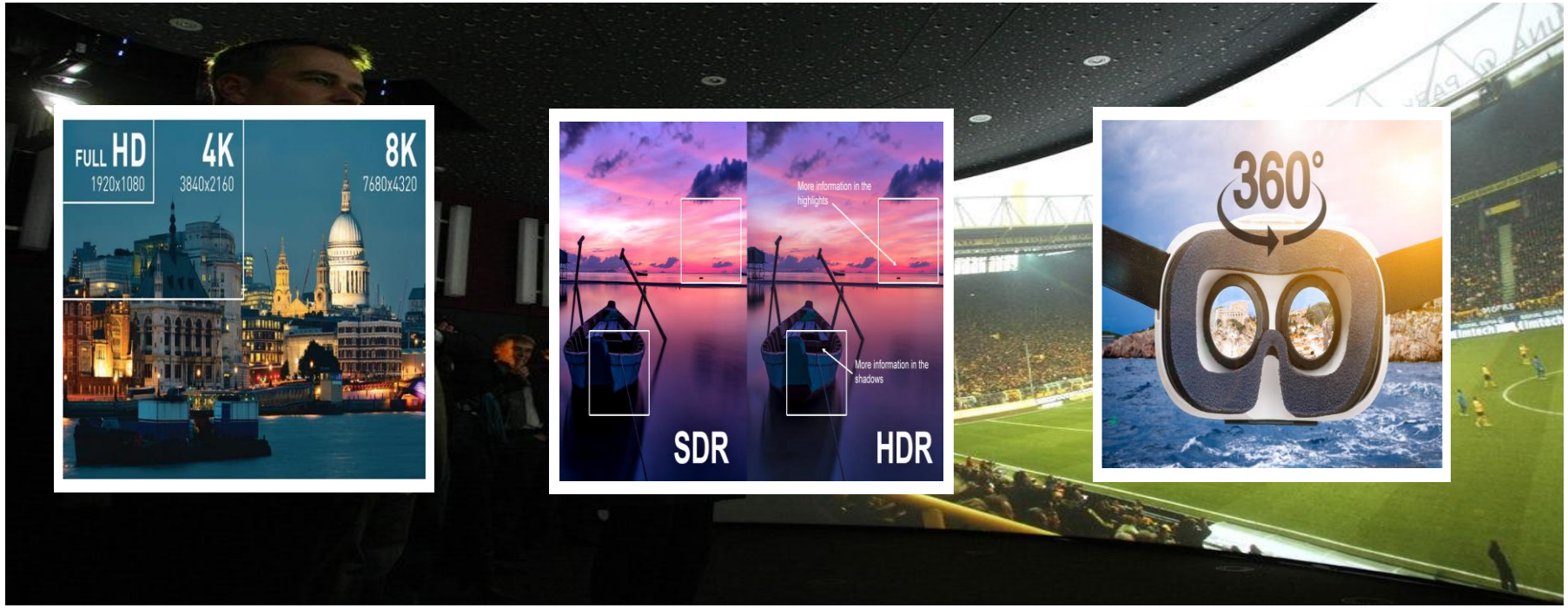
Versatile Video Codec (VVC)

Joint ITU-T (VCEG) and ISO/IEC (MPEG) project
Successor of HEVC/H.265



8K UHD
4K UHD에서 8K UHD 미디어로 진화

HDR/WCG
고선명 , 고 생동감 TV 등장

High Dynamic range(HDR)
Wide color gamut(WCG)

Immersive /360 video
VR 미디어 등장

파노라믹 비디오
VR walkthrough

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Milestones of VVC

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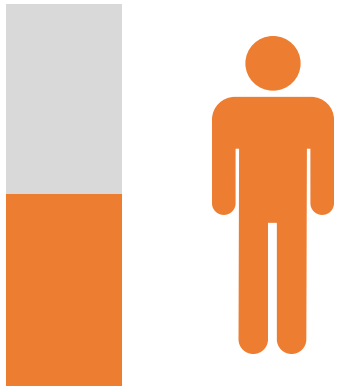
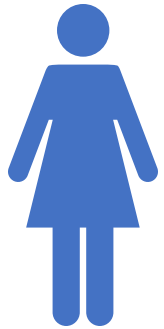
Versatile Video Codec

Coding Efficiency

압축률 향상

Flexible block structure,
New





Versatility

360 video, VR, smooth streaming

실감 미디어를 위한 function 구현

50% bitrate reduction over HEVC

Achieve 50% bitrate reduction with perceptual quality over HEVC
Achieve 38% bitrate reduction with PSNR over HEVC

HD/UHD/8K resolution

Efficiently compress 8K UHD video

Adaptive streaming with resolution switching

Resample reference picture in case of different resolutions

Tiled steaming of 360 video Independent subpicture

Enable sub-picture decoding according to user preference.

