

# Explanation of the Fairness and Reasonableness of Access Advance's HEVC Royalty Rates

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## *Introduction*

### Purpose and Scope of this Explanation.

Set forth below is a description of several significant factors that confirm the fairness and reasonableness of the royalty rates for the HEVC Advance Patent Portfolio License Agreement (“PPL”).<sup>1</sup>

Access Advance<sup>2</sup> offers the PPL to implementers who wish to practice one or more of the profiles and/or extensions specified in Versions 1-7 of H.265, the High Efficiency Video Coding standard (“HEVC”), and to take a license in a single transaction—rather than negotiating multiple bilateral licenses—to all patents essential to HEVC that 36 HEVC Advance Licensors<sup>3</sup> (and any future Licensors) have the right to license. The list of Licensors has grown steadily over time, as the licensing program continues to attract other HEVC standard-essential patent owners. For an up-to-date list and further information about the licensing program, please go to <https://accessadvance.com/licensing-programs/hevc-advance/>.

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<sup>1</sup> The bottom-line analysis set forth in this report is as of November 2018; the report was revised in April 2020 to reflect new information which supports the original analysis and again in October 2021 to reflect the Licensors’ decision to offer the HEVC Advance Platform PPL, which consolidates the royalty rates for Versions 3-7 and Version 2 profiles into the Main / Main 10 rate.

<sup>2</sup> Access Advance is the administrator for the HEVC Advance Patent Pool. Before October 1, 2020, Access Advance was known as HEVC Advance. References herein to HEVC Advance refer to the pool, its patent portfolio, and related agreements, and references to Access Advance refer to the administrator of the HEVC Advance Patent Pool.

<sup>3</sup> The number of Licensors grew from 18 in November 2018 to 36 as of October 2021.

As a patent pool administrator, Access Advance seeks to achieve multiple goals by offering the PPL to the marketplace. These goals include: (i) furthering the interests of implementers who wish to apply HEVC and respect intellectual property rights; (ii) easing access to the use and adoption of HEVC to the benefit of consumers, implementers and rights holders; (iii) lowering transaction costs through a single, standard PPL that removes concerns about the blocking positions of multiple Licensors; (iv) offering terms and conditions that are fair and reasonable for both implementers and rights holders by, among other things, evaluating the value of licensed patents to licensed devices and the value of HEVC to those devices; (v) fostering consensual licensing and avoiding, where possible, disputes and litigation; (vi) meeting worldwide legal and regulatory requirements for patent pools; and (vii) making licenses available to all qualified licensees under a commitment to non-discrimination among similarly situated licensees. Achieving these goals in the PPL results in Access Advance offering a pro-competitive PPL that achieves economies of scale, reduces transaction costs, and efficiently integrates complementary technologies.

While an analysis focused only on the value of the HEVC Advance licensed portfolio to licensed devices confirms that a royalty considerably higher than that in the PPL would be a fair and reasonable royalty, Access Advance has not sought to capture this full value of HEVC in light of other prominent goals of its licensing program, including those identified above. As noted herein, for example, Access Advance listened to market feedback and sought to promote consensual licenses, respect for intellectual property, and widespread adoption of HEVC, thereby bringing multiple benefits to implementers and consumers alike. These goals suggest to Access Advance that the

HEVC Advance patent pool should not seek to set rates at the highest end of the range of fairness and reasonableness. Conversely, the goals of the program also suggest that rates set too low that do not fairly value intellectual property would fail to attract a critical number of licensors, thereby making the PPL less efficient in achieving Access Advance’s goals. Moreover, at least in the long run, undervaluing intellectual property would stifle innovation and hurt implementers and consumers alike. The HEVC Advance PPL is a balance of these goals and sets rates that are fair to both implementers and innovators.

Because, among other reasons, rates and terms of the PPL are set assuming a consensual license offered on a worldwide basis, and because both licensees and licensors in a consensual pool license transaction receive significant monetary and non-monetary benefits such as (i) reduced transaction costs; (ii) ease of access; and (iii) certainty about the availability of licenses, the rates in the PPL are not necessarily correlated to appropriate bilateral license rates that might be offered by a particular patentee. Furthermore, HEVC Advance rates certainly are not correlated to royalty rates that are appropriate in a contested proceeding—such as litigation—where “a reasonable royalty” for a license to one or more patents may be many multiples of the rate for a consensual pool license to a portfolio including those patents.

A hallmark of Access Advance is transparency. Thus, this paper is offered to licensees and prospective licensees to promote good faith discussions between Access Advance and licensees and to explain why the HEVC Advance PPL rates are undeniably fair and reasonable rates for the HEVC Advance patent pool license to practice HEVC.

### Summary of Approaches Considered in this Explanation.

As set out in detail below, HEVC Advance rates are fair and reasonable based on examining five principal approaches (not in order of significance):

- Patent pool and joint licensing program rates for HEVC and other technologies;
- The value of HEVC technology to licensed products;
- A “top down” or royalty stack analysis;
- The value of the HEVC Advance licensed portfolio to the HEVC technology; and
- Responsiveness to market feedback in light of the multiple goals of the program.

Based on a detailed analysis of these factors, we are confident that the Access Advance rates have achieved a careful balance of fairness to both licensors and licensees, thus advancing the dual purpose of (i) attracting licensors seeking a fair return on their IP, thereby increasing efficiency of the pool, incentivizing innovation and advancing further research and development, and achieving other goals and (ii) providing fair rates and terms that incentivize licensees to respect intellectual property rights in a consensual arrangement thereby easing access to and fostering widespread adoption of HEVC technology while avoiding costly and time-consuming litigation.

The PPL complies with Access Advance’s policy to offer a FRAND license—a license that is fair, reasonable and non-discriminatory—notwithstanding that Access Advance believes it is not subject to a FRAND obligation. Any implementer who finds that the PPL does not meet its needs is free to negotiate a bilateral license with any

or all of the HEVC Advance Licensors. It is the Licensor's obligation to offer bilateral licenses on fair, reasonable and non-discriminatory rates on its respective patents that satisfies the Licensor's FRAND commitment. Our Licensors' commitments to offer FRAND bilateral licenses, however, may very well take into account factors relevant to bilateral licenses which may not necessarily be those factors relevant to a fair pool license. In other words, the goals and considerations that support Access Advance's determination and explanation of its pool rates should not be understood to necessarily apply to any one Licensor in its bilateral licensing of its HEVC patents.

### ***Background***

#### HEVC Technology.

High Efficiency Video Coding ("HEVC," also known as MPEG-H Part 2 and H.265) is an advanced video compression standard developed through a collaboration between the ITU and ISO/IEC MPEG standard setting organizations. Version 1 of the HEVC standard was first published in June 2013 and included Main profiles (including MAIN 10 and MAIN Still Picture). Subsequent Versions 2-7, published beginning in early 2015 and with the most recent (Version 7) in late 2019, included extensions for multi-view video coding, range extensions, scalable video coding, 3D video coding, and screen content coding extensions. When it was launched, the HEVC Advance Patent Pool covered implementations of Versions 1-2 of the HEVC standard, with a single royalty rate for the Main/Main10 profiles and additional royalties due for products

featuring Version 2 profiles.<sup>4</sup> In June 2021, Access Advance announced that the HEVC Advance Licensors decided to expand the scope of the HEVC Advance Pool license in a new “Platform” PPL to include Versions 3-7 of H.265 and to consolidate the royalty rate for all Version 2-7 profiles into the same single royalty rate for the Main/Main 10 profiles. As a result, the new Platform PPL eliminates the additional royalty due under legacy PPLs for Version 2 profiles.

HEVC has multiple significant advantages over predecessor compression technologies such as AVC (H.264). HEVC approximately doubles the compression ratio at the same level of video quality as compared to AVC, with the result, among other benefits, that a given level of video quality generally requires less than half the transmission bandwidth to a device and/or far less storage capacity within a given device. For example, in 2017 Apple highlighted that HEVC can achieve “up to 2X better compression than H.264 in iOS camera capture.”<sup>5</sup> Independent tests showed that HEVC can achieve “bitrate reduction” of over 50 percent compared to prior technologies such as AVC, which means that, in comparison with using AVC, using HEVC to compress videos “will drop [] bandwidth and storage requirements by roughly 50%.”<sup>6</sup>

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<sup>4</sup> The profiles added in Version 2 are Multiview HEVC extensions (MV-HEVC), Range extensions (Rext), and Scalable HEVC extensions (SHVC). Existing licensees have the option to continue under their existing PPL or transition to the new Platform PPL.

<sup>5</sup> Gavin Thomson & Athar Shah, *Introducing HEIF and HEVC*, at 21 (2017) (Apple presentation slides), available at <https://developer.apple.com/videos/play/wwdc2017/503/> (viewed April 15, 2020).

<sup>6</sup> Boxcast Blog, *HEVC (H.265) Vs. AVC (H.264)—What’s the Difference*, <https://www.boxcast.com/blog/hevc-h.265-vs.-h.264-avc-whats-the-difference> (viewed April 13, 2020); see also Will Brown, *Video Translation 101: What Is Bit*

The fact that HEVC is roughly twice as efficient as AVC substantially reduces the cost of transmission and the need for devices to include more costly memory capacity. Unlike AVC or other prior video compression standards, HEVC was designed to support ultra-high video resolutions, including 4K UHD and 8K UHD (“4K UHD+”). Coding efficiency and video quality are, of course, the main goals of video compression standards, and HEVC has considerably furthered both goals, making possible significantly enhanced video capabilities, such as enhanced ability to stream 4K UHD+, in consumer products including:

- Mobile devices
- 4K UHD+ TVs
- Home devices such as desktop PCs, set-top boxes, optical disc players, cameras, and game consoles.<sup>7</sup>

Many knowledgeable observers have noted that HEVC’s significantly increased compression efficiency (as compared to earlier compression standards) is revolutionary not only because of the new coding structures incorporated into HEVC, but also due to the new and advanced coding tools that are incorporated to achieve these benefits.

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*Rate? Why Does It Matter for Localization?*, available at <https://www.jbistudios.com/blog/bit-rate-video-translation> (viewed April 13, 2020); Ana Rodrigues, *H.264 vs H.25—A Technical Comparison. When Will H.265 Dominate the Market?*, available at <https://medium.com/advanced-computer-vision/h-264-vs-h-265-a-technical-comparison-when-will-h-265-dominate-the-market-26659303171a> (April 15, 2020).

<sup>7</sup> The PPL includes HEVC Software in the Connected Home & Other Devices product category for royalty determination purposes, and HEVC Software includes Cloud Based Services.

Technologies significant to the performance improvements of HEVC include: (i) a new, more efficient and simpler lossless entropy coding scheme based on CABAC (context adaptive binary arithmetic coding); (ii) improvements in data structure (and flexibility in block partitioning), better use of tiles and slices and other enhancements to promote parallel processing; and (iii) more efficient intra- and inter-block coding and filter technology. These improvements make higher quality video both less expensive and more accessible than ever before across a wider range of devices by providing better quality video at similar bitrates compared to prior compression systems or—depending on the implementer’s use case—comparable video at much lower bitrates that allow higher throughput as a result of higher compression efficiency. For example, on average—and particularly for resolution beyond HD—HEVC achieves substantially better performance than AVC, allowing a reduction in bitrate of up to 65% while maintaining the same perceived video quality.<sup>8</sup>

#### The Structure of the HEVC Advance PPL.

While a single royalty rate for all licensed products may further the goal of licensing simplicity and lower transaction costs, the approach of Access Advance to identify a limited number of categories of licensed products at somewhat different royalty rates furthers several other goals of the HEVC Advance Patent Pool licensing program (including those noted above). Thus, Access Advance has structured the PPL to, on the

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<sup>8</sup> M. Řeřábek, T. Ebrahimi, “Comparison of compression efficiency between HEVC/H.265 and VP9 based on subjective assessments”, Proc. SPIE Appl. Digit. Image Process. XXXVII, vol. 9217, pp. 92170U, Aug. 2014, *pre-print available* at <https://infoscience.epfl.ch/record/200925/files/article-vp9-submitted-v2.pdf> (viewed April 15, 2020).

one hand, address different uses of HEVC technology by different licensed products and the different value HEVC may contribute to such products, while on the other hand, promote the well-recognized pro-competitive efficiency of standard license terms that are not “custom designed” for each licensee. A process of custom design would, if adopted, raise costs, create administrative and practical inefficiencies, and result in controversies about discrimination among licensees claiming to be similarly situated. As explained below, the PPL divides its royalty structure into product categories, and geographic regions.<sup>9</sup>

Although the PPL provides a license to dozens of different products, Access Advance has addressed the efficiency and simplicity goals noted above by grouping licensed products into three principal categories: (i) mobile devices; (ii) connected home and other devices (*e.g.*, desktop PCs, set-top boxes, gaming consoles, cameras); and (iii) 4K UHD+ televisions. The level of product categorization thus provides a reasonable balance between (i) different uses of HEVC technology by different licensed products and the different value HEVC may contribute to such products; and (ii) efficiency in reporting and administration which, in turn, allows lower royalty rates. We acknowledge that the value of HEVC to licensed devices may vary somewhat within categories and, therefore, for the category with the largest potential

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<sup>9</sup> When it was originally launched, the HEVC Advance Patent Pool included add-on royalties for the use of Version 2 profiles (*see n. 14*). The impact of the add-on royalties was discussed in the November 2018 and April 2020 versions of this paper. With the consolidation of the Version 2 profiles into the Main profile royalty rate in June 2021 in the Platform PPL, separate consideration of the impact of the royalties for profiles is no longer relevant.

price variation—connected home and other devices—we have set a range of royalty rates within the category based on the range of sale prices.

