

HEVC, H.264 AND MPEG-DASH ROYALTY UPDATE

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Agenda

- H.264
- HEVC
- DASH

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H.264

- What do we know?
 - MPEG LA
 - Motorola
- What's new?
 - Nokia v. Apple

What Do We Know

- MPEG LA Patent Pool - Includes right to manufacture and sell AVC encoders and decoders with the right of End Users to use them for personal and consumer (including internal business) purposes without remuneration but not for other uses

<http://www.mpegla.com/main/programs/AVC/Documents/avcweb.pdf>

What Do We Know – MPEG LA - Products

- Products sold to end users and OEM for PC but not part of OS (decoder, encoder or product consisting of one decoder and one encoder = “unit”)
 - 0 - 100,000 units/year = no royalty (available to one legal entity in an affiliated group)
 - US \$0.20 per unit after first 100,000 units/year
 - Above 5 million units/year, royalty = US \$0.10 per unit
 - Enterprise cap: \$3.5M per year 2005-2006, \$4.25M per year 2007-08, \$5M per year 2009-10, \$6.5M per year 2011-2015; \$8.125M in 2016 and \$9.75M per year in 2017 through 2020

http://bit.ly/MPEGLA_h264terms

MPEG LA – Branded PCs

- An Enterprise selling branded OEM for PC OS may pay for its customer
 - 0 - 100,000 units/year = no royalty (available to one legal entity in an affiliated group)
 - US \$0.20 per unit after first 100,000 units/year
 - Above 5 million units/year, royalty = US \$0.10 per unit
 - Enterprise cap: \$3.5M per year 2005-2006, \$4.25M per year 2007-08, \$5M per year 2009-10, \$6.5M per year 2011-2015; \$8.125M in 2016 and \$9.75M per year in 2017 through 2020

MPEG LA - Content

- Where End User pays for AVC Video
 - **Subscription (not limited by title)**
 - 100,000 or fewer subscribers/yr = no royalty;
 - 100,000 to 250,000 subscribers/yr = \$25,000;
 - 250,000 to 500,000 subscribers/yr = \$50,000;
 - 500,000 to 1M subscribers/yr = \$75,000;
 - 1M subscribers/yr = \$100,000
 - **Title-by-Title - 12 minutes or less = no royalty;**
 - 12 minutes in length = lower of (a) 2% or (b) \$0.02 per title •
 - Enterprise cap: \$3.5M per year 2006-07, \$4.25M per year 2008-09, \$5M per year 2010, \$6.5M per year 2011-2015; **\$8.125M in 2016 and \$9.75M per year in 2017 through 2020**

MPEG LA - Content

- Where remuneration is from other sources
 - Free Television
 - (a) one-time \$2,500 per transmission encoder or
 - (b) annual fee starting at \$2,500 for > 100,000 HH rising to maximum \$10,000 for >1,000,000 HH
 - Enterprise cap: \$3.5M per year 2006-07, \$4.25M per year 2008-09, \$5M per year 2010, \$6.5M per year 2011-2015; \$8.125M in 2016 and \$9.75M per year in 2017 through 2020 • Royalties begin January 1, 2006
 - Internet Broadcast AVC Video (not title-by-title, not subscription) – no royalty for life of the AVC Patent Portfolio License

MPEG LA Very Active

- Over 1400 licensees (and still suing)

ZTE, Huawei sued over AVC patents

- Licensors actually bring suit (these are the first two in H.264 patent pool)

Motorola H.264 Patents

- Famous case against Microsoft
 - Focused on FRAND (fair, reasonable, and non-discriminatory pricing)
 - If a technology is a component of a standard, it must be offered on a Fair, Reasonable, and Non-Discriminatory basis
 - Motorola claimed \$6-\$8/unit for combined Wi-Fi/H.264 patents
 - Court looked at MPEG LA royalty for HEVC and ended up at \$0.00555/unit for H.264
 - Unclear how frequently Motorola goes after companies (I assume you have to be very, very large)

Nokia vs. Apple

- Nokia sued Apple in December 2016
- Claimed infringement of multiple patents across multiple technologies, including 14 H.264 patents
- Apple sued back claiming antitrust violations

What the Nokia-Apple Lawsuit Means for the Streaming Industry

If Nokia's standards infringement lawsuit prevails over Apple, the costs could be steep to any company relying on H.264 or even HEVC. Here are the issues at stake.

By *Jan Ozer*

Posted on December 30, 2016

http://bit.ly/nok_v_apple

Issue: Does FRAND Pricing from Motorola Apply?