Versatile Video Codec

01 Flexible block partition

Binary partition of coding block
Ternary partition of coding block

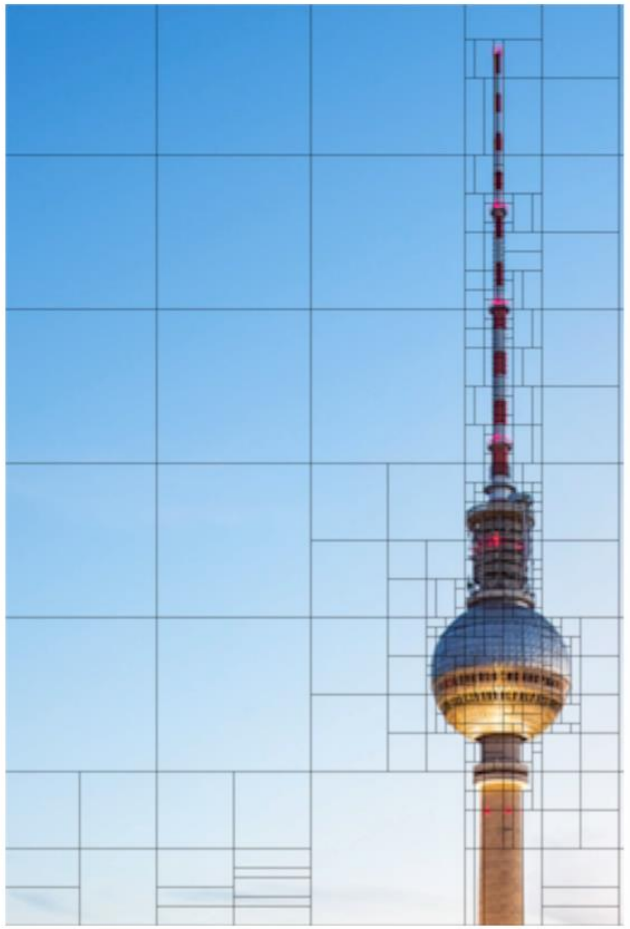
02 New coding tool

Affine motion compensation
History based motion vector predictor
Motion vector refinement
Triangle partition
Multiple transform selection
Matrix-based intra prediction

03 High level syntax for immersive media

Adaptive resolution change
Tile and rectangular slice structure for support OMAF use case
Subpicture for support effective streaming

