



Next Gen Open Video

In Hardware

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- Introducing the hardware team
- Current status of VP8 hardware adoption
- Things to focus on in the Next Gen Open Video

15 YEARS OF VIDEO CODEC EXPERIENCE



- The start-up Hantro was founded in 1992 in Oulu, Finland
- Focused on video coding since 1998
- Provider of HW IP cores and ARM optimized software codecs
- Acquired by On2 Technologies in 2007
- Acquired by Google in 2010
- Became the Chrome Media Hardware team
- Released the world's first VP8 HW decoder in 06/2010, and the world's first VP8 HW encoder in 02/2011

- A new video codec cannot be truly successful without wide device support
- Implement VP8 / multi-standard hardware accelerators
- Ensure hardware's accessibility in different platforms
- Proliferate the technology to semiconductor companies
 - WebM Project
 - Strategic partners
 - Channel partners
- Close participation in the Next Gen Open Video development

- Hardware multi-standard decoder – focus on cost and performance

- G1 Decoder v1 released in June 2010
- G1 Decoder v2 released in February 2011
- G1 Decoder v3 “Chip Shot” released in June 2011
- G1 Decoder v4 “Driver” released in December 2011
- G1 Decoder v5 “Eagle” released in March 2012
- G1 Decoder v6 “Fairway” released in July 2012

- Hardware multi-standard encoder – focus on quality

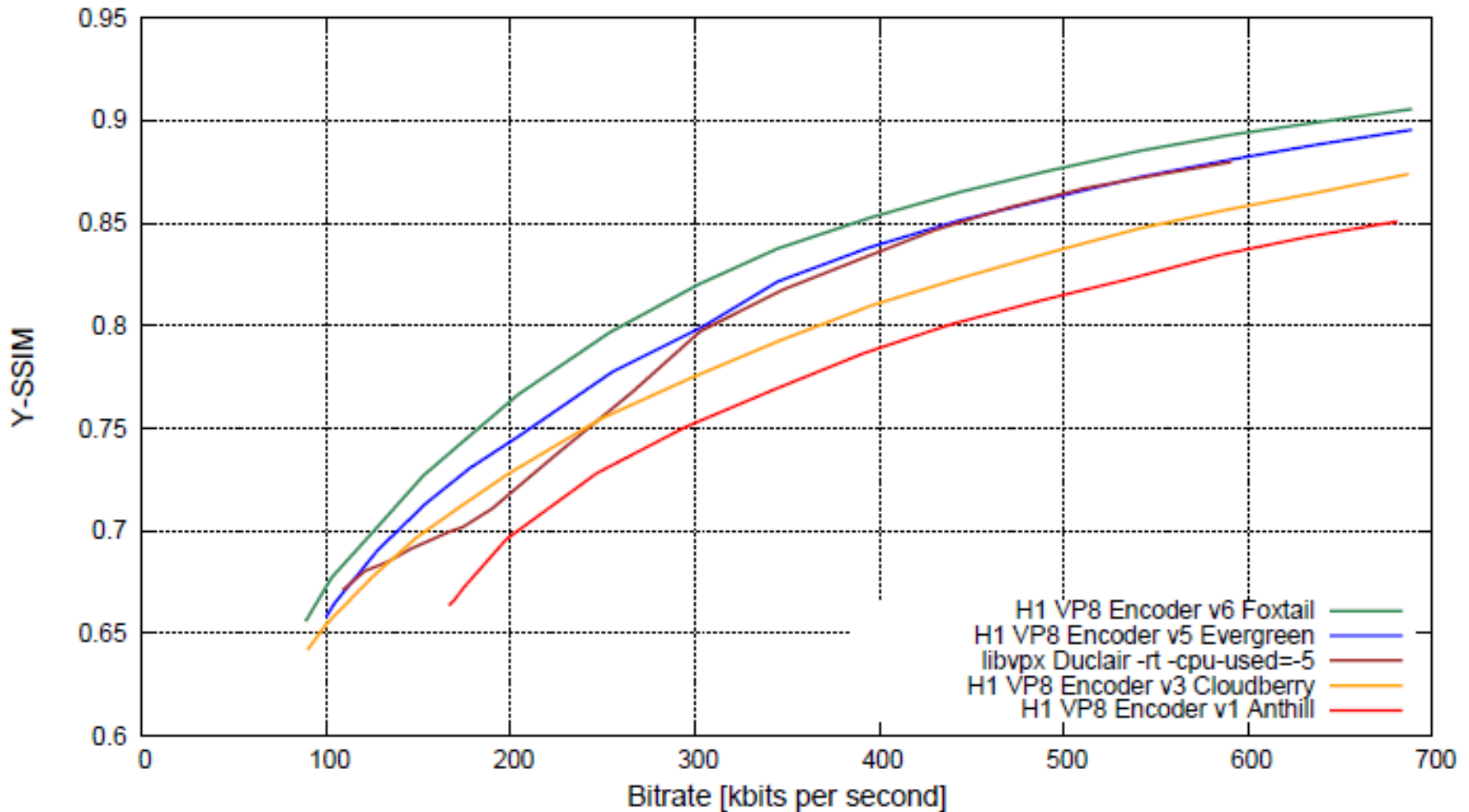
- H1 Encoder v1 “Anthill” released in February 2011
- H1 Encoder v2 “Blueberry” released in May 2011
- H1 Encoder v3 “Cloudberry” released in August 2011
- H1 Encoder v4 “Dragonfly” released in November 2011
- H1 Encoder v5 “Evergreen” released in March 2012
- H1 Encoder v6 “Foxtail” released in July 2012

VP8 HARDWARE ENCODER QUALITY IMPROVEMENTS



•30-40% quality improvement over six generations

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VP8 HARDWARE MILESTONES



- May 2010: VP8 open sourced
- Jan 2011: VP8 HW cores available through WebMProject
- June 2010: First VP8 HW decoder released
- Jan 2011: First chipset with VP8 HW decoder available
- Aug 2011: VP8 decoder in mass-market devices
- Feb 2011: First VP8 HW encoder released
- Feb 2012: First chipset With VP8 HW encoder available
- June 2012: VP8 encoder in mass-market devices



- Huge semiconductor adoption across different applications
 - > 50 VP8 standalone codec licensees at WebM Project
 - > 30 Multi-standard G1 Decoder licensees
 - > 10 Multi-standard H1 Encoder licensees
 - > 10 third-party implementations of VP8 hardware

- G1 and H1 in mass production – publicly announced chipsets:
 - Rockchip RK3066 application processor
 - Hisilicon K3V2 application processor
 - ST-Ericsson NovaThor L9540 application processor
 - LG Electronics SmartTV SoC

- In 2013, we expect majority of new chipsets to include full VP8 support

WHAT WILL BE DIFFERENT WITH THE NGOV



- Provide the hardware point of view
 - Ensure a bit-precise, unambiguous specification
 - Verify that each part of the codec is easy to implement in hardware
 - Help design the bitstream to support low-latency streaming, data partitioning, multicore
 - Improve real-time features

- Design hardware corner case test vectors (worst case memory bandwidth, worst case entropy coding, maximum length motion vectors, etc.)

- Provide feature requirements for third party developers

- Closely implementing hardware along with algorithm development
- NGOV accelerators available within a quarter after bitstream specification freeze
- Same distribution model as with VP8 – free of charge
 - Distribution channels well established -> Faster adoption than with VP8 expected
- Wide device adoption estimated for 2015