The PPL also sets different rates based on the geographic region in which a licensed product is sold. This structure of the PPL recognizes certain local geographic market effects such as different regulatory schemes, differences in the value of IP rights, differing predictability and timing of litigation results, and other factors that may suggest a different value of HEVC to licensed devices. Thus, while we explain in detail in the following pages the principal factors that confirm the fairness and reasonableness of actual rates in the PPL, the structure of the PPL advances multiple goals and addresses multiple factors related to the value of HEVC in different devices and different local market conditions.

Within each combination of product category and regions, HEVC Advance PPL rates are fixed amounts rather than expressed as a percentage of licensed device sale prices. While royalties based on a percentage of sale price are certainly an acceptable license structure, they generally are not widely used in patent pools for many sensible reasons.

*First*, determining and reporting net sales price is invariably complicated, and adds significant costs to a licensing program. The need to verify reports of such prices also raises compliance and other transactional costs for licensees and licensors. As noted above, in recognition of the fact that the products in the Connected Home and Other Device category are sold at the largest potential range of prices, the PPL includes, for that category of products, a corresponding range of fixed royalties based on sales

price. Access Advance adopted this structure to address market needs and feedback, while doing so in a way that still provides the efficiency of a standard pool license structure.

*Second* and in accordance with the above, Access Advance has been careful to consider the principle of proportionality to ensure that the royalty is commensurate with the value of the patented technology to the licensed product. Rates based on a percentage of sales price may fail to account for the fact that certain types of devices licensed through the PPL may reflect vastly different sale prices having nothing to do with the value of HEVC. We have avoided in the HEVC Advance rate structure reflecting value in devices not attributable to HEVC.

Thus, the HEVC Advance PPL structure and royalty rates address numerous pro-competitive and efficient goals, and the fair and reasonable royalty rates are set as follows:

CHART 1

**New HEVC-Only Platform License – Standard Rate Royalty Structure for Licensees, Issued April 1, 2021**

Device Category and Examples	Selling Price	Per-Device Royalty <sup>(1)</sup> All Profiles and Optional Features	Annual In-Compliance Device Category Caps <sup>(2)</sup> for the Period up to 1/1/2021	Annual In-Compliance Device Category Caps <sup>(2)</sup> for the Period on/after 1/1/2021 unless suspension applies <sup>(3)</sup>	Annual In-Compliance Enterprise Credit and Cap <sup>(2)</sup> for the Period up to 1/1/2021	Annual In-Compliance Enterprise Credit and Cap <sup>(2)</sup> for the Period on/after 1/1/2021 unless suspension applies <sup>(3)</sup>
Mobile Devices: Mobile Phone, Tablet, Laptop	All price ranges	\$0.533/\$0.267	No Cap applies	No Cap applies		
Connected Home & Other Devices: Set-Top Box, Game Console, Blu-ray Player, Desktop PC, non-4k UHD+ TV, Surveillance Cameras, Conferencing Products, Medical Imaging, Digital Signage, HEVC Software	Devices ≤\$80.00 <sup>(4)</sup>	\$20 or less \$20.01-\$30.00 \$30.01-\$40.00 \$40.01-\$50.00 \$50.01-\$60.00 \$60.01-\$70.00 \$70.01-\$80.00	\$0.267/\$0.267 \$0.333/\$0.333 \$0.467/\$0.467 \$0.600/\$0.533 \$0.733/\$0.533 \$0.867/\$0.533 \$1.000/\$0.533	No Cap applies	No Cap applies	No Cap applies  No Annual Enterprise Credit
	Devices >\$80.00 <sup>(5)</sup> and All HEVC Software	\$1.067/\$0.533				No Annual Enterprise Credit
	4K UHD+ Televisions/Displays	All price ranges	\$1.60/\$0.80	No Cap applies	No Cap applies	
Digital Media Storage Blu-ray Discs, Other Storage Devices	All price ranges	Per Disc/Title \$0.03/\$0.015	No Cap applies	No Cap applies		

(1) Royalties shown are Region 1/Region 2 Countries/Territories. Rates include all Advanced Profiles and Optional Features.  
 (2) Excludes HEVC Software.  
 (3) For Licensees before 1/1/2021, the annual caps for the renewal period on/after 1/1/2021 are "suspended" through 12/31/2025, and the pre-renewal caps for the period up to 1/1/2021 will continue to apply. After 12/31/2025, the annual caps for the period on/after 1/1/2021 will apply to all Licensees (unless the suspension is extended), which annual caps are further subject to adjustment for the period after 12/31/2025.  
 (4) Applies to all Devices with a Selling Price of \$80 or less, excluding HEVC Software. Discounts for Devices Sold in Region 1 Countries/Territories at a Selling Price from \$40.01 to \$80 are effective for Sales on or after 1/1/2018.  
 (5) Includes Devices Sold in Region 1 Countries/Territories at a Selling Price from \$40.01 to \$80 for Sales before 1/1/2018.

Compliant licensees (*i.e.*, licensees who correctly and timely meet their obligations under the PPL) receive a discount from standard rates because such compliance reduces transaction costs and provides other benefits to the program. Further discounts from the already discounted compliant licensee rates are available to compliant licensees willing to license the HEVC Advance Trademark and include the trademark on their products or product packaging/manuals in accordance with the HEVC Advance Trademark License Agreement. The most highly discounted rates for those compliant licensees willing to license the HEVC Advance Trademark are as follows:

## CHART 2

### New HEVC-Only Platform License - Royalty Rate Structure for Licensees In-Compliance with Trademark Discount, Issued April 1, 2021

Device Category and Examples	Selling Price	Per-Device Royalty <sup>(1)</sup> All Profiles and Optional Features	Annual In-Compliance Device Category Caps <sup>(2)</sup> for the Period up to 1/1/2021	Annual In-Compliance Device Category Caps <sup>(2)</sup> for the Period on/after 1/1/2021 unless suspension applies <sup>(5)</sup>	Annual In-Compliance Enterprise Credit and Cap <sup>(3)</sup> for the Period up to 1/1/2021	Annual In-Compliance Enterprise Credit and Cap <sup>(3)</sup> for the Period on/after 1/1/2021 unless suspension applies <sup>(5)</sup>
Mobile Devices: Mobile Phone, Tablet, Laptop	All price ranges	\$0.40/\$0.20	\$30MM \$20MM (If entity does not sell phones)	\$36MM \$24MM (If entity does not sell phones)		
Connected Home & Other Devices: Set-Top Box, Game Console, Blu-ray Player, Desktop PC, non-4k UHD+ TV, Surveillance Cameras, Conferencing Products, Medical Imaging, Digital Signage, HEVC Software	Devices ≤\$80.00 <sup>(4)</sup>	\$20 or less \$20.01-\$30.00 \$30.01-\$40.00 \$40.01-\$50.00 \$50.01-\$60.00 \$60.01-\$70.00 \$70.01-\$80.00	\$20MM	\$24MM	Annual Enterprise Cap \$40 million	Annual Enterprise Cap \$48 million
	Devices >\$80.00 <sup>(5)</sup> and All HEVC Software	\$0.20/\$0.20 \$0.25/\$0.25 \$0.35/\$0.35 \$0.45/\$0.40 \$0.55/\$0.40 \$0.65/\$0.40 \$0.75/\$0.40				
		\$0.80/\$0.40				
4K UHD+ Televisions/Displays	All price ranges	\$1.20/\$0.60	\$20MM	\$24MM		
Digital Media Storage Blu-ray Discs, Other Storage Devices	All price ranges	Per Disc/Title \$.0225/\$.01125	\$2.5MM	\$3.0MM		

(1) Royalties shown are Region 1/Region 2 Countries/Territories. Rates include all Advanced Profiles and Optional Features.  
 (2) Excludes HEVC Software.  
 (3) For Licensees before 1/1/2021, the annual caps for the renewal period on/after 1/1/2021 are "suspended" through 12/31/2025, and the pre-renewal caps for the period up to 1/1/2021 will continue to apply. After 12/31/2025, the annual caps for the period on/after 1/1/2021 will apply to all Licensees (unless the suspension is extended), which annual caps are further subject to adjustment for the period after 12/31/2025.  
 (4) Applies to all Devices with a Selling Price of \$80 or less, excluding HEVC Software. Discounts for Devices Sold in Region 1 Countries/Territories at a Selling Price from \$40.01 to \$80 are effective for Sales on or after 1/1/2018.  
 (5) Includes Devices Sold in Region 1 Countries/Territories at a Selling Price from \$40.01 to \$80 for Sales before 1/1/2018.

As shown in Chart 1: Standard Royalty Rate Structure above, the *highest* HEVC Advance rates (assuming sales in Region 1, and irrespective of the number of implemented advanced profiles or extensions) are as follows:

Mobile Devices:           \$0.533

Connected Home  
and Other Devices:   \$1.067

4K UHD+ TVs:           \$1.60<sup>10</sup>

<sup>10</sup> The November 2018 and April 2020 versions of this paper showed the following rates, based on the Standard Royalty Rate Structure of the legacy PPL, which included the royalties then-charged for the since-consolidated add-on royalties for Version 2 profiles:

Mobile Devices:   \$0.866  
 Connected Home and Other Devices:   \$1.734  
 4K UHD+ TVs:   \$2.60

While the HEVC Advance rate table has several refinements to reflect, among other things, the value of HEVC to particular licensed products, we have in this paper for purposes of clarity and simplicity analyzed the fairness and reasonableness of only the *highest* standard rate for each licensed product category—*i.e.*, the highest rates charged by Access Advance.

Although the PPL sets rates in fixed amounts as discussed above, it is useful for purposes of this analysis to translate those fixed rates into a “hypothetical” percentage of sale prices to facilitate comparing the PPL fixed rates to comparable percentage rates used elsewhere in the industry, particularly in bilateral licensing. To do so, we have expressed the fixed HEVC Advance rates as a percentage of publicly reported prices of devices licensed by the PPL.<sup>11</sup> As with other estimates in this paper,

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The November 2018 and April 2020 versions of this paper analyzed the HEVC Advance PPL rates based on the then-applicable rate card. The November 2018 and April 2020 versions of this paper demonstrated that the then-highest rates were fair and reasonable to implementers. Since the higher rates were fair and reasonable, it necessarily follows that the comparatively (and substantially) lower consolidated rates announced in June 2021 are also necessarily fair and reasonable.

<sup>11</sup> Mobile Devices: Smartphone Average Selling Price Sees Record Year-on-Year Growth in 3Q, GFK (Oct. 24, 2017), available at <https://www.gfk.com/insights/press-release/smartphone-average-selling-price-sees-record-year-on-year-growth-in-3q/> (viewed April 13, 2020); Caroline Cakebread, Business Insider, *The \$999 iPhone X Is Paving the Way for an Even Pricier Smartphone Market* (Oct. 25, 2017), available at <http://www.businessinsider.com/one-chart-shows-how-smartphone-prices-are-rising-chart-2017-10> (viewed April 15, 2020).

Connected Home and Other Devices: Jonathon Dornbush, Update: Comparing the Price of Every Game Console, with Inflation, IGN (Oct. 4, 2016), available at <http://www.ign.com/articles/2016/10/04/comparing-the-price-of-every-game-console-with-inflation> (viewed April 13, 2020); Brian Fung, *You’re Paying a Shocking Amount to Rent Cable Boxes Every Year*, Wash. Post (July 30, 2015),

we have been conservative, *i.e.*, Access Advance has not selected industry-reported numbers used in this analysis to support any particular outcome. For the licensed product category with the widest range of sale prices—Connected Home and Other Devices—we have used two reasonable “average” prices at the two ends of the range of product prices within this category of licensed devices to analyze the fairness of the HEVC Advance rates. Accordingly, for purposes of comparisons to other established percentage royalty rates, we have used the following sale prices:

Mobile Devices:       \$300<sup>12</sup>

Connected Home  
and Other Devices:   \$80 and \$350<sup>13</sup>

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*available at* [https://www.washingtonpost.com/news/the-switch/wp/2015/07/30/the-average-american-pays-a-shocking-amount-to-rent-cable-boxes-each-year/?utm\\_source=reddit.com](https://www.washingtonpost.com/news/the-switch/wp/2015/07/30/the-average-american-pays-a-shocking-amount-to-rent-cable-boxes-each-year/?utm_source=reddit.com) (viewed April 13, 2020); Statista, *Smart Appliances Report*, available at <https://www.statista.com/outlook/389/109/smart-appliances/united-statesm> (viewed April 15, 2020).

4K UHD+ TVs: Joshua Fruhlinger, Wall St. J., *Gear & Gadgets: Bursting at the Screens - 4K TVs Are Streaming Football, Films and Flowers into Your Home with Stunning Quality* (Jan. 27, 2018); Statista, *Forecast Average Selling Price Smart TVs Worldwide from 2011 to 2017*, available at <https://www.statista.com/statistics/314631/smart-tv-average-selling-price-worldwide-forecast/> (viewed April 15, 2020).