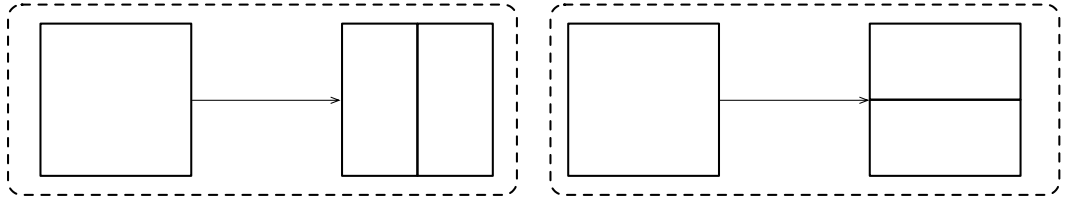
VVC – Flexible block partition



Quadtree + Multi-type tree block partition

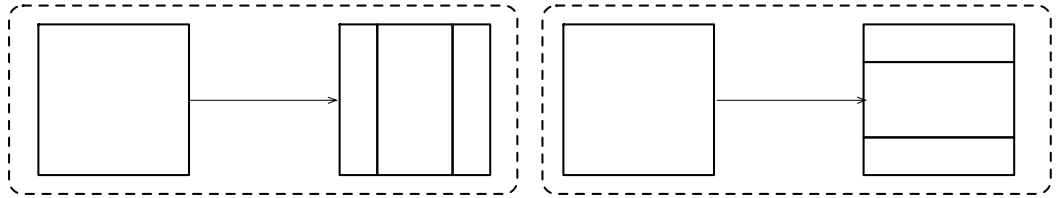
Binary Tree

Split root node into horizontal or vertical binary

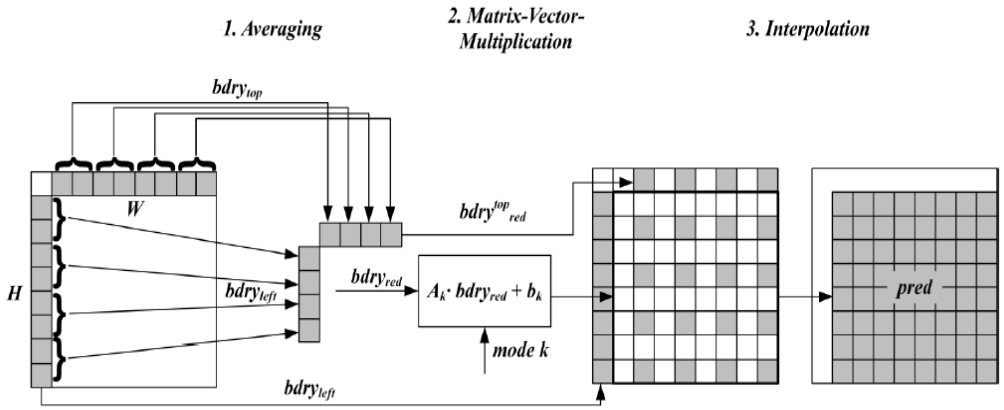


Ternary Tree

Split root node into horizontal or vertical ternary



VVC – Matrix weighted intra prediction



MIP

Newly added intra prediction technique into VVC

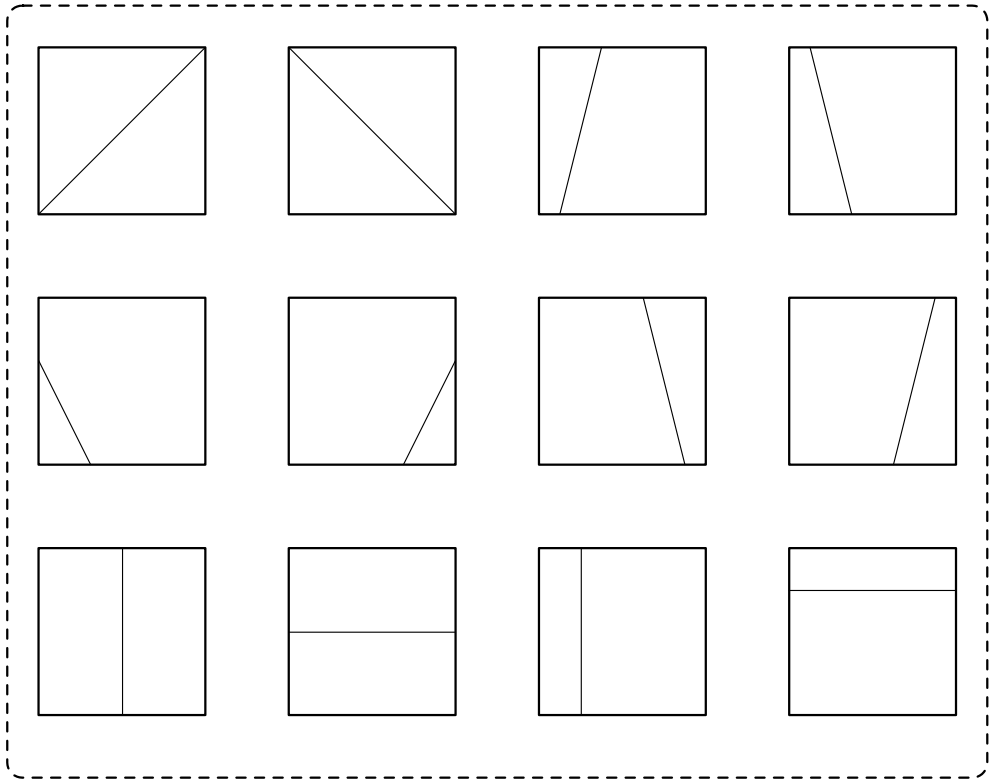
Left neighboring and above neighboring samples are used for multiplication of matrix