- Seems it would, except pricing ultimately depends upon the relative value of patent rather than how many you offer
 - If Nokia's patents are more essential, they can charge more
 - Case by case analysis

http://bit.ly/nok_v_apple

Issue: Does FRAND Pricing from Motorola Apply?

- Nokia is also claiming FRAND doesn't apply because:
 - H.264 standard defines decoding process not encoding (defines 'encoder' as 'an embodiment of an encoding process,' and then defines 'encoding process' as **'a process, not specified in this Recommendation | International Standard, that produces a bitstream conforming to this Recommendation)**
 - In essence, since the standard defines decode (not encode), FRAND only applies to decode related patents
 - All Nokia patents are encoder-related, so FRAND should **not** apply

http://bit.ly/nok_v_apple

Do Nokia's Claims Hold Water?

- Tough to say, but they certainly raise the bar from \$0.00555 as a starting point, at least for negotiation purposes
 - Issue not raised in Motorola case
- Really does raise question as to H.264 pricing going forward

http://bit.ly/nok_v_apple

Perspective

- MPEG LA patent group unquestionably advanced H.264 adaption
 - Flash support was huge boost
 - OS support – Windows, Mac, iOS, Android
 - Browser support
 - Direct – IE, Edge, Chrome, Safari
 - Indirect (through OS) – Firefox, Opera
- H.264 became very successful, and completely brushed off challenges from VP8

HEVC/H.264

- What do we know?
 - MPEG LA
 - HEVC Advance
 - Technicolor/others
 - Perspective
- What's new?
 - HEVC Advance – free software decode

MPEG LA HEVC

- HEVC Products Sold to End Users by a Licensee with (a) ownership/control of the brand name or (b) if the HEVC Product bears no brand name, with discretion over decision to Sell
 - 0 - 100,000 units/year = no royalty (available to one Legal Entity in an affiliated group)
 - US \$0.20 per unit after first 100,000 units each year
- Maximum annual royalty payable by an Enterprise (Legal Entity and Affiliates) is \$25M for present coverage during the first License Term

http://bit.ly/MPEGLA_HEVCterms

MPEG LA Licensees

- 150 on website
(<http://www.mpegla.com/main/programs/HEVC/Pages/Licensees.aspx>)

HEVC Advance

- Hardware royalties
- Content royalties
- Optional features
- Free software decode

http://bit.ly/HA_terms

HEVC Advance - Hardware

Hardware Device Categories	Examples	Main Profiles Royalty (Region 1/2)	Profile Extensions Any One (Region 1/2)	Profile Extensions All Three (Region 1/2)	Annual Category Cap
Mobile Devices	Mobile Phone, Tablet, Laptop PC	\$.40/\$.20	+.10/\$.05	+.25/\$.125	\$30M (All Mobile) \$20M (Excluding Phones)
Connected Home and Other Consumer Devices	<u>Consumer Products:</u> Set-Top Box, Game Console, Blu-Ray Player, Desktop PC, non-4k UHD+ TV, Software <u>Commercial Products:</u> Surveillance Cameras, Conferencing Products, Medical Imaging, Digital Signage	\$.80/\$.40	+.20/\$.10	+.50/\$.25	\$20MM
4K UHD+ TV	4K UHD+ TV	\$1.20/\$.60	+.30/\$.15	+.75/\$.375	\$20MM

\$40MM
Combined
Cap

HEVC Advance - Hardware

- Three product classes
 - Mobile - \$.40/\$.20
 - Consumer (except TV)/Surveillance - \$.80/\$.40
 - TV - \$1.20/\$.60
 - Costs more for profile extensions
- Different rates depending upon region
 - Region 1 = U.S., Canada, EU, Japan, S. Korea, Australia, New Zealand, (others)
 - Region 2 = All countries outside of Region 1.
- \$40 million combined annual cap

HEVC Advance - Content

Content Distribution Categories	Examples	Main Profiles Royalty (Region 1/2)	Profile Extensions Any One (Region 1/2)	Profile Extensions All Three (Region 1/2)	Annual Category Cap
Free-to-End User	Public TV, 100% Ad-Funded Commercial Broadcast TV and Internet Content Distribution	Waived (Free)	Waived (Free)	Waived (Free)	N/A
Subscription	OTT Subscription, Cable TV, Satellite TV	Per Subscriber/Month 2016-17: \$.005/\$.0025 2018-19: \$.015/\$.0075 2020+: \$.025/\$.0125	Included in Main Profile	Included in Main Profile	\$2.5MM
Title-by-Title	Pay-Per-View, OTT Streaming Rental, Download to Own	Per Title \$.025/\$.0125	Included in Main Profile	Included in Main Profile	\$2.5MM
Digital Media Storage	Blu-Ray Disc, other storage devices	Per Media/Title \$.025/\$.0125	Included in Main Profile	Included in Main Profile	\$2.5MM