<sup>12</sup> Access Advance chose a price point for mobile devices—for purposes of showing the royalty rates in percentage terms—that is lower than the actual average selling price (ASP) of smart phones, which was in fact higher than the rate used for calculation, at about \$345 in 2018 based on data from IDC. As of September 2021, the most recent data from IDC indicates that the ASP of smart phones worldwide was \$368 for half-year 2021 (an increase of 6.67%).

<sup>13</sup> Access Advance chose two price points in consideration of the many device types in this category for purposes of showing the royalty rates in percentage terms. For the Connected Home and Other Devices category, devices that sell for less than \$80 are subject to tiers of lower royalty rates. \$350 represents a low-end desktop, or a mid-range digital camera. Data from IDC indicates that the average selling

4K UHD+ TVs: \$600<sup>14</sup>

Using these values, the highest HEVC Advance rates would represent the following percentage royalties (again, only for purposes of comparison to other established percentage rates):

<b>Device</b>	<b>Sale Price</b>	<b>Highest HEVC Advance Rate</b>	<b>Percentage<sup>15</sup></b>
Mobile Devices	\$300	\$0.533	0.18%
Connected Home and Other Devices	\$80/\$350	\$1.067	1.33%/0.30%
4K UHD+ TVs	\$600	\$1.60	0.27%

As shown above, the highest HEVC Advance rates as expressed as hypothetical percentages are for the Connected Home and Other Device category in the lowest price ranges. This is primarily a function of one factor: products in this category

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price (ASP) of desktop PC's in fact was higher than the rate used for calculation, and was \$583 in 2018, \$613 in 2019, \$628 in 2020, and \$668 in 2021 (an increase of 14.6%). Data from Camera and Imaging Products Association indicates ASP of digital still cameras worldwide also in fact was higher than the rate used for calculation, and was about \$351 in 2018, and about \$468 in 2Q 2021 (yen converted into USD at 109.43:1) (an increase of 33.3%).

<sup>14</sup> Access Advance chose a price point that is lower than the actual average selling price (ASP) of 4K UHD+ TVs for purposes of showing the royalty rates in percentage terms; that actual average selling price was at about \$825 in 2018 based on data from Omdia. As of September 2021, the most recent data from Omdia indicates that the ASP of 4K UHD+ TVs worldwide was \$753 for 2H2021 (a decrease of about 8.7%). The April 2018 and November 2020 versions of this paper cited price data for 4K UHD+ TVs from IHS Markit. As of 2020 IHS Markit is part of Omdia.

<sup>15</sup> The same table in the November 2018 and April 2020 versions of this paper showed the highest rates for Mobile Devices at \$0.866, which translated to a percentage of 0.29%; for Connected Home and Other Devices \$80/\$350 of \$1.00/\$1.734, which translated to percentages of 1.25%/0.50%; and for 4K UHD+ TVs of \$2.60, which translated to a percentage of 0.43%.

typically derive a very significant portion of their value from video decoding and/or encoding. For example, HEVC set top boxes have no display, and their major function is to decode compressed video bit streams. Similarly, the sole purpose of HEVC surveillance cameras is capturing, encoding, and transmitting video. HEVC is a major technology driver for set top boxes, video surveillance equipment, and other similar products in this licensed category. Indeed, HEVC capability is one of the most frequently advertised functionalities of these products. Thus, adhering to the principle of proportionality, royalties for this category of products should be higher when expressed as a percentage of sale price.

In the following pages, we describe different approaches that verify the fairness and reasonableness of the actual highest standard rates in the HEVC Advance royalty chart above.

### *Analysis*

#### Patent Pool / Joint Licensing Program Rates.

To assess the fairness and reasonableness of rates in the HEVC Advance PPL, Access Advance reviewed established rates accepted by licensors and implementers of HEVC and other comparable technologies. To be sure, the most relevant established rates are those for HEVC and technologies comparable to HEVC and the rates for the same categories of licensed devices as those licensed by Access Advance. Nevertheless, other established rates for other technologies also are instructive because those rates reflect a royalty range by which hundreds of licensors have licensed and will license thousands of essential patents to countless licensees in consensual licensing transactions.

### *Video Codec Licensing Programs*

First, with respect to the HEVC Advance Patent Pool, as of October 2021, more than two hundred twenty (220) companies around the world had executed the PPL as licensees.<sup>16</sup> The acceptance of the PPL and the rates it provides in consensual transactions by a large number of significant industry participants is persuasive evidence alone of the fairness and reasonableness of the HEVC Advance rates and terms. We anticipate that the number of HEVC Advance licensees will continue to grow as the adoption of HEVC by implementers increases. For an up-to-date list of licensees, see <https://accessadvance.com/hevc-advance-patent-pool-licensees/>. Notably, widespread acceptance of HEVC by the marketplace came only *after* Access Advance first announced its HEVC Advance PPL and associated rates in July 2015. Prior to 2015, industry participants expected that the adoption process of the H.265 standard could take years,<sup>17</sup> and video content providers were slow to adopt H.265. Omdia (previously IHS Markit) estimated that less than 30 million households worldwide were using 4K TVs in 2015.<sup>18</sup> By the end of 2018, over 275 million households worldwide were using 4K

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<sup>16</sup> In November 2018, when this paper was first published, the number of licensees stood at 70+. By April 2020, the number had climbed to more than 150 companies that had executed the PPL.

<sup>17</sup> See, e.g., Nitin Narang, #4 Concept Series: *What Is the Difference Between HEVC (H.265) and H. 264 (MPEG-4 AVC)*, available at <https://www.mediaentertainmentinfo.com/?p=1745> (viewed April 13, 2020).

<sup>18</sup> IHS Markit, *4K TV and UHD: The Whole Picture (2017)*, at 25, available at <https://cdn.ihs.com/www/pdf/4ktv-uhd-ebook.pdf> (viewed April 15, 2020). As of 2020 IHS Markit is part of Omdia.

TV's, which number had grown to 470 million by the end of 2020.<sup>19</sup> Likewise, a 2021 report showed that the share of 4K streaming media player devices accounted for a limited share (~10 percent) of global streaming media player device shipments prior to 2016.<sup>20</sup> However, by 2020, more than 72 percent of streaming media player devices were equipped with 4K UHD+ capabilities, which number was estimated to increase to approximately 84 percent by the end of 2021.<sup>21</sup>

In examining other licensing programs, it is clear that royalty rates for video codecs have varied considerably. Based on evidence from published reports and market participants, this range may reflect in large part the various goals of participating licensors (including licensors determining royalty rates based primarily on concerns of the amount of royalties they would pay as licensees). The initial royalty rate for MPEG-2, the first and perhaps most successful video compression patent pool, was approximately \$4 (\$6 per device in 2018 dollars, \$6.80 in 2021 dollars). As shown below, that rate was subsequently reduced in the early 2000's, to \$2.50 (approximately \$3.50 in 2018 dollars, \$4.10 in 2021 dollars).

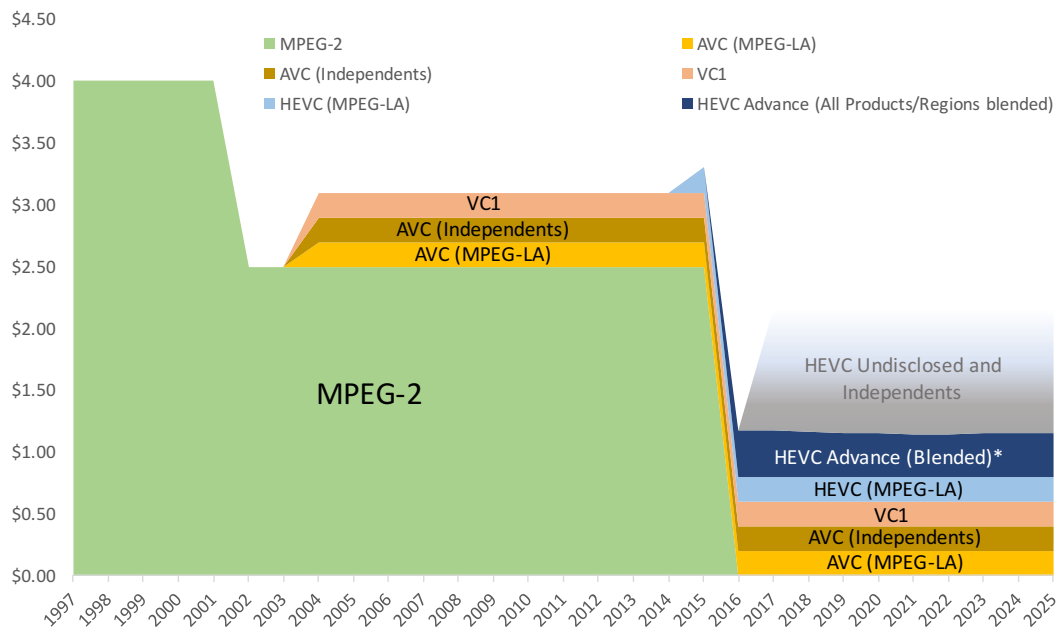
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<sup>19</sup> See Global TV Households By Feature – 3Q20 (*subscription required*) available at <https://omdia.tech.informa.com/OM014115/Global-TV-Households-By-Feature--3Q20>

<sup>20</sup> See *Streaming Media Device Report – 2021 Analysis, May 2021* available at [https://omdia.tech.informa.com/-/media/tech/omdia/assetfamily/2021/04/16/streaming-media-device-report--2021-analysis/exported/streaming-media-device-report--2021-analysis-pdf.pdf?rev=0be9b01ce05e4228b1931e39533aa27e&sc\\_lang=en](https://omdia.tech.informa.com/-/media/tech/omdia/assetfamily/2021/04/16/streaming-media-device-report--2021-analysis/exported/streaming-media-device-report--2021-analysis-pdf.pdf?rev=0be9b01ce05e4228b1931e39533aa27e&sc_lang=en).

<sup>21</sup> See supra note 20.

**Figure 1**  
**History of Video Codec Royalties**



\* HEVC Advance (Blended) rate is the weighted average of the in-compliance with trademark discount royalty rates across all licensable device categories and regions.

As can be seen from Figure 1, the pool rate for the successor technology to MPEG-2, namely AVC—a technology with roughly a 50% efficiency improvement over MPEG-2 (but only half as efficient as HEVC and not realistic for supporting 4K UHD+ video)—generally ranges from \$0.10 to 0.20 per unit. An IAM Media report cited evidence that the rate charged by the AVC patent pool “was set artificially low in a way that favored manufacturers [*i.e.*, implementers who will need licenses] over innovators and contributors to the standard [*i.e.*, patent holders].”<sup>22</sup> It is Access Advance’s

<sup>22</sup> IAM Media, *What Will TV Cost You? Putting a Price on HEVC Licenses*, IAM Magazine Issue 89 (May/June 2018), available at <http://www.iam-media.com/Magazine/Issue/89/Features/What-will-TV-cost-you-Putting-a-price-on-HEVC-licences> (viewed April 15, 2020).

understanding that the MPEG LA HEVC pool charges virtually the same \$0.20-per-codec rate as was the royalty rate for AVC. We understand that MPEG LA's HEVC pool rate, like its AVC rate, was largely determined by participating large companies that manufactured consumer devices and that dominated content distribution, who were primarily focused on limiting the royalties they would pay as HEVC licensees.

Another licensing program for HEVC technology, formed by Velos Media after the MPEG LA and HEVC Advance rates were set, was reported to charge \$1-\$2.50 per device.<sup>23</sup>

VP9 and AV1 are other current video standards which their promulgators—Google and AOM, respectively—have touted as royalty-free alternatives to HEVC.<sup>24</sup> However, even leaving aside the issue of whether either of these video

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<sup>23</sup> Velos never publicly disclosed its rates. In September 2021 it was reported by IAM that Qualcomm had left the Velos program. Previously in July 2021, Panasonic and Sun Patent Trust left the Velos program and joined Access Advance. These companies represent a majority of patents previously available for license through the Velos program. See *Qualcomm ends participation in HEVC licensing platform Velos Media* (September 28, 2021), available at <https://www.iam-media.com/frandseps/qualcomm-ends-participation-in-hevc-licensing-platform-velos-media>

<sup>24</sup> The fact that the authors of the codecs say that they will not charge royalties is not a guarantee that their codecs do not infringe patents owned and licensable by others. For example, in March 2019, Sisvel International S.A. announced the launch of its Video Codec Licensing Platform, which offers licenses to patents relevant to the VP9 and AV1 specifications, for a royalty on a per device basis with no annual caps. See Sisvel, Press Release, *Sisvel Announces the Launch of Its Video Coding Licensing Platform* (March 27, 2019), available at <https://www.sisvel.com/news-events/news/sisvel-announces-the-launch-of-its-video-coding-licensing-platform> (viewed April 15, 2020); Sisvel, *AV1 License Terms* (2019), available at, <https://sisvel.com/licensing-programs/audio-and->

codecs is in fact royalty-free,<sup>25</sup> licenses to VP9 and AV1 are not *economically* comparable to licenses for HEVC and cannot form the basis of a FRAND analysis. The economic incentives for the licensors of these alleged “royalty-free” standards are based on the licensors being implementers, whose primary business models and mode of monetizing their IP are based on providing products and services with codecs covered by their IP. Therefore, they have very different economic incentives in setting royalty rates than do the innovators and contributors whose business model is based on monetizing their IP by licensing. For those implementors who authored the VP9 and AV1 codecs, offering them on a royalty-free basis may make the most economic sense for their business plans. No doubt companies such as Google and Netflix expect to obtain a return on their investments in VP9 and/or AV1 at least by providing content in exchange for advertising, search and/or subscription revenue. However, this is not comparable to HEVC, whose licensors are entitled to collect fair and reasonable royalties pursuant to *their* business plans.

In addition, VP9 and AV1 are not *technologically* comparable to HEVC. HEVC provides substantial technological advantages over VP9 and AV1 in terms of compression efficiency.<sup>26</sup> HEVC was designed for a wide variety of applications,

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[video-coding-decoding/video-coding-platform/license-terms/av1-license-terms](https://aomedia.org/license/patent-license/) (viewed April 15, 2020).

<sup>25</sup> It should be noted that neither AOM nor any of its members provide any warranty of non-infringement to match their royalty-free claims. *See* <https://aomedia.org/license/patent-license/>.

<sup>26</sup> *See, e.g.,* Dan Grois, Detlev Marpe, and Tung Nguyen, *Performance Comparison of AV1, JEM, VP9, and HEVC Encoders* (2017), available at <https://pdfs.semanticscholar.org/f8a4/23de4d8d44c8552048418d944ff631662e29>.

including “the deployment of new services such as broadcasting of UHD programs”, while VP9 and AV1 were primarily “designed for web applications.”<sup>27</sup>

### *Licensing Programs for Other Technologies*

Pool rates for other standardized technologies also vary across a significant range. For example, various licensing programs charge the following per unit rates:

<u>License Source</u>	<u>Technology</u>	<u>Rates</u>
Via Licensing	AAC	\$0.15–\$1.47
Via Licensing	LTE	\$1.00–\$2.10
Sisvel	3G	€0.35–0.45
Sisvel	LTE	€0.40–0.90
Qualcomm	3G/4G/5G	3.25% of device price
One-Red	DVD	\$1.40-\$3.60
One-Blue	Blu-ray	\$5.60-\$9.60
One-Blue	Ultra-HD	\$7.20-\$10.10

While economists and courts have found that competing standards are relevant to a FRAND analysis only to the extent that the competing standards are truly comparable, both economically and technologically, an analysis of competing standards can provide a valuable reference point. HEVC Advance’s highest royalty rate for mobile devices under its new Platform PPL —\$0.533 (or 0.18% of the average sale price)—is

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pdf (viewed on April 15, 2020) (HEVC provides an average bit-rate savings of 30.6% relative to AV1 and 46% relative to VP9).

<sup>27</sup> Glenn Herrou, Wassim Hamidouche & Xavier Ducloux, *HDR Video Quality Evaluation of HEVC and VP9 Codecs 2* (February 2019) (conference presentation), available at <https://hal.archives-ouvertes.fr/hal-01510906/document> (viewed April 15, 2020).

well within the range of these market-established pool rates which have been accepted by thousands of licensees for licenses to portfolios of varying numbers of patents.<sup>28</sup>

In sum, the range of fair and reasonable rates accepted by both licensors and licensees for video codecs and other standards is wide, and the HEVC rates on a blended basis (*see* Figure 1) are well within the range for historical and current royalty rates for both video codecs and other standards as confirmed by the above charts.

#### *AVC Royalty Rates are Not a Proper Benchmark for HEVC Royalty Rates*

While the AVC video standard is often touted as the only proper benchmark for HEVC rates by patent implementers interested only (or primarily) in the lowest royalty rate for HEVC, as was mentioned earlier, an IAM Media report cited evidence that the rate charged by the AVC patent pool “was set artificially low in a way that favored manufacturers over innovators and contributors to the standard”.<sup>29</sup> The fact that the AVC rate was set artificially low is clear and obvious from the fact that despite AVC providing roughly a 50% efficiency improvement over MPEG-2, a royalty rate of ~\$0.20 with a very low cap (originally \$3.5 million) was set—the equivalent of a rate **reduction** of about **90%** and even more of a reduction for large patent implementers when the cap is considered. This rate reduction occurred largely as a result of a MPEG LA

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<sup>28</sup> In the November 2018 and April 2020 versions of this paper, the highest rate for mobile devices was \$0.866 (or 0.29% of the ASP), still well within range of market-established pool rates.

<sup>29</sup> IAM Media, *What Will TV Cost You?*, *supra* note \_\_.

pool process which allowed those participants who were primarily interested in the lowest possible royalty rate to vote themselves a drastically below-market royalty rate.

While the actions of large patent implementers to vote themselves a drastically below-market royalty rate was certainly the key reason for the AVC royalty rate being established at a 90%+ discount, there are other reasons as well. One is that at the time the AVC rate was set (approximately 2004), the use of video compression on mobile and internet devices was significantly less important, with video representing only about 5% of total internet bandwidth in 2004 versus about 80% today and still increasing. The established MPEG-2 royalty rate at the time of \$2.50 per device (approximately \$3.50 in 2018 dollars) was also a factor; many market participants believed that adding an additional royalty to reflect the full value of AVC to the \$2.50 MPEG-2 royalty rate was likely to hinder adoption.

In *Microsoft v. Motorola*<sup>30</sup> in 2013, Judge Robart recognized that the MPEG LA \$0.20 AVC rate does not represent the value of the entire AVC stack, as key patent holders such as Motorola were not represented in that pool. Judge Robart further found that the MPEG LA \$0.20 rate for AVC “is the low end of the range for a RAND royalty”, and “... the final rate chosen is on the very low end of those discussed.”<sup>31</sup> Judge Robart further found that the upper bound of the full AVC stack was an “uncapped [rate of] \$1.50 per unit,” in 2003 dollars.<sup>32</sup> Even Microsoft recognized that the AVC

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<sup>30</sup> *Microsoft Corp. v. Motorola, Inc.*, No. 10-cv-01823, 2013 WL 2111217 (W.D. Wash. Apr. 25, 2013).

<sup>31</sup> *Id.* at \*83.

<sup>32</sup> *Id.* at \*87.

royalty rates were on the low end of a RAND royalty rate, as the Court noted in its opinion: “Microsoft saw the setting of low MPEG LA rates [for AVC] as a ‘business win’ for the company.”<sup>33</sup> Using only HEVC’s additional bandwidth savings as a modifier, HEVC’s 2x performance advantage (*i.e.*, a ~10MB HEVC file would be ~20MB in AVC) would indicate that the upper bound of the HEVC stack is worth at least twice the AVC stack, *i.e.*, \$3.00 for HEVC in 2003 dollars. If we then factor in inflation, it becomes \$4.46 for 100% of all HEVC essential patents in 2021 dollars.

In January 2019, Unified Patents published a report (Unified Report) arguing that “HEVC rates should be comparable to or less than the cost of licensing the main patent pool for [Advanced Video Coding (AVC)] (MPEG LA), HEVC’s predecessor codec” and suggesting that the fair and reasonable royalty stack rate for HEVC was between 40% and 140% of the MPEG LA AVC rate.<sup>34</sup> This conclusion was effectively based on a single metric (which was itself faulty)—a calculation of the incremental cost savings of HEVC over AVC limited to only changes in bandwidth costs and storage costs per unit of data.

The Unified Report was flawed for a number of reasons, including because it used AVC as the sole baseline, and entirely ignored the difference in

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<sup>33</sup> *Id.* at \*81.

<sup>34</sup> While Unified Patents did not make the full Unified Report publicly available, it summarized the key points in a press release. Unified Patents, *Independent Economic Study Suggests HEVC Royalties Should Be Comparable to or Less than Rates for AVC* (Press Release, January 2019), available at <https://www.unifiedpatents.com/insights/2019/1/9/independent-economic-study-suggests-hevc-royalties-should-be-comparable-to-or-less-than-rates-for-avc> (viewed April 14, 2020).

technology and market dynamics at the time when AVC rates were set, as compared to when HEVC rates were set. It thus entirely ignored the difference in value of HEVC to licensed products at the time the rates were set—a parameter of critical importance. Most notably, the Unified Report also failed to account for increased video usage, the explosion in mobile data and the historical increase in prices per GB of smartphone data plans, and increased device and cloud storage capacity. All of these baseline facts ignored by the Unified Report are critical to the value of HEVC as compared to AVC. A more thorough and realistic analysis suggests that, even using (improperly) the MPEG LA AVC rate as the sole baseline, the FRAND stack rate for HEVC would be no less than at least 6.7 to 29.2 times the AVC rate.<sup>35</sup>

#### *Flawed Process in Setting MPEG LA's HEVC Royalty Rates*

As stated above, a key goal of the HEVC Advance program is to be fair and reasonable not only to implementers, but to licensors as well. There is no dispute that FRAND does not mean the “lowest possible rate” but rather means a rate that is fair to both licensors and licensees. This balance enables Access Advance to attract both licensors and licensees to its HEVC program; and the increase in licensors attracted to the program in turn increases the value proposition for its licensees. As such, in analyzing the fairness of other video codec pool rates one must consider the process by which those pool rates were set by those other programs and whether significant licensors found those rates to be fair to them. A successful pool is one that attract a meaningful number of

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<sup>35</sup> A full analysis of the Unified Report demonstrating the flaws that render the Report unreliable at best, prepared by the economic consulting firm Houlihan Lokey, is available on request.

licensors and results in the pool including a meaningful number of essential patents. A pool that fails to do that will fail, because it will not offer enough patent coverage to potential licensees to be worth paying for, even if the royalty rates are very low. Moreover, a failure to achieve a balance between the interests of licensors and licensees would have adverse consequences such as less efficient patent pools, less standard setting activity, and less innovation.

Also as noted above, we understand that the MPEG LA HEVC pool's adoption of virtually the same \$0.20 rate as for AVC (notwithstanding the substantial inventive effort over and above AVC that went into HEVC) was largely determined by participating consumer device giants primarily concerned with what royalties they would pay as HEVC licensees, neglecting to neutrally consider whether that rate would also be a fair rate for licensors, especially for those who had invested heavily in developing HEVC. The MPEG LA rate thus substantially ignored Access Advance's goals both of attracting as many licensors as reasonably possible to increase market efficiency and also of fairly valuing the contribution of the licensed technology to licensed devices. It is abundantly clear that neither goal is met by charging the same royalty for the use of HEVC as MPEG LA charged for AVC. Beyond the fact that AVC is less valuable than HEVC, the royalty rate for AVC was set, as IAM reports, at a level that was "artificially low" even for AVC, or as Judge Robarts found, "at the low end of the range for a RAND royalty."

It is our understanding that the failure of the MPEG LA HEVC pool to address these goals led to rejection of the MPEG LA HEVC program and its \$0.20 rate by patentees representing most of the universe of HEVC essential patents. Those

patentees then elected other forms of licensing rather than joining a pool that did not fairly compensate them for their innovations, an understanding confirmed by IAM Media.<sup>36</sup> This rejection itself, as Judge Robart recognized in *Microsoft v. Motorola*, is a clear indication that MPEG LA's HEVC rate is not an indicator of FRAND because SEP holders with valuable SEPs declined to join. It is likely also the reason that 12 licensors, including MPEG LA's largest HEVC essential patent owner Samsung, have withdrawn from the MPEG LA pool during the period from January 1, 2020, the first date at which MPEG LA Licensors could withdraw from the MPEG LA HEVC pool, through April 2020. Thus, it appears that under all the relevant circumstances, including the circumstances under which the \$0.20 MPEG LA HEVC rate was set, and given the goals of the Access Advance HEVC licensing program and the strength of the licensed portfolio (*see* pages 54-58, *infra.*), the \$0.20 rate offered by the MPEG LA HEVC program is not fair or reasonable.

In addition, as courts and scholars around the world have recognized, FRAND is a range, not a point; that is, for every technology, a range of rates qualify as FRAND. As noted above, Judge Robart determined that the MPEG LA rate for AVC “[was] the low end of the range for a RAND royalty”, and “the final rate chosen [for the AVC royalty rate was] on the very low end of those discussed.” Therefore, while the HEVC Advance rate is higher than MPEG LA's same \$0.20 rate for a later generation of technology with twice the efficiency<sup>37</sup>, such rate does not meet the goals of the HEVC

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<sup>36</sup> IAM Media, *What Will TV Cost You?*, *supra* note \_\_.

<sup>37</sup> Access Advance offers a “First Sale Exception” which provides that only a single royalty is due for devices that contain multiple codecs at the time of First Sale.

Advance program and that rate is by no means a “ceiling” for a fair and reasonable rate for HEVC royalties. Furthermore, new licensees taking an HEVC license from MPEG LA obtain a license to ~5,310 patents, while new licensees taking an HEVC license from Access Advance obtain a license to nearly 15,000 patents, almost three times as many (both numbers as of October 2021).<sup>38</sup> And we understand that the highest HEVC Advance mobile device rate of \$0.533 is lower than the rate previously offered by the Velos Media licensing program.<sup>39</sup> The HEVC Advance rates compare even more favorably to the Velos Media licensing program when all HEVC Advance rates—such as those offered for sales in Region 2 countries and those paid by compliant licensees, not just the highest rates—are considered.

### *Conclusion*

Thus, based alone on other pool rates—and confirmed by other analyses, *infra*—the highest rates set by Access Advance are fair, reasonable, and well within the

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To our knowledge, MPEG LA does not offer such an exception. As a result, while HEVC Advance’s per-codec royalty rates for certain device categories are higher than those of MPEG LA, in some circumstances the overall effective royalty *cost* per device is lower under the HEVC Advance pool as compared to the MPEG LA pool.

<sup>38</sup> We should note that some licensors license their HEVC SEPs through both Access Advance and MPEG LA. We estimate, as of October 2021, the number of “overlapping” patents licensable in both pools is approximately 2,590. In other words, for new licensees about 2,722 patents are pool-licensable only through MPEG LA, while about 12,400 patents are pool-licensable only through Access Advance (i.e., ~4.5x as many).

<sup>39</sup> The November 2018 and April 2020 versions of this paper referred to the then-highest HEVC Advance PPL rate for Mobile Devices of \$0.866, for which the conclusion still holds.

norm of established pool rates for broadly comparable portfolios and technologies accepted by thousands of licensees in consensual licensing transactions around the world.

### The Value of HEVC to Licensed Products.

In addition to accepted market rates, another typical method to evaluate royalties is to assess the value of the licensed technology to the licensed products. HEVC provides substantial value to all products licensed by the PPL. In general, and as described in greater detail below, a significant portion of the value of licensed products is their ability to play high quality video (which, by definition, requires a higher amount of uncompressed data than lower quality video) while using lower bitrates than those rates associated with the same quality video in other compression technologies. HEVC gives these devices the ability to play high quality video while saving costly transmission bandwidth, expensive memory, and, under certain conditions, preserving battery life.<sup>40</sup>

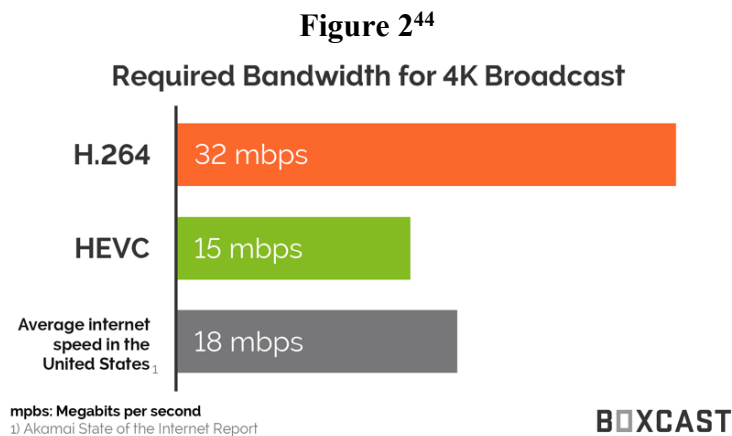
For example, the coding efficiency of H.264 is often insufficient for streaming 4K UHD+ videos.<sup>41</sup> H.265, on the other hand, was “conceived to boost video

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<sup>40</sup> Robin Harris, *More Video! Apple’s New HEVC Codec Cuts Storage Needs, But Should You Care?*, ZDNet (Jun. 28, 2017), available at <https://www.zdnet.com/article/shiny-new-tech-is-hevc-265-worth-it/> (viewed April 15, 2020); Jan Ozer, *HEVC in HLS: How Does It Affect Device Performance?*, StreamingMedia.com (Nov. 15, 2017), available at <http://www.streamingmedia.com/Articles/Editorial/Featured-Articles/HEVC-in-HLS-How-Does-It-Affect-Device-Performance-121758.aspx> (viewed April 15, 2020).

<sup>41</sup> See, e.g., <https://www.mediaentertainmentinfo.com/?p=1745> (viewed April 13, 2020); Gordan Daily, *H. 264 Versus HEVC: Understanding the Differences*, The

streaming” and thus can “revolutionize how video data is displayed, either online, on television and even in the surveillance industry.”<sup>42</sup> Figure 2 shows that the average internet speed in the U.S. may be too low to support 4K UHD+ broadcast using H.264 compression, but can be sufficient if using H.265. Today, one of the many important uses of H.265 is to enable consumers to stream 4K UHD+ videos.<sup>43</sup>



The value of HEVC to licensed products will only continue to increase as video consumption (and especially streaming video consumption) continues to grow, in particular that of 4K UHD+ content (and more recently 8K content which relies heavily

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Broadcast Bridge (Nov. 28, 2017), *available at* <https://www.thebroadcastbridge.com/content/entry/10029/h.264-versus-hevc-understanding-the-differences/> (viewed April 15, 2020) (“Links using H.264 can be overwhelmed by the much higher bandwidth requirements of 4K video. HEVC is often the better solution.”)

<sup>42</sup> Ana Rodrigues, *H.264 vs H.25—A Technical Comparison*, *supra* note 4.

<sup>43</sup> See, e.g., Kevin Ohannessian, *What Is HEVC?*, *available at* <https://www.tomsguide.com/us/hevc-4k-explained,news-18206.html> (viewed April 15, 2020).

<sup>44</sup> Boxcast Blog, *HEVC (H.265) Vs. AVC (H.264)*, *supra* note 4.

on HEVC<sup>45</sup>). In 2018, Cisco forecasted that global IP video traffic would grow by 47 percent each year, from about 100 Exabytes per month in 2017 to more than 300 Exabytes per month in 2022,<sup>46</sup> and that IP video will increase to 82% of all internet traffic by 2022.<sup>47</sup> The share of 4K IP VoD traffic in all IP video traffic was expected to grow from 3 percent in 2017 to 22 percent in 2022<sup>48</sup> as more and more content providers are now offering 4K content. As a result, sales of devices capable of handling the higher definition are also increasing. For example, connected 4K and 8K TV set sales comprised 58 percent of TV sets in 2020 and are anticipated to increase to 72 percent by 2025.<sup>49</sup> Omdia forecasts that by the end of 2021, ~60% of households in North America, ~45% in Western Europe, ~40% in China, and ~35% will have a 4K or 8K television set.<sup>50</sup> In 2018, more than 45 percent of streaming media player devices sold were equipped with 4K UHD+ capabilities (this percentage increased to about 69 percent in 2019 and is expected to increase to about 84 percent in 2021).<sup>51</sup> In addition, consumers'

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<sup>45</sup> See, e.g., *8K Association Announces Performance Specification for Consumer TVs*, available at <https://8kassociation.com/8k-association-announces-performance-specification-for-consumer-tvs/>

<sup>46</sup> Thomas Barnett, Jr. et al., *Cisco Visual Networking Index: Forecast and Trends, 2017–2022*, at 10 (Dec. 2018).

<sup>47</sup> *Id.* at 67.

<sup>48</sup> *Id.* at 10.

<sup>49</sup> Omdia TV Sets (Emerging Technologies) Market Tracker, August 2021 <https://omdia.tech.informa.com/OM019453/TV-Sets-Emerging-Technologies-Market-Tracker-History--2Q21-Analysis> (*subscription required*).

<sup>50</sup> See *supra* note 19.

<sup>51</sup> See *supra* note 20.

usage of mobile devices is also shifting towards video. According to Ericsson, 66 percent of all mobile traffic in 2021 is video with the expectation that video will increase to 77 percent in 2026.<sup>52</sup>

It cannot be disputed that the functionalities enabled by HEVC continue to drive sales of HEVC-enabled licensed devices, and HEVC will continue to create markets for video streaming and video displayed on mobile devices, as well as other new technologies such as high resolution 8K TVs.

### *Rapid and Significant Adoption of HEVC*

The value and core functionality that HEVC provides to devices such as mobile phones, set top boxes, 4K UHD+ TVs, video surveillance systems, and other licensed devices is undeniable. High quality videos—such as those encoded for 4K resolution—require a significant amount of encoded data (*e.g.*, 4K TVs have four times the number of pixels—and substantially more bits of data—compared to standard 1080 HDTVs). This creates a challenge for transmitting video to users and storing that video in memory. The compression efficiency of HEVC—twice as powerful as AVC—is particularly important for such high-quality video. For example, it is fair to say that without HEVC, watching high quality movies or other videos of significant length on mobile devices would not be commercially feasible. This HEVC-enabled functionality has caused manufacturers to make, and consumers to increasingly purchase, HEVC-enabled mobile devices such as smartphones. For example, in mid-2020, 95% of iOS

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<sup>52</sup> *Ericsson Mobility Report, 2021* available at <https://www.ericsson.com/4a03c2/assets/local/mobility-report/documents/2021/june-2021-ericsson-mobility-report.pdf>

smartphones and 81% of Android smartphones in use were equipped with hardware HEVC *decoding* capability.<sup>53</sup> Moreover, the transmission and storage of high-quality video (including 4K UHD+) would be prohibitively expensive, or simply commercially impossible, given the bandwidth constraints of consumer broadband, and in some cases, the data cap of consumer broadband or wireless data plans.

HEVC undeniably allows more people to enjoy high-quality video at lower costs which, in turn, increases demand for HEVC-enabled devices to view high-quality video on mobile phones and TVs. This increased demand is one reason why vendors of HEVC-enabled devices are able to obtain a substantial price premium on HEVC-enabled devices over non-HEVC-enabled devices (as shown at page 39, *infra*).

An article published by well-respected IAM Media summed up the value of HEVC, concluding that HEVC is “a piece of critical technology that enables users to view videos” and that “HEVC can help consumers to save limited mobile data and businesses to cut costs on data storage and transmission. All the while delivering equal—or better—quality video.”<sup>54</sup> As one commentator concluded after testing HEVC against other codecs, for “the best quality files in the smallest possible format, HEVC is the way to go.”<sup>55</sup>

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<sup>53</sup> Scientia Mobile, *Mobile Data Report May-October 2020* (Commissioned by HEVC Advance).

<sup>54</sup> IAM Media, *What Will TV Cost You?*, *supra* note \_\_.

<sup>55</sup> Tim Schiesser, Techspot, *Guide to HEVC/H.265 Encoding and Playback* (Dec. 2016), available at <https://www.techspot.com/article/1131-hevc-h256-encoding-playback/page8.html> (viewed April 15, 2020).

The benefits of HEVC also are confirmed by the rapid adoption of HEVC by mobile phones, 4K UHD+ TVs, and connected home and other devices. By 2020, more than four billion HEVC capable devices had already been shipped by vendors<sup>56,57</sup>, covering a wide range of devices:

- All current generation of Apple iOS devices, as well as the current version of Google Android mobile OS (Android 5.0 and later)<sup>58</sup> used in leading smartphone brands such as Samsung, Huawei, Xiaomi, Oppo, Sony, LG and OnePlus, support HEVC
- All Apple computers running MacOS High Sierra and later versions, and computers with an Intel Kaby Lake (or equivalent) processor or newer and running Microsoft Windows 10, support HEVC<sup>59</sup>
- Almost all of the leading brands of video surveillance equipment support HEVC

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<sup>56</sup> Mark Donningan, Beamr Blog, *HEVC Today, AVI Tomorrow?* (Jan. 6, 2018), available at <http://blog.beamr.com/2018/01/06/hevc-today-av1-tomorrow/> (viewed April 15, 2020).

<sup>57</sup> Earlier versions of this paper estimated, one billion HEVC capable devices shipped by 2018, and about 2.5 billion by the end of 2019.

<sup>58</sup> Google: *Android 5.0 Compatibility Definition* (Jan. 11, 2015), available at <https://source.android.com/compatibility/5.0/android-5.0-cdd.pdf> (viewed April 15, 2020).

<sup>59</sup> GoPro, *HEVC Explained* (Sept.30, 2019), available at <https://gopro.com/help/articles/block/hevc> (viewed April 15, 2020).