MIP Process

1. Averaging left neighboring and above neighboring samples

2. Matrix multiplication
   - A matrix vector multiplication is carried out with the averaged samples as an input

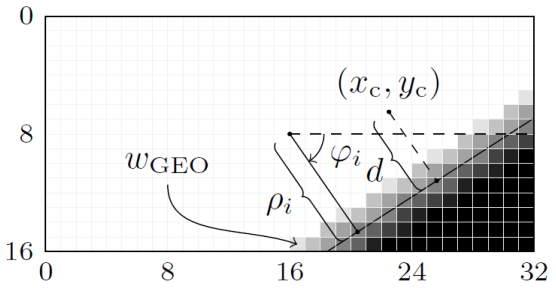
VVC – Geometric motion partition



Non-rectangular motion partition

Support 64 geometric motion partition

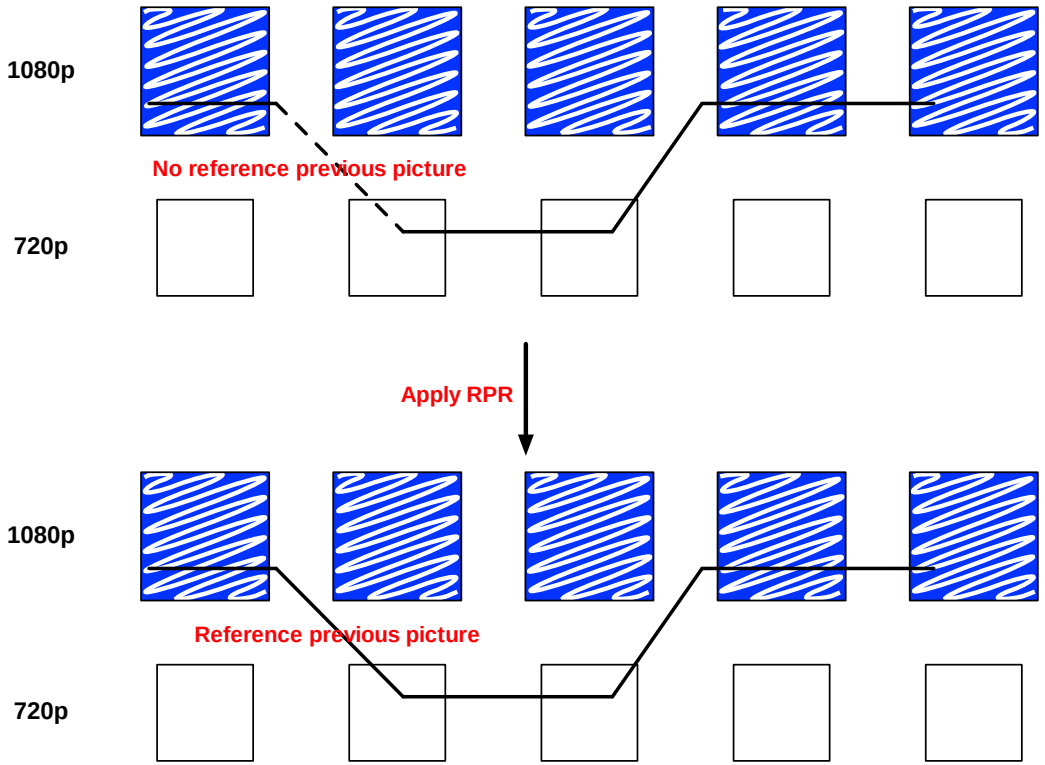
Apply geometric motion partition in case of merge mode
The split boundary of geometric merge mode is descripted by angle φ_i and distance offset ρ_i .



Geometric motion prediction generating process

Choose 2 merge candidates
Generate 2 motion prediction
Blending 2 motion prediction into 1 motion prediction
- Weighted prediction in the boundary

VVC - Versatility



Reference picture resampling (RPR)

- Resample reference picture in case of different resolutions
- Apply resampling reference picture when ARC is applied

Use case : Adaptive streaming

- Adaptive streaming with resolution switching
- Removing noticeable temporal quality variation caused by IDR pictures
- Better compression performance
  - 5.6% Y-BDBR reduction with 24-picture

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VVC - Versatility

Independent sub-picture

- More efficient coding of independent sub-pictures
- Flexible block addressing for easier extraction and m erging of sub-pictures