\$5MM Combined Cap

HEVC Advance - Content

- Four classes
 - Free to end user
 - Subscription
 - Per Subscriber/Month
 - 2016-17: \$.005/\$.0025
 - 2018-19: \$.015/\$.0075
 - 2020+: \$.025/\$.0125
 - Pay-per-view
 - Per Title \$.025/\$.0125
 - Storage
 - Per Media/Title
\$.025/\$.0125
- \$5 million US combined cap

HEVC Advance – Optional Features

Device Type	Optional Features Pricing (Region 1/ 2)	Annual Category Caps	Annual Optional Features Enterprise Cap
Mobile Devices	\$0.04/\$0.02	\$1MM	\$2MM
Connected Home and Other Devices	\$0.04/\$0.02	\$1MM	
4K UHD+ Television	\$0.08/\$0.04	\$1MM	

HEVC Advance – Optional Features

- Any patent claim covering a feature described in the HEVC Standard which is not required to be implemented in an HEVC Product, but, if the feature is implemented, must be implemented within the scope of the HEVC Standard and necessarily or unavoidably infringes such patent claim.
 - Fees are in addition to any other HEVC Royalties.
 - Caps on Optional Feature royalties are separate from and not additive with other HEVC

Technicolor and Others

- Withdrew from HEVC Advance pool to make direct deals
 - Terms unknown; since licensed with other technologies
 - Will not seek content royalties
- Others
 - Several known HEVC IP owners not in either pool (Broadcom, MediaTek, Qualcomm) so more individual licensors, or even pools, may be coming

Perspective

- HEVC adaption has been very modest
 - Not in general Flash decoder (may be in Primetime)
 - In Windows, Android, not Mac or iOS
 - Browser support
 - Edge
 - Not in IE, Chrome, Safari, Firefox, or Opera
 - In most set top boxes and smart TVs
- HEVC adoption has been stilted by \$65 million (plus content) annual cap, only used for OTT

Perspective

- Challengers:
 - VP9 in browser space
 - AV1 codec from Alliance for Open Media in all spaces

HEVC Advance – Free Software

- To qualify for the exclusion, the software must meet three main requirements.
 - It must enable software-only encoding or decoding (no hardware acceleration).
 - The software must be downloaded after the initial sale of the product, and not bundled
 - Must not be specifically excluded:
 - Operating systems are excluded
 - Browsers aren't (unless bundled with hardware)
- Obviously, only HEVC Advance, not MPEG LA

DASH

- IP History
- What do we know?
 - MPEG LA Patent Pool
- What's Scary

IP History

- MPEG DASH finalized in 2011-2012
- What is MPEG DASH article in Streaming Media (http://bit.ly/what_is_DASH)
 - Many of the participants who are contributing intellectual property to the effort—including Microsoft, [Cisco](#), and Qualcomm—have indicated that they want a royalty-free solution. While these three companies comprise the significant bulk of the IP contributed to the specification, not all contributors agree, **so the royalty issue is unclear at this time.**
 - July 2015, MPEG LA announces pool (http://bit.ly/DASH_pool_formed)
 - In November 2016, MPEG LA announces license (http://bit.ly/DASH_license)

MPEG LA License Terms – DASH Clients

- DASH Clients (products capable of parsing a Media Presentation Description and accessing or playing DASH Segments)
 - 0 - 100,000 units/year = no royalty (available to one Legal Entity in an affiliated group)
 - US \$0.05 per unit after first 100,000 units each year
- What's a DASH client?
 - Multimedia players that play DASH (exoplayer, VLC (if and when))
 - Browsers with DASH playback (Edge)
 - Players like JWPlayer, Bitmovin, but license currently excludes players that are loaded temporarily through the browser, though this will be evaluated every 12 months
- Who owes royalty?
 - The company that actually supplies the player to the end user.