- Almost all 4K UHD+ televisions and set top boxes support HEVC
- All Ultra-HD Blu-ray players and discs support HEVC

In 2021 alone, more than 1 billion smartphones with HEVC capability were shipped to customers.<sup>60</sup>

The inclusion of HEVC in these products is driven at least in part by consumers' demand for the increasing availability of high-quality video content encoded in HEVC (or, in the case of video surveillance, the need for the more highly-detailed video definition that is the purpose of surveillance). A long list of market-leading streaming service providers and pay-TV service providers are already distributing content in HEVC, including Amazon, Apple (Apple TV+), BET+, CNN+, DirecTV, Dish, Disney+, ESPN+, Fandango, Hulu, HBO Max, Netflix, Paramount+, Peacock, Pluto TV, Vudu, and many more. In a survey conducted by Haivision, 50 percent of respondents from the broadcast industry currently use HEVC with that proportion expected to increase in the near-term. 82 percent of survey respondents indicated they plan to use

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<sup>60</sup> Access Advance estimates based on IDC Worldwide Quarterly Mobile Phone Tracker 2021Q2  
[https://www.idc.com/tracker/showproductinfo.jsp?containerId=IDC\\_P8397](https://www.idc.com/tracker/showproductinfo.jsp?containerId=IDC_P8397)

HEVC in the next year.<sup>61</sup> Indeed, HEVC is poised to become the universal codec for video consumption.<sup>62</sup>

In addition, HEVC will continue to drive demand for devices licensed by Access Advance because HEVC is the video codec for the next generation of UHD broadcast standards including ATSC 3.0 and DVB T2. Korea and the United States already have launched ATSC 3.0 broadcasting using HEVC, and a broad coalition of broadcast television station groups as well as public broadcasters announced in September 2021 that ATSC 3.0 with HEVC will be rolled out in fifty-three U.S. markets by the end of 2021.<sup>63</sup> Moreover, Germany, Netherlands, Ukraine, Croatia and the Czech Republic, among others, chose HEVC for their DVB T2 HD roll-outs. As a result, televisions sold in these countries are already required to support HEVC. Japan chose HEVC for its 4K/8K satellite broadcasting services, which began in December 2018. In addition, traditional pay-TV operators (cable, satellite, IPTV) are choosing HEVC over

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<sup>61</sup> Haivision [Broadcast IP Transformation Report 2021](https://www.haivision.com/resources/white-paper/broadcast-ip-transformation-report/)  
<https://www.haivision.com/resources/white-paper/broadcast-ip-transformation-report/>.

<sup>62</sup> With respect to 4K/UHD deployments, 188 out of 189 video services used HEVC. 4K and Ultra High Definition Video Services Explained, By Thierry Fautier, Harmonic March 22, 2021, <https://www.harmonicinc.com/insights/blog/4k-in-context/>

<sup>63</sup> According to NextGen TV, ATSC 3.0 is on air in 45 markets as of August 25<sup>th</sup>, 2021 with 8 additional markets schedule by Fall 2021. **[CITE]**

other codecs for their 4K service offerings. The widespread, international adoption of HEVC confirms the considerable value that HEVC provides.<sup>64</sup>

As more and more streaming and pay-TV service providers continue to offer HEVC content, and HEVC broadcast rolls out on a global basis, the growth of HEVC content and demand for HEVC devices—already substantial—is expected to continue to increase dramatically in the next few years.<sup>65</sup>

In addition to the professional video content provided by streaming service providers, pay-TV, and broadcast TV, there is also a growing amount of non-professional video footage being created in HEVC. This increase is driven by the growth in annual shipments of devices capable of capturing video in HEVC, including billions of smart phones<sup>66</sup>, and hundreds of millions of HEVC-capable video surveillance cameras. As noted, the use of HEVC enables content providers to store and transmit high quality video and enables the devices to receive and store that video, while saving on storage and bandwidth capacity and cost.

From analog to digital, standard definition to high definition and ultra-high definition, consumers continue to demand better video quality. As shown below, HEVC is one of the core technologies that enables device makers and content service providers to meet this demand for higher resolution video content, and therefore enables

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<sup>64</sup> The fact of this mandated use of HEVC is not itself reflected in the HEVC Advance rates.

<sup>65</sup> Haivision: *supra* notes \_\_, \_\_.

<sup>66</sup> According to Scientia Mobile, in mid 2020, 85% of iOS and 61% of Android mobile devices in use supported HEVC video *encoding*. *supra* note \_\_.

them not only to sell new and more devices but also to charge a premium for those new devices over products and services that do not include HEVC, as we discuss in the next section.

### *Price Premiums Enabled by HEVC*

As just one illustration, consumers without unlimited data plans have been able to use their HEVC devices to watch considerably more video on the same data plan price than they can with non-HEVC devices. For example, looking at Verizon's Unlimited 5G Nationwide plans, the price of the 15GB premium data plan is \$45/month while the Unlimited Plus plan with 30GB of premium data is \$55/month (a 22% price premium).<sup>67</sup> HEVC's 50% increase in compression efficiency allows a customer to watch the same amount of video on the 15GB plan that the customer would need the 30GB plan to watch without HEVC. Likewise, Vodafone's UK plan for 10 GB of data was 33% more costly to the consumer than the 5 GB plan,<sup>68</sup> but Vodafone customers can watch as much HEVC video on the 5GB as the customer would need 10GB to watch without HEVC. Achieving lower data costs for watching high quality video increases consumer demand (and consumers' willingness to pay higher prices) for HEVC devices. And, of course, for the same amount of viewing HEVC allows consumers to significantly

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<sup>67</sup> As set forth in the November 2018 and April 2020 versions of this paper, in 2018 Verizon's 2GB data plan cost \$35/month, while a 4GB plan cost \$50/month.

<sup>68</sup> As set forth in the November 2018 and April 2020 versions of this paper, Vodafone's 10GB plan in the UK was 32% more costly to the consumer than its 5GB plan.

lower their monthly cost with a lower GB data plan, or to watch twice as much video on any data plan as they could without HEVC.

Saving on data transmission plans is not the only advantage consumers derive from buying HEVC-enabled devices: Because of the same doubling in compression efficiency described above, HEVC allows consumers to purchase lower-priced devices with less memory to store the same amount of video content, thereby increasing the ability of consumers to buy newer “replacement” devices more quickly and less expensively for the same needs. For example, Apple’s current iPhone—the iPhone 13—with 256 GB of storage retail for \$100 more than the same models with 128 GB of storage.

Moreover, HEVC enables the “UHD”—ultra-high definition—experience in many 4K UHD+ TV devices, and TV makers recognize the value of the higher resolution TVs by charging more for them. Purchasers of TVs are willing to pay more for the 4K UHD+ TV experience made available in part by HEVC—indeed, most 4K/8K UHD+ TV content is available only in HEVC today. For example, in January 2020, *Consumer Reports* reviewed and rated more than 250 TV models available in the U.S. marketplace, including 45 models with resolutions up to full HD and 205 models up to 4K.<sup>69</sup> 4K UHD models (with HEVC) generally command substantial price premiums over HD models (generally with only AVC technology); on average, 4K models are 2x

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<sup>69</sup> See *Consumer Reports, TV Ratings*, available at <https://www.consumerreports.org/cro/tvs.htm> (viewed April 15, 2020).

(or more) as expensive compared to HD models, according to Omdia.<sup>70</sup> As shown below, at various time sellers of other products also have achieved considerable premiums for devices that offer higher resolution:<sup>71</sup>

<u>Lower resolution devices and prices</u>	<u>Comparable higher resolution devices and prices</u>	<u>Price premium</u>
<i>Phones</i>		
Samsung Galaxy S21 5G – \$849.99	Galaxy S21 Ultra 5G – \$1,199.99	41%
Xiaomi Poco F3 5G+ 4G Volte – \$479.99	Xiaomi Mi 11i – \$599.99	25%
Motorola g stylus – \$399.99	Motorola Edge– \$699.99	75%
<i>Tablets</i>		
Samsung Galaxy Tab S7 FE – \$599.99	Samsung Galaxy Tab S7+ – \$849.99	42%
Lenovo Tab M10 Plus – \$259.99	Lenovo Tab P11 Pro Tablet – \$499.99	92%
Amazon Fire HD 8 – \$89.99	Amazon Fire HD 10 – \$149.99	67%

<sup>70</sup> TV Sets (Emerging Technologies) Market Tracker: History – 2Q21 Database available at <https://omdia.tech.informa.com/OM019491/TV-Sets-Emerging-Technologies-Market-Tracker-History--2Q21-Database>

<sup>71</sup> This is not to say that the value of HEVC accounts for the entire up-charge of higher resolution devices. But the existence and magnitude of the up-charge is some of the considerable concrete evidence available that the addition of HEVC to a device enables and therefore adds considerable value to licensed devices.

<u>Lower resolution devices and prices</u>	<u>Comparable higher resolution devices and prices</u>	<u>Price premium</u>
<i>Laptops</i>		
Dell XPS 15 Laptop, FHD+, 15.6-in display (Intel Core i9, 16GB, 8GB Storage, 1 TB Memory) – \$2349.99	Dell XPS 15 Laptop, FHD+, 15.6-in display (Intel Core i9, 16GB, 8GB Storage, 1 TB Memory) – \$2749.99	17%
<i>4K UHD+ TVs</i>		
Samsung 65" Class QN90A Samsung Neo QLED 4K – \$2,599.99	Samsung 65" Class QN800A Samsung Neo QLED 8K – \$3,499.99	35%
Sony KDL-32W600D, 32" UHD (720p) – \$299.99	Sony KD-43x85J 4K HDR – \$749.99	150% <sup>72</sup>

Content providers achieve similar price premiums and revenue gains by offering HEVC encoded video. For example, as of September 2021, Netflix’s typical HD

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<sup>72</sup> The November 2018 and April 2020 versions of this paper presented the following version of this table:

streaming plan was priced at \$13.99 per month, while its 4K UHD plan for its videos encoded in HEVC was priced at \$17.99, or almost 30% higher.<sup>73</sup>

*Royalty Rate for HEVC in Light of its Value*

Because HEVC (at least in large part) drives the sales of HEVC-enabled smart phones, 4K UHD+ TVs (e.g., to stream 4K content), and many other devices used to capture and display high quality/low bitrate video, it would not be unreasonable or unfair to apply a typical consumer electronics royalty rate to the entire value of the licensed device. While courts frequently have set royalty rates for key consumer

<b>Lower resolution devices and prices</b>	<b>Comparable higher resolution devices and prices</b>	<b>Price premium</b>
<u>Phones</u>		
Motorola Droid Maxx – \$400	Droid Turbo – \$600	50%
Google Nexus – \$399	Nexus 6 – \$649	63%
Huawei P7 – \$417	G7 – \$444	6.5%
<u>Tablets</u>		
Lenovo A8 – \$150	S8 – \$179	19.3%
Kindle Fire HD7 – \$139	Kindle Fire HDX – \$239	72%
Samsung Galaxy Tab® 4 10.1 16GB – \$349	Samsung Galaxy Note® 10.1 – \$499	43%
<u>Laptops</u>		
Dell 15.6” LED Backlit Touch Display with True Life and FHD resolution – \$1,599	15.6” LED Backlit Touch Display with True Life and QHD resolution – \$2,049	28%
<u>4K UHD+ TVs</u>		
Samsung LED H6400 Series Smart TV – \$1,199.99	Samsung 4K UHD HU8550 Series Smart TV – \$2,099.99	75%
Sharp 50” LED HD Smart TV – \$299.99	Sharp 50” LED 4K UHD Smart TV – \$379.99	27%

<sup>73</sup> Netflix Plans and Pricing available at <https://help.netflix.com/en/node/24926>, (viewed on September 20, 2021). The April 2020 version of this Paper used then-current data for Netflix’s streaming subscription plans, in which its HD streaming plan was priced at \$12.99/month and its 4K UHD plan using HEVC was priced at \$15.99/month.

electronics technologies at 6-10% of the device price,<sup>74</sup> we also examined other reports on typical percentage royalties from well-respected industry sources such as IPSCIO and the Licensing Executives Society (“LES”).<sup>75</sup> IPSCIO reports that in 2017, median patent license rates for the electrical and electronics industry were 4% of the device sales price, while median rates ranged from 4.5% for telecom licensing to 5.5% for media and entertainment.<sup>76</sup> This range of rates is supported by the LES 2014 survey of IP licenses and royalty rates. LES reported that the average royalty rate for patent licenses was 3.94-5% of sales price, and that average licensing rates for consumer electronics technologies varied between 4.75%-5.25%.<sup>77</sup> Based solely on the value of HEVC to licensed devices—and setting aside other Access Advance licensing goals—we believe a royalty rate at the average rate commonly found for such devices would be fair and reasonable for licensing the use of HEVC.

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<sup>74</sup> *TCL Commc 'n v. Ericsson*, No. 14-cv-00341, 2017 WL 6611635 (C.D. Cal. Dec. 21, 2017); *Unwired Planet v. Huawei*, [2017] EWHC 711 (Pat) (Apr. 5, 2017).

<sup>75</sup> IPSCIO reports that it is the “longest running Royalty Rate and Licensing Agreement database in the market.” See <https://ipscio.com/> (viewed April 15, 2020).

<sup>76</sup> IPSCIO, *Royalty Rate Industry Summary 2017*, at 3, available at <https://ipscio.com/product/reports/royalty-rate-industry-summary-2017/> (“2017 IPSCIO Report”). In the same report, IPSCIO reports that the 1st Quartile and 3rd Quartile of royalty rates for the electrical and electronics industry are 2.5% and 5.5%, respectively. *Id.* These figures are similar to those reported for telecom (1Q – 2.3%, 3Q – 6.5%) and computer & office equipment industries (1Q – 2.3%, 3Q – 6.8%). *Id.*

<sup>77</sup> Licensing Executives Society, 2014 HIGH TECH DEAL TERM & ROYALTY RATE SURVEY REPORT 19-20 (October 2015).

