Augmented Reality & Video Service Emerging Technologies

Skype, YouTube & H.264/MPEG-4 AVC

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Skype, YouTube & H.264/MPEG-4 AVC

H.264/MPEG-4 AVC

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- H.264 = MPEG-4 Part 10 AVC
  - AVC: Advanced Video Coding
- Most popular standard for video recording, compression, and distribution

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- Developed by the project partnership
  JVT (Joint Video Team) of
  ITU-T VCEG (Video Coding Experts Group) and
  ISO/IEC JTC1 MPEG (Moving Picture Experts Group)
  - ITU-T
    - International Telecommunication Union - Telecommunication Standardization Sector
  - ISO/IEC JTC1
    - Joint technical committee of the ISO (International Organization for Standardization) & IEC (International Electrotechnical Commission)
    - Develops, maintains, and promotes IT (Information Technology) & ICT (Information and Communications Technology) standards

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- Designed for high quality video with lowest bitrates
- Video standard that uses Block-oriented Motion-compensation compression

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- H.264 was designed to have half or a lesser bitrate compared to MPEG-2, H.263, or MPEG-4 Part 2 without increasing the complexity too much
- Increased computation complexity considers the improved processing capability of CPUs and GPUs on modern devices

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- H.264 is a family of standards that composes several different video encoding profiles
- H.264 decoder may not be able to decode all profiles, so the decodable profiles need to be informed

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC

- H.264 compression results in low bitrates and lower resolutions
  - H.264 lossless encoding is possible but rarely used
- H.265 = MPEG-H Part 2 = HEVC is a successor of the H.264/MPEG-4 AVC
  - HVEC: High Efficiency Video Coding

H.264/MPEG-4 AVC

❖ H.264/MPEG-4 AVC applications

- Blu-ray Discs, Internet streaming sources
  - YouTube, Skype, iTunes Store, Vimeo, etc.
- Web software
  - Adobe Flash Player, Microsoft Silverlight, etc.
- HDTV broadcasting companies
  - Advanced Television Systems Committee standards, ISDB-T, DVB-T or DVB-T2
- Cable services: DVB-C
- Satellite services: DVB-S and DVB-S2

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❖ H.264/MPEG-4 AVC

- H.264 patents are owned by various parties whose licensing is administered by the patent firm MPEG LA (Licensing Administration), which is based in Denver, Colorado, USA

H.264/MPEG-4 AVC

❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - CBP (Constrained Baseline Profile)
     - For low-cost applications
     - Used in videoconferencing and mobile applications
   - BP (Baseline Profile)
     - For low-cost applications that require additional data loss robustness
     - Used in videoconferencing and mobile applications

H.264/MPEG-4 AVC

❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - XP (Extended Profile)
     - For streaming video
     - Relatively high compression capability with enhanced robustness to support data losses and server stream switching

H.264/MPEG-4 AVC

❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - MP (Main Profile)
     - For standard-definition digital TV broadcasts using MPEG-4 DVB (Digital Video Broadcasting) standard
     - Used for HDTV (High-Definition Television) but rarely used after HP (High Profile) was developed in 2004

H.264/MPEG-4 AVC

❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - HP (High Profile)
     - For DVB HDTV broadcast and disc storage applications
     - Used as the Blu-ray Disc storage format and the DVB HDTV broadcast services
   - PHiP (Progressive High Profile)
     - Similar to HP without field coding features

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❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - Constrained High Profile
     - Similar to PHiP without B (bi-predictive) slices
   - Hi10P (High 10 Profile)
     - Builds on HP with added support for up to 10 bits per sample of decoded picture precision

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❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - Hi422P (High 4:2:2 Profile)
     - For professional applications that use interlaced video
     - Builds on Hi10P with added support for the 4:2:2 chroma subsampling format while using up to 10 bits per sample of decoded picture precision

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❖ H.264 Profiles

1. Non-Scalable 2D Video Application Profiles
   - Hi444PP (High 4:4:4 Predictive Profile)
     - Builds on top of Hi422P supporting up to 4:4:4 chroma sampling with up to 14 bits per sample
     - Uses efficient lossless region coding, and individual picture as three separate color planes coding

H.264/MPEG-4 AVC

❖ H.264 Profiles

2. Camcorders, Editing, and Professional Application Profiles
   - Four additional Intra-frame-only profiles used mostly for professional applications involving camera and editing systems
     - High 10 Intra Profile
     - High 4:2:2 Intra Profile
     - High 4:4:4 Intra Profile
     - CAVLC 4:4:4 Intra Profile

H.264/MPEG-4 AVC

❖ H.264 Profiles

3. SVC (Scalable Video Coding) Profiles
   - Scalable Constrained Baseline Profile
     - Primarily for real-time communication applications
   - Scalable High Profile
     - Primarily for broadcast and streaming applications

H.264/MPEG-4 AVC

❖ H.264 Profiles

3. SVC (Scalable Video Coding) Profiles
   - Scalable Constrained High Profile
     - Primarily for real-time communication applications
   - Scalable High Intra Profile
     - Primarily for production applications
     - Constrained to all-Intra use

H.264/MPEG-4 AVC

❖ H.264 Profiles

4. MVC (Multiview Video Coding) Profiles
   - Stereo High Profile
     - Profile for two-view stereoscopic 3D video
   - Multiview High Profile
     - Profile for two or more views using both inter-picture (temporal) and MVC inter-view prediction
   - Multiview Depth High Profile

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