Augmented Reality & Video Service Emerging Technologies

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

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

skype™ Codecs

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❖ **Skype Audio Codecs**

- Initially used G.729 and SVOPC for VoIP

- Skype added SILK to Skype 4.0 for Windows and other Skype clients

- SILK is a lightweight and embeddable audio codec created by Skype

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❖ **Skype Audio Codecs**

- Skype's Opus is an open source codec that can integrate the SILK codec for voice transmission with CELT codecs for higher quality audio transmissions (e.g., live music performances)
  - CELT: Constrained Energy Lapped Transform

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❖ **Skype Audio Codec - SILK**

- SILK is an audio compression format
  and audio codec

- Developed by Skype Limited
  - Initial released in March 2009
  - Latest release SDK 1.0.9 in 2012

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❖ **Skype Audio Codec - SILK**

- SILK operation specs
  - Audio sampling frequencies
    - 8, 12, 16 or 24 kHz
  - Bitrate range
    - 6~40 kb/s (b/s = bit/s = bps)
  - Low algorithmic delay
    - 25 ms
    - Based on a 20 ms frame size + 5 ms look-ahead

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❖ **Skype Audio Codec - SILK**

- Reference programming in C language

- Codec is based on LPC
  - LPC: Linear Predictive Coding

- SILK binary SDK is available
  - SDK: Software Development Kit

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❖ **Skype Audio Codec - Opus**

- Designed as a lossy audio coding format to efficiently encode speech and general audio into a single format

- Opus was designed to combine SILK with CELT
  - Switching between or combining SILK and CELT as needed for maximum efficiency

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❖ **Skype Audio Codec - Opus**

- Maintains low-latency sufficient for
  real-time interactive communications

- Designed to have low-complexity to run
  on low end ARM3 processors

- Opus was developed by Xiph and is
  standardized as RFC 6716 by the IETF
  - IETF: Internet Engineering Task Force

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❖ **Skype Audio Codec - CELT**

- CELT (Constrained Energy Lapped Transform)

- Open royalty-free lossy audio compression
  codec software algorithm format

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❖ **Skype Audio Codec - CELT**

- Very low algorithmic delay to support low-latency audio communications

- Designed using lower-latency MDCT
  - MDTC: Modified Discrete Cosine Transform

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❖ **Skype Video Codecs**

- VP7 was used for versions prior to Skype 5.5 as the video codec

- After 2005, Skype used True Motion VP7 codec

- In early 2011, Skype 5.5 moved to VP8

- True Motion VP7 and VP8 were developed by On2 Technologies for Google

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❖ **Skype Video Codecs**

- Skype 5.7 uses VP8 for both group and one-on-one standard definition video chatting

- After Microsoft acquired Skype in 2011 the video codec was replaced to H.264

Microsoft

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❖ **Skype Video Call Quality**

- Standard mode has a video resolution of 320×240 pixels with 15 fps (frames/s)
- High-quality mode has a resolution of 640×480 pixels with 30 fps
- HD (High Definition) mode has the highest resolution of 1280×720 pixels with 30 fps
- Other H.264 codecs are also used in group and peer-to-peer (one-on-one) video chatting

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

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