The patent portfolio licensed by Access Advance does not constitute 100% of the inventive contributions to HEVC and, therefore, a reasonable percentage royalty for the Access Advance pool of HEVC SEPs based on the value of HEVC to a licensed device in a consensual licensing transaction generally will be less than the rate would be for the total value of the technology—that is, for 100% of HEVC SEPs—to licensed devices (*i.e.*, because others outside of Access Advance’s HEVC Licensors also hold patents essential to HEVC). Thus, to compare the Access Advance HEVC rates to those reported by IPSCIO and LES, at pages 45-50, *infra*, we have conservatively used the calculation that the Access Advance HEVC PPL (as of October 2021) provided a license to approximately 70% of all HEVC essential patents. Applying that percentage to typical industry percentage royalty rates of 4-5.5% of the device price would result in an industry-supported royalty rate for the HEVC Advance portfolio of between 2.8% and 3.85% of a device’s price (70% x 4%) and (70% x 5.5%))<sup>78</sup>. As shown at page 15, *supra*, the highest HEVC Advance rates are considerably lower than these industry-supported rates would justify. Moreover, as also explained in detail below, this purely numerical count of the proportion of all HEVC essential patents licensed by Access Advance substantially undervalues the contribution made to licensed products by the particular inventions in the HEVC Advance Patent Pool licensed portfolio. Thus, this analysis of

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<sup>78</sup> When this paper was first published in November 2018, Access Advance estimated its HEVC Advance pool contained approximately 34.5% of all HEVC essential patents, which, when applied to typical industry percentage royalties of rates of 4-5.5%, resulted in an industry-supported royalty rate for the portfolio of between 1.38%-1.9%. In the April 2020 version of this Paper, it was reported that Access Advance licensed about 65% of all HEVC essential patents, resulting in a royalty range of 2.6% to 3.6% rather than 1.38% to 1.9%.

the value of HEVC to licensed devices confirms that HEVC Advance rates are fair and reasonable.<sup>79</sup>

We also have examined judicial determinations of the value to consumer mobile phones of another technology necessary to those products: mobile phone connectivity.<sup>80</sup> While the question of whether the value to mobile phones of connectivity and HEVC are precisely comparable may be subject to debate, both are critical technologies widely adopted to create considerable value to devices and consumers who use them, especially in today's market where smartphones are increasingly the device of choice for watching videos.<sup>81</sup> The analysis of judicial determinations is thus useful both as an additional benchmark on the validity of other analyses in this paper as well as serving as an independent data point which confirms the fairness of HEVC Advance rates.

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<sup>79</sup> The share of all HEVC-essential patents licensable through Access Advance will only increase over time, making this analysis a lower baseline limit for the fairness and reasonableness of HEVC Advance's rates. In fact, since 2018, a number of important HEVC-essential patent holders joined the HEVC Advance patent pool as licensors, but not the MPEG LA HEVC pool, and twelve other licensors left the MPEG LA HEVC pool. As a result, by the end of the third quarter of 2021, the estimated number of patents licensed through the HEVC Advance Program exceeded 15,000, approximately 3x more than the number licensed through MPEG LA's pool. Accordingly, the share of HEVC-essential patents licensable through Access Advance is likely now approximately 70%.

<sup>80</sup> We are unaware of any judicial determination of the value of HEVC or other technologies that may be more comparable to HEVC than the 3G/4G technologies at issue in these decisions.

<sup>81</sup> While we have not seen studies on the point, we believe it is highly likely that, on average, more time is spent consuming video than making telephone calls on smartphones, and the same is undoubtedly true of mobile devices, even those on which phone calls are made over Wi-Fi.

Judicial determinations regarding connectivity have set the royalty stack for a particular technology (*i.e.*, the value of all patents essential to that technology) for technologies such as LTE at approximately 5-6% of the mobile phone sale price, and at between 6% to 10% of sale price for multi-mode mobile phones (*i.e.*, smartphones using 3G/4G/5G).<sup>82</sup> To compare such rates to Access Advance's HEVC Advance rates requires considering that Access Advance licenses approximately 70%<sup>83</sup> of all HEVC essential patents (*see* pages 45-50, *infra*). Using the 5-6% judicial determination of a FRAND royalty for LTE as an example, the comparable range of royalty rates for the HEVC Advance portfolio would be 3.5%-4.2% (70% of 5-6%)<sup>84</sup>. That is, if Access Advance's HEVC pool rates were equivalent to 3.5% to 4.2% of the price of devices licensed by the pool, those pool rates would be within the range determined by courts for licensing 3G/4G/5G technologies to cellular/mobile phones and smartphones. But as the analysis at page 15 *supra* demonstrates, and as explained below, the Access Advance HEVC pool rates are considerably lower than that.

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<sup>82</sup> *TCL*, 2017 WL 6611635, at \*14; *Unwired Planet*, slip op. at 164.

<sup>83</sup> *Supra* note 66.

<sup>84</sup> When this paper was first published in November 2018, Access Advance estimated its HEVC Advance pool contained approximately 34.5% of all HEVC essential patents, which, when applied to the LTE estimated royalty rates of 5-6%, resulted in an industry-supported royalty rate for the portfolio of between 1.73%-2.07%. In the April 2020 version of this paper, it was reported that Access Advance licensed approximately 65% of all HEVC essential patents, so the percentage royalty rates would then be 3.25%-3.9% rather than 1.73%-2.07%.

### *Conclusion*

Thus, these industry and judicially-determined royalty rates would support hypothetical percentage rates for HEVC Advance of between 2.8% - 3.85% of the licensed device sale price (IPSCIO and LES surveys) and between 3.5% - 4.2% of the licensed device sale price (judicial determinations), percentages which are increasing over time as additional HEVC-essential patents become licensable through Access Advance<sup>85</sup>. As set out at page 15 *supra*, the highest hypothetical percentages associated with HEVC Advance program sales price royalties are considerably lower than the range supported by these industry and judicially-determined royalty rates: the HEVC Advance rates range from 0.18% for mobile phones, to 0.267 % for royalties 4K UHD+ TVs to between 0.3% and 1.33% for connected home and other devices. Indeed, the HEVC Advance rate reaches a hypothetical percentage rate over 0.5% only for those devices which obtain most or all of their value from HEVC (*see page 15, supra*). This analysis again confirms that the highest HEVC Advance rates are fair and reasonable.

While a royalty percentage calculated solely based on the value of HEVC to licensed devices within the IPSCIO, LES, and court-determined ranges for various devices noted above would be fair and reasonable, the HEVC Advance PPL does not employ this approach or set rates at these levels. Rather it provides a license at lower rates, in most cases significantly lower, in light of other factors and goals of the program, particularly the goal of encouraging consensual licenses and furthering market adoption of HEVC to the benefit of consumers. Nevertheless, based on (i) the value of HEVC to

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<sup>85</sup> *Supra* note \_\_.

licensed devices, (ii) the widespread adoption of HEVC by market participants thereby recognizing its value, (iii) the increasing use of HEVC by consumers of licensed devices, (iv) the price premium HEVC-enabled devices and content are able to command, (v) typical consumer electronics products' royalty rates, (vi) judicial determinations of rates for critical technologies, and (vii) other factors, the highest HEVC Advance rates are well within the range of fair and reasonable rates. This conclusion obviously applies with even greater force to lower HEVC Advance rates such as those for products sold in Region 2 countries and those available to compliant licensees.

#### A “Top Down” Analysis.

Several judicial authorities and commentators have analyzed fair and reasonable rates using, among other analytical constructs addressed in this paper, a “top down” approach. Under this approach, *first*, a number is chosen to represent the value of the technology to the device, *second*, a determination is made of the total number of essential patents held by the licensor whose rate is being evaluated, *third*, a determination is made of the total number of essential patents held by all patentees, *fourth*, the value of the technology to the device is multiplied by a fraction consisting of the total number of SEPs owned by the licensor divided by the total number of all the patents essential to the technology. As an example, if a licensor owns 100 SEPs, and there are 1,000 total SEPs for the technology then the licensor owns 10% of all SEPs, and its FRAND royalty is set at 10% of the total value of the technology to the device(s) at issue.

As those who employ this “top down” approach have noted, determining the numerical inputs of each part of this formula is difficult, and subject to different reasonable outcomes for multiple reasons, including because (i) the “ceiling” number

representing the total value of the technology to the device(s) at issue is both subjective and objective, and not uniform across market segments; (ii) the number of essential patents continually changes over time (patents continue to issue in jurisdictions around the world, and new applications continue to be filed from already-pending applications); (iii) whether a patent is essential can only be determined by a detailed (and expensive) analysis by a patent expert, and therefore courts perform this analysis only on the patents of the licensor at issue; (iv) as courts and commentators have observed, many patent holders who participate in standard setting activities “over declare” (*i.e.*, overstate the number of) their essential patents by as much as, if not more than, 80%; (v) on the other hand, many patentees do not disclose the full extent of their standard-related patent portfolios, leaving courts to guess at this number and (vi) there may be reasonable disagreement over what constitutes a patent essential to any standardized technology (see (iii) and (iv) above).

Moreover, in any particular top down calculation by a court, the numerator of that fraction—the number of essential and valid patents owned by the patentee—is determined by the court based on a close analysis and determination of essentiality and validity of each patent or family,<sup>86</sup> while the denominator of that fraction—the total number of essential patents—is represented by the total of patents that have been

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<sup>86</sup> *Unwired Planet v. Huawei*, in High Court of Justice Chancery Division Patents Court, HP-2014-000005, May 4, 2017, ¶203 (“The numerators, in other words the numbers representing Unwired Planet’s own Relevant SEP’s for a given type of technology, are the result of a detailed assessment of the individual patent families.”); ¶361 (“if a number derived from [a broad-brush approach based on declaration] is used as the denominator in a fraction in which the numerator is a number derived by considering [Unwired Planet’s] patents in more detail, the result will understate the significance of Unwired Planet’s patents.”)

declared essential, despite the widespread recognition that that number is overstated<sup>87</sup> by anywhere from under 20% to 50%<sup>88, 89, 90, 91</sup>.

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<sup>87</sup> “The over-declaration problem is the following. Very many more patents are declared to be essential than in fact are essential. . . . [I]t must also be recognised that the fact that rates are negotiated by counting patents creates a perverse incentive to declare as many patents as possible, making over-declaration worse.” *Unwired Planet v Huawei*, ¶201

<sup>88</sup> The European Commission created a working group in 2017 tasked with investigating the essentiality assessment of standard essential patents. The group issued its report, entitled *Pilot Study for Essentiality Assessment of Standard Essential Patents*, in 2020 (EUR 30111 EN, Publications Office of the European Union, Luxembourg, JRC119894 (“*Pilot Study*”). The *Pilot Study* analyzed the state of the art on essentiality assessment in literature, court cases involving larger scale essentiality assessments, and essentiality assessment in patent pools. Its literature review on page 29 found rates of essentiality of self-declared patents to be in the range from 20% (in Goodman and Myers, *3GPP cellular standards and patents*, IEEE WirelessCom 2005, June 13, 2005.), to 35% (*LTE Essential IPR*. PA Consulting Group’s 3GPP-LTE Database and Report (2015)), to 56% (*Evaluation of LTE essential patents declared to ETSI*, Cyber Creative Institute (2011)). The *Pilot Study* also concluded that independent essentiality determinations by patent pools—especially ones that require claim charts—are the most sophisticated systems in place for essentiality assessment. (*Id.* at 15, 30, and 43-48).

<sup>89</sup> The Court in *Unwired Planet v. Huawei* determined that approximately 26.2% of the 4G/LTE declared patents to be standard essential. (*Id.* at ¶ 377, where the rate is the average determined by the Court of the two LTE numbers contended by the experts from both sides; *see also* Table 2 of the *Pilot Study*). In discussing the over-declaration issue, the Court in *Unwired Planet v Huawei* noted that Huawei had submitted “a summary of third party essentiality studies on 4G . . . iRunway at 8.2%, Fairfield at 50% and two Cyber Creative studies at 53.8% and 56.0%. Huawei submitted the iRunway study was not representative. . . . However as Unwired Planet point out, Huawei’s own HPA produces a lower overall essentiality ratio than the 50%+ rates from Cyber Creative and Fairfield. Dr Kakaes [an expert witness for Huawei] reported overall essentiality ratios for 4G of 35.8% and 34.1% from the HPA [an expert’s report] on slightly different bases (the differences do not matter). In his third report Dr Kakaes set out a table for sixteen individual companies’ 4G essentiality ratios derived from the HPA. They range from 18.6% for Google’s patents . . . to 82.3% for Sharp’s patents . . . . Most of the companies in the table (13) have ratios within 22%-50%. . . . The ratio for Huawei is 43.5% and the ratio for Samsung is 23.5%.” *Unwired Planet v Huawei*, ¶¶ 200-201, 301-304.

As is obvious from the math, reducing the numerator to actually essential patents while using an overstated denominator of assumed essential patents, will understate, potentially significantly, the share of essential patents of the patentee. Nevertheless, like other valuation determinations, the “top down” approach is one analytical tool, and one that is commonly requested by patentees and implementers.

*Access Advance’s Estimated Percentage of the Overall HEVC Stack*

The universe of all HEVC essential patents may be categorized into four groups: (i) the HEVC Advance portfolio; (ii) the portfolio of the HEVC licensing program administered by MPEG LA; (iii) the patents of the joint licensing program administered by Velos Media; (iv) the patents of unaffiliated patentees. A fair analysis of available evidence—including estimates published by IAM Media in 2018, and rates of new patent issuances—suggests that the total number of HEVC essential patents relevant

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<sup>90</sup> The Court in *TCL v. Ericsson* determined that approximately 47.9% of the 2G/3G/4G declared patents to be standard essential. (*Id.* at 32; *see also* Table 2 of the *Pilot Study*).

