Standard-related patent landscape: VVC

Patent Mapping to the VVC standard in LexisNexis® IPlytics®

General Scope

VVC, or Versatile Video Coding, stands as the latest generation video compression standard, succeeding HEVC/H.265. VVC is designed to further enhance video compression efficiency, providing superior coding performance for a wide range of applications, including ultra-high-definition video content and immersive multimedia experiences. The standard aims to deliver higher compression ratios and improved visual quality compared to its predecessors, making it a key technology for advancing video streaming, broadcasting, and video communication in the era of evolving multimedia requirements.

References

- As stated by the Joint Video Experts Team (JVET), a collaboration between the Video Coding Experts Group (VCEG) and the Moving Picture Experts Group (MPEG), VVC represents a significant leap forward in video compression technology. The JVET emphasizes VVC's ability to achieve substantially improved coding efficiency, stating that it "provides a versatile solution for high-quality video coding, addressing the diverse needs of modern multimedia applications across different platforms."
  Source: *jvet-international.org*

- Reports from international standardization bodies, including the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC), recognize VVC as a key standard in the evolving landscape of video coding. These reports highlight VVC's role in enabling efficient compression for ultra-high-definition content, virtual reality, and emerging multimedia applications, positioning it as a critical technology for the next generation of video services.
  Source: *iso.org, iec.ch*

VVC standard	Topics (positive concepts)
Relevant concepts	▪ H.266 is a video compression standard developed by the JVET (Joint Video Experts Team), published in 2020 as a successor to the H.265/ HEVC standard. H.266 aims to improve compression efficiency and support a broad range of applications. ▪ H.265 Features/Components: Coding Tree Unit (CTU) / Largest Coding Unit (LCU): ▪ Provides a hierarchical and flexible structure for encoding and decoding video frames efficiently. ▪ Maximum CTU size is 128x128 pixels in H.266 which is an improvement on 64x64 pixels in H.265. High-Level Syntax (HLS): ▪ HLS is everything related to the Network Abstraction Layer (NAL). ▪ Key purpose of the HLS design is to provide an interface of a video codec to various networks/systems where the video codec is used. Block Partitioning: ▪ Introduces a quadtree with nested multi-type tree (QT+MTT) block partitioning structure that supports Binary-Tree and Ternary-Tree splits in both vertical and horizontal directions. Intra Prediction: ▪ Improves the prediction accuracy, coding efficiency and encoding complexity of the encoder. ▪ Increased the intra-frame prediction modes from 35 in H.265 to 67 (DC Mode + Planar Mode + 65 angular intra prediction modes) in H.266. Intra Prediction: ▪ Inter prediction involves using previously encoded frames as references to predict the current frame's pixels. Motion compensation is applied to align the reference frame with the current frame, and residuals are calculated. Transformation and Quantization: ▪ H.266 utilizes Discrete Cosine Transform (DCT) and Discrete Sine Transform (DST) for transform coding. ▪ Quantization – The purpose of quantization is to map the output values from the transformation, which are continuous, onto discrete values that can be coded into the bitstream. H.266 introduces Dependent Quantization. Loop Filtering: ▪ In-loop filtering is a process used to reduce or completely remove coding artifacts. ▪ H.266 incorporates a Deblocking Filter, Sample Adaptive Offset Filter, Adaptive Loop Filter, Cross-Component Adaptive Loop Filter & Luma Mapping with Chroma Scaling. Entropy Coding: ▪ Reduces the average bitstream length, or equivalently, the average number of bits required to represent information within a picture. ▪ H.266 uses Context-Based Adaptive Binary Arithmetic Coding (CABAC).

VVC standard	Topics (negative concepts)
No relevant concepts	Macroblock: ▪ H.264 processes video frames using macroblock whereas the standards following (H.265 onwards) use Coding Tree Units. CAVLC (Context Adaptive Variable Length Coding): ▪ An entropy coding method used in H.264. Image Compression: ▪ Image compression shares similar concepts to video compression (e.g. Transform Coding, Quantization and Entropy Coding). Image compression has its own set of standards including JPEG, PNG, GIF etc. Audio Coding: ▪ Shares similar concepts to video compression (e.g. Transform Coding, Quantization and Entropy Coding). Audio coding standards include Advanced Audio Coding (AAC), MP3 etc. ▪ Point Cloud Compression (PCC): ▪ Point Clouds are sets of tiny "points" grouped together to make a 3D image. Point Cloud has become a popular method for AR and VR video composition and was standardized in 2020 (V-PCC, S-PCC & L-PCC).