Use case : Tiled streaming of 360 video

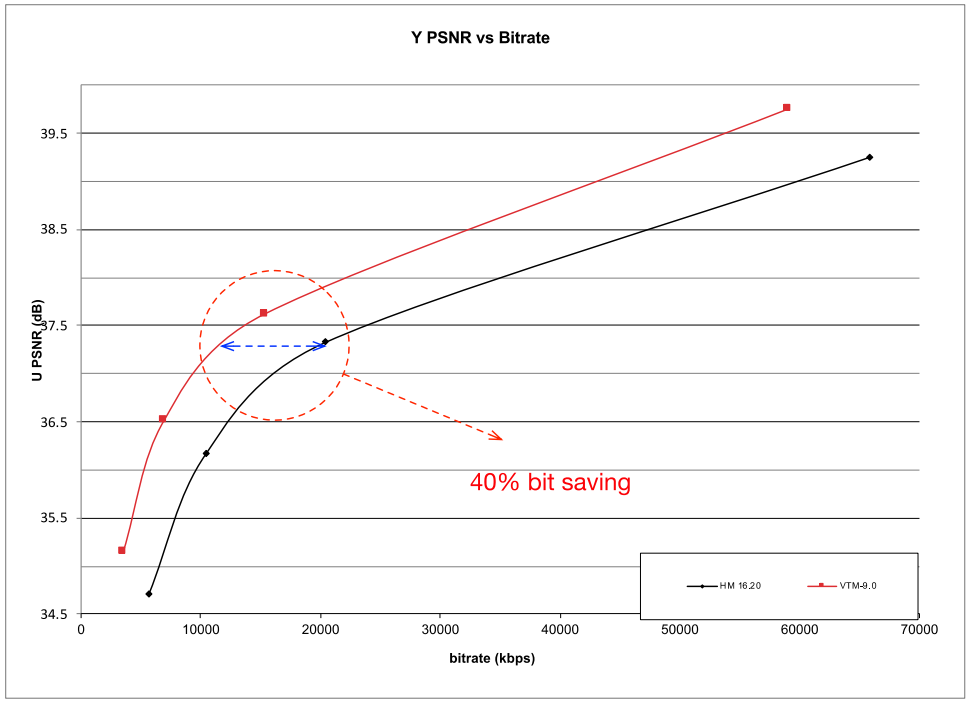
- Enable sub-picture decoding according to user preference.
  - 2K sub-picture decoding at 8K 360 video
  - 4K full 360 video + 4K preference view

Performance of VVC

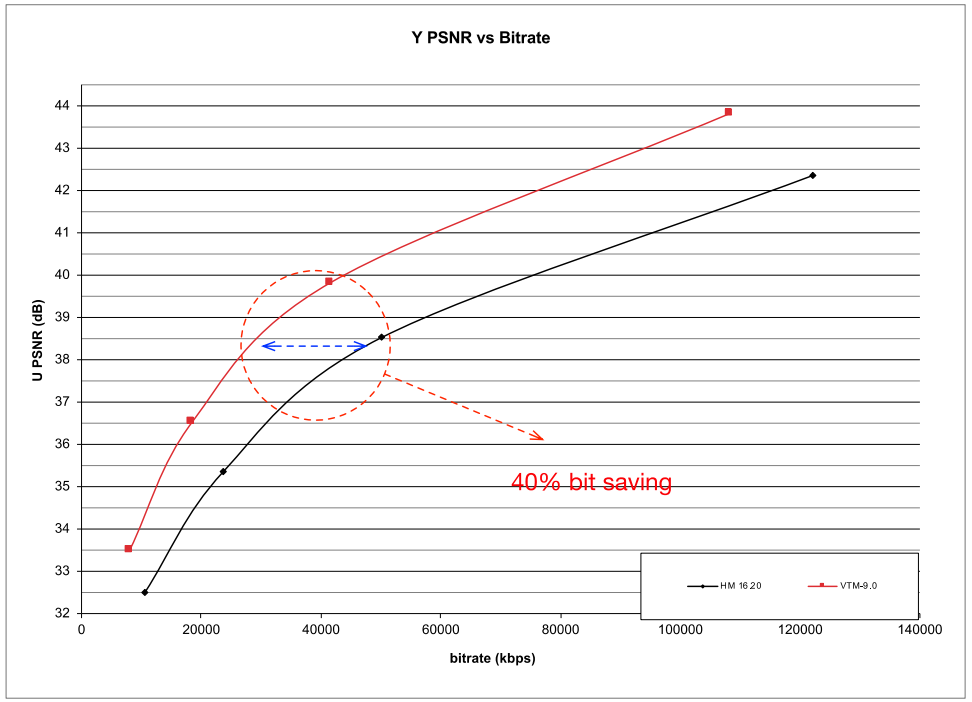
VVC reference software (VTM) vs. HEVC reference software (HM)