<sup>91</sup> *See also* “Approximating the Standard Essentiality of Patents – A Semantics-Based Analysis” at: [http://www.law.northwestern.edu/research-faculty/clbe/events/innovation/documents/gaessler\\_approximating\\_standard\\_essentiality.pdf](http://www.law.northwestern.edu/research-faculty/clbe/events/innovation/documents/gaessler_approximating_standard_essentiality.pdf) - a study of the share of true SEP’s in firm patent portfolios for GSM, UMTS and LTE standards, finding essentiality rates ranging from 22.7% to 46.1%, and that “firm-level differences . . . are statistically significant and economically substantial. Furthermore, we observe a general decline in the average share of true SEP’s between successive standard generations.” at 19. The study also found that “The common practice of SEP counting in licensing agreements may incentivize such a behavior, since licensing revenues are often tied to the number of SEP’s a firm holds (Dewatripont and Legros, 2013). This is particularly true for top-down approaches, which are frequently used when determining SEP royalty rates in court. (internal citation omitted). at 1,5. The authors also noted that “some patent pools follow the practice to conduct standard essential assessments before they include a given SEP (internal citations omitted). Hence, patent pool inclusion can serve as a signal for true standard essentiality, even though this again applies to a selected set of SEP’s only.”

for a “top down” analysis as of October 2021 is likely around 22,800 patents. This estimate is primarily based on the following:

*First*, Access Advance makes available on its website the list of patents that have been subject to a process of independent review to confirm the essentiality of the patents to the HEVC standard. That list amounted to approximately 5000 patents by November 2018 and is expected to exceed 16,000 patents by the end of 2021 given the current list of patents evaluated as standard essential and the current number of patents undergoing evaluation.<sup>92</sup>

*Second*, MPEG LA likewise publishes a list of patents (also subject to independent confirmation of essentiality). As of October 2021 that list cited approximately 2,722 essential patents that are not otherwise licensable through the HEVC Advance pool.<sup>93</sup>

*Third*, Velos Media has never published its list of licensed patents, and of course, there is no public list of unaffiliated patentee patents. Moreover, neither of these

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<sup>92</sup> Also, Access Advance’s HEVC patent list understates the number of essential patents to which a licensee obtains rights, since a licensee obtains a license to all essential patents which each licensor has the right to license, irrespective of whether or not those patents have been evaluated and listed as essential. This protects licensees by ensuring, for example, that a patent which is essential but which a licensor has not yet submitted for evaluation is nevertheless licensed in the PPL.

<sup>93</sup> As of November 2018, MPEG-LA’s patent list included approximately 3,600 patents that were not licensable through the HEVC Advance pool.

collections of patents has been subject to an independent determination of essentiality to address the well-recognized “over-declaration” issue.

Nevertheless, in 2018, IAM Media *had* published a study by Oliver and Richardson estimating the number of HEVC essential patents licensed by Velos Media and those held by unaffiliated patentees.<sup>94</sup> Velos Media communicated with the authors who estimated that the Velos Media licensors owned or controlled 3,200 patents, a number consistent with what Velos Media had represented about its portfolio. As noted above, the Velos Media patents had not been subject to an independent essentiality evaluation. Nevertheless, and notwithstanding the lack of independent evaluation, for purposes of this calculation we assumed that Velos Media controlled as many as 3,000 essential patents as of November 2018.<sup>95</sup> We made two necessary adjustments to arrive at an estimate of the number of HEVC essential patents controlled by Velos Media as of October 2021. First, Panasonic and Sun Patent Trust, whose patents were originally licensable through Velos Media in 2018, terminated their relationship with Velos Media and are currently HEVC Advance licensors. We estimate, based on issue dates and Access Advance’s estimated projection of independent essentiality evaluations currently in process, that Panasonic and Sun Patent Trust contributed approximately 700 HEVC

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<sup>94</sup> IAM Media, *What Will TV Cost You?*, *supra* note \_\_\_\_.

<sup>95</sup> Velos Media’s website represented, as late as March 2019, that its program included approximately 5,000 HEVC “related” patents. (See <https://web.archive.org/web/20190310065142/https://velosmedia.com/licensing/>). We note that Access Advance’s estimate of 3,000 essential patents from this self-declared group represents a 60% “essentiality rate” of the self-declared number of 5,000 HEVC-related patents, which we consider a very conservative estimate in light of the much lower ranges of 20% to 50% for essentiality rates of self-declared patents reported in the *Pilot Study*, referenced above.

SEPs to the 2018 estimate of 3,000 HEVC SEPs then controlled by Velos Media. This results in the 2018 Velos Media program then controlling approximately 2,300 HEVC SEPs, exclusive of Panasonic and Sun Patent Trust. We make a further adjustment to estimate the number of patents in the Velos Media program in 2021. *First*, we consider the number of HEVC-essential patents that have issued since 2018. Based on historical data from HEVC Advance's current list of approximately 15,000 evaluated HEVC SEPs, we estimate the average growth in HEVC SEPs from 2018 to present is about 39%. *Second*, if we assume the 2,300 HEVC SEPs referenced above experienced the same growth rate as the HEVC Advance pool (an assumption that we are unable to test based on public information), we estimate that number of HEVC SEPs in the Velos Media program as of October 2021 at approximately ~3,200 (2,300 x 139%).

*Fourth*, the number of patents held by unaffiliated entities is even less certain. Access Advance had been given estimates in 2018 by several entities who contributed to the standard that the unaffiliated patentees owned approximately 15% of the stack of all essential patents. While Oliver and Richardson also provided an estimate of patents held by unaffiliated patentees, that estimate was of questionable value for our analysis for at least two reasons: *First*, unaffiliated entities are not subject to the rigorous independent analysis of essentiality which has ensured that the HEVC Advance patent list includes only essential patents. *Second*, the purpose of the "top down" analysis is to determine the universe of essential patents which may seek a share of a reasonable total royalty for use of the relevant technology, here HEVC. It is at best uncertain whether all those who may hold HEVC essential patents but have not sought to license their portfolio will do so in the future. Additionally, since the Oliver and Richardson report, a number

of the unaffiliated patentees, including the largest ones such as LG, Huawei, Toshiba, and Google have joined the HEVC Advance pool as licensors. Thus, in the earlier versions of this Paper we adopted the 15% “industry” estimate, which was increased by approximately 15% (i.e., to 17.25%) in light of the Oliver and Richardson estimate, to arrive at a total of approximately 2,500 essential patents. The number is now reduced by the number of patents held by then-unaffiliated licensors who have since joined the HEVC Advance pool, resulting in an estimated total of less than 900 HEVC essential patents held by patent owners not affiliated with any patent pool or joint licensing program.

Based on these analyses, plus the fact that—unlike the Access Advance and MPEG LA portfolios— the portfolios of the Velos Media licensors and the unaffiliated patent owners were not subject to independent essentiality verification, plus the uncertainty of the extent to which unaffiliated licensors would seek royalties, it was reasonable to estimate that Velos Media together with unaffiliated patentees controlled approximately 4,100 HEVC essential patents as of October 2021. Thus, for purposes of a “top down” royalty analysis, we estimate the total number of HEVC essential patents to be approximately 22,822 (16,000 + 2,722 + 4,100) as of October 2021.

Based on these estimates, the HEVC Advance portfolio of approximately 16,000 patents constitutes approximately 70% of the now estimated more than 22,822 HEVC essential patents that may seek a share of the total HEVC royalty stack. For a top-down analysis of the HEVC Advance rates, we thus use the 70% estimate calculated above. We note, however, that this percentage likely will be shown to be a conservative estimate for two principal reasons. *First*, as noted at pages \_\_\_ to \_\_\_ *infra*, a purely

numerical analysis considerably undervalues the value contribution of the particular patents in the HEVC Advance portfolio patents to HEVC. *Second*, we believe our percentage of all licensed essential patents will continue to increase based on the increasing number of Licensors joining the HEVC Advance program and the continuing growth of the patent portfolios of both our existing and our future Licensors'. The 70% figure is thus both conservative and reasonable<sup>96 97</sup>.

#### *Royalty Allocation for Licensed Portfolio*

For the royalty stack analysis, and to be conservative, we applied our 70% estimate of HEVC Advance's share of the HEVC royalty stack, to our royalty rates for each of the device categories we license under our PPL.

- For both the “**Mobile Devices**” and the “**4K UHD+ TVs**” categories, we used the 2.5% first Quartile royalty rate reported in the 2017 IPSCIO Report for the electrical and electronics industry<sup>98</sup> (rather than using the higher median rate of 4%, or the even higher LTE rates set by courts). Applying the 70% factor for the

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<sup>96</sup> The November 2018 version of this paper applied a 34.5% factor, based on the then-existing estimated share of the stack of HEVC essential patents available through the HEVC Advance pool, and the April 2020 version of this paper used a 65% factor based on the then-existing estimate.

<sup>97</sup> It should be noted that licensees receive a license for all of their past and future licensable sales from all licensors that are in the pool, not only those licensors that are in the pool when the licensee joins the pool, but also all licensors that join later. So, an analysis of the value of a patent pool needs to take into account the estimated percentage of the royalty stack the pool will have as of the last day of the pool, not the first day or any day in between.

<sup>98</sup> The 1st Quartile rate “can be thought of as the median of the lower half of the data.” 2017 IPSCIO Report, at 2, *supra* note 64.

Access Advance pool's share of all HEVC SEPs results in a comparable **royalty rate of 1.75%** of sales price (= 70% x 2.5%).<sup>99, 100</sup>

- The Access Advance HEVC rate for the “**Mobile Devices**” category, when translated into a percentage, is **0.18%** of the average selling price, compared to the **1.75%** that would represent a low royalty for the electrical and electronics industry.
- The Access Advance HEVC rate for devices in the “**4K UHD+ TVs**” category, when translated into a percentage, is **0.27%** of the average selling price, compared to the **1.75%** that would represent a low royalty for the electrical and electronics industry.
- For the “**Connected Homes and Other**” device category of products that derive most or all of their value from the inclusion of HEVC, we used the higher 5% LES survey rate for consumer electronics products.<sup>101</sup> Applying the 70% factor for the Access Advance pool's share of all HEVC SEPs results in a **royalty rate**

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<sup>99</sup> The use of the first Quartile 2.5% rate (rather than the median or average rate) was intended to represent a conservative estimate of the value of HEVC technology to these categories of licensed devices.

<sup>100</sup> In the November 2018 version of this paper, the percentage royalty was 0.86% of sales price (34.5% of stack x 2.5%). The April 2020 version of this paper reported that the HEVC Advance pool licensed approximately 65% of all HEVC essential patents, so the percentage royalty rate was then in April 2020 1.625% rather than 0.86%.

<sup>101</sup> For connected home and other devices, the higher industry-wide accepted rate of 5% also was conservative under a proportional analysis of the value of the technology to the device.

of 3.5% of sales price (=70% x 5%).<sup>102</sup> The Access Advance HEVC rate for the “Connected Homes and Other” category, when translated into a percentage, is between 0.30% and 1.33% of the average selling price, compared to the 1.75% that would represent a low royalty according to the LES survey rate for consumer electronics products.

### *Conclusion*

This analysis indisputably confirms that the HEVC Advance rates are fair and reasonable. For example, the “top down” approach using a 70% stack rate suggests a fair rate for the PPL for a licensed mobile device would be 1.75% of an average sales price of \$300 or \$5.25 while the highest rate for mobile devices in the PPL is \$0.533, or \$4.987 less than the “royalty stack” rate.<sup>103</sup>

As for all licensed products, the table below compares a hypothetical “top down” FRAND royalty of 0.86% (based on the 34.5% stack share when this paper was first issued in November 2018) and 1.75% (based on the current 70% stack share)<sup>104</sup> of licensed device sales price of mobile devices and 4K UHD+ TVs (*see page 15, supra*)

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<sup>102</sup> In the November 2018 version of this paper, the percentage royalty was 1.73% of sales price (34.5% of stack x 5%). The April 2020 version of this paper reported that Access Advance licensed approximately 65% of all HEVC essential patents, so the percentage royalty rate was then in April 2020 3.25% rather than 1.73%.

<sup>103</sup> As noted throughout this paper, Access Advance did not seek to capture the full value of the portfolio it licenses for multiple reasons.

<sup>104</sup> *Supra* note \_\_.

and demonstrates that the HEVC Advance actual royalty for these products is substantially lower than the hypothetical HEVC Advance rates supported by the “top down” analysis for these products. Similarly, the table also compares the 1.73% (based on a 34.5% stack share) and 3.5% (based on a 70% stack share)<sup>105</sup> “top down” FRAND royalty for connected home and other devices to the actual HEVC Advance rates, and similarly demonstrates a lower rate than the hypothetical HEVC Advance highest rate for this category of licensed product as well.

<b>Product</b>	<b>Nominal Price<sup>106</sup></b>	<b>Total Hypothetical HEVC Advance Royalty for PPL Portfolio in Top Down Percentage Rate Analysis using 34