http://bit.ly/DASH_terms

MPEG LA License Terms – DASH Initiators

- DASH Initiators (Essentially apps)
 - 0 - 100,000 units/year = no royalty (available to one Legal Entity in an affiliated group)
 - US \$0.05 per unit after first 100,000 units each year
- What's a DASH initiator?
 - Apps on smartphones, tablets, smart TVs and the like
- Who owes royalty?
 - The company that creates the app
- Royalty cap
 - \$30 million combined

http://bit.ly/DASH_terms

Scenarios

- From article MPEG-DASH Royalties: What we know so far (bit.ly/cash4dash)
- 1. Microsoft Edge plays DASH files. That makes it a DASH Client and a per-unit royalty is due.
 - **MPEG LA response:** Assuming Edge plays DASH files, yes.
- 2. All other current browsers support MSE, but can't parse, access, or play DASH files. These are not DASH Clients so no royalty is due.
 - **MPEG LA response:** Probably correct, but we will evaluate on a case-by-case basis.
- 3. If third-party players (JW, Bitmovin, dash.js), are loaded temporarily, they are excluded today, though this may change.
 - **MPEG LA response:** Correct

Scenarios

- 4. An Android phone comes with ExoPlayer, which is a DASH Client. The phone seller pays the royalty.
 - **MPEG LA response:** Correct
- 5. The same Android phone comes with multiple apps that call ExoPlayer to play MPD files. There are DASH Initiators generating a license payable by the app seller.
 - **MPEG LA response:** Correct.
- 6. DASH Players on Smart TVs/OTT devices are DASH Clients. This gives rise to a royalty that the hardware vendor pays.
 - **MPEG LA response:** Correct – player in OS, browser, or a standalone player not associated with an app.
- 7. Apps on Smart TVs/OTT devices. These are DASH Initiators, giving rise to a royalty payable by the app seller.
 - **MPEG LA response:** Correct.

Scenarios

- 8. A consumer downloads an app after purchasing a hardware device. This is a DASH Initiator, giving rise to a royalty payable by the app seller.
 - **MPEG LA response:** Correct.
- 9. I have a Netflix account and apps on six devices. These are all DASH Initiators, and Netflix owes six royalties.
 - **MPEG LA response:** Correct

Analysis and Implications

- This is the first royalty on free internet video
- BBC distributes free video in H264 or HEVC
 - No royalty
- BBC distributes free video with DASH
 - Royalty on apps and ultimately perhaps browser-based playback
- No exclusions for churches, charities, governments or otherwise
- Really is remarkable in scope

What's Happening

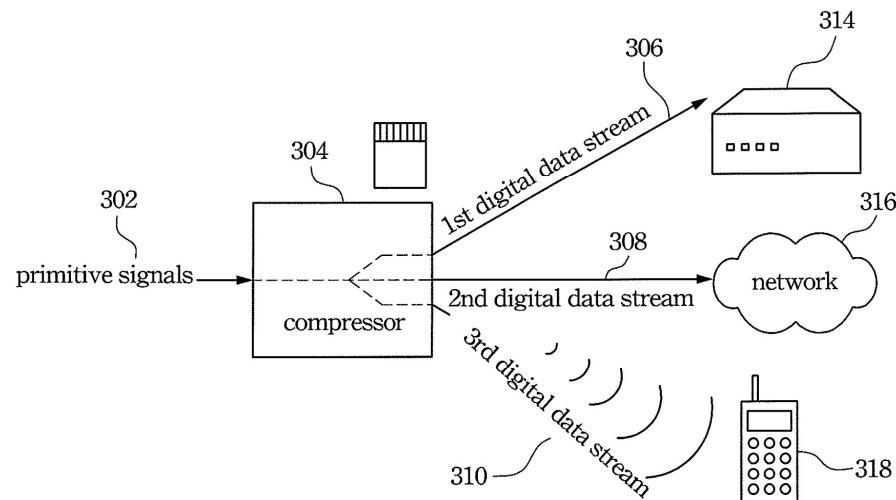
- DASH.IF – prohibited from providing legal advice due to anti-trust laws
- Microsoft, Cisco, Qualcomm – obviously considering their options, but likely prevented from commenting by legal counsel
 - We asked all three for comment, and they pointed to 6-year old press releases and declined further elaboration

Analysis

- MPEG LA shows no licensees on their web page as of today
 - Reportedly Fluendo has signed a license
- Really not much any company can do until patent owners goes after them
 - Large companies adapting a wait and see attitude
 - If sued by patent owners, can challenge patents, challenge pricing, or take other steps
- Need to be factoring potential for royalties into DASH usage

What's Scary

- Avermedia Patent Inc. US 7,539,094
 - Output multiple digital data streams of different compressed ratios or types
 - To adapt to multiple limitations of storage spaces and transmission bandwidths
- Looks like it could apply to HLS, HDS, and any other ABR technique



Asked MPEG LA

- We asked MPEG if additional pools were coming
- “We frequently look at different possibilities for patent pools. I can tell you we don’t have any active pool work on the standards you mention, although such work is not precluded if we see a patent thicket and a market need for a solution.”