Bit rate saving of more than 40% in UHD (PSNR)

Campfire (4K sequence)



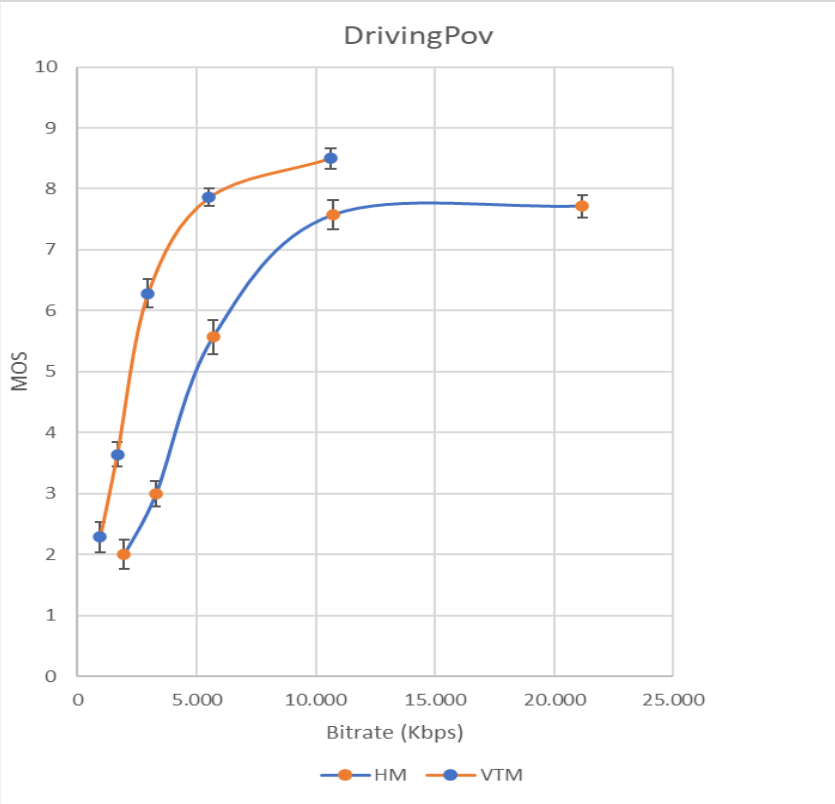
Parkrunning3 (4K sequence)



Visual Subjective Performance of VVC

Bit rate savings provided by VTM is about 50% over HM

Test with non-expert viewers (8 different viewers)
DSIS test method



JVET-S0246 : Results of dry run subjective assessment of SDR UHD verification test

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표준 특허 창출 지원 사례

KISTA 표준 특허 창출 지원 사업
1 단계: '19.03~'19.11 , 2단계 :'20~'22

사업 기획 및 관리

사업 기획 및 수요 기업 파악
지원 대상 기업 선정

엑스리스 니즈 파악

엑스리스 기 출원 현황 및 weak point 파악

KISTA

지원 사업 전략 및 scope 정의

IPR 획득 전략 도출

표준 특허 변리사

표준 특허 창출 지원

기고문 분석, 특허 지원 교육 등 지원 활동

엑스리스

표준 특허 출원

표준 특허 창출 지원을 통한 고품질 특허 출원

표준 특허 확보

특허맵 분석
Claim chart 작성

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VVC 표준 특허 발굴 및 권리화

- 특허 출원 단계에서부터 체계적 컨설팅을 통한 권리 범위 강화

VVC 표준 특허 개발
특허 출원 시 retouching, 실시예 추가

VVC 표준 기술 기고 / 채택
JVET 표준 기고 및 표준 기고 채택

VVC 표준 특허 발굴 및 권리화
특허맵 작성을 통한 특허 출원 전략 수립
클레임 차트 보강을 통한 표준 특허 확보

VVC 표준 특허 수익화
글로벌 기업에 VVC 특허 x건 매각
('20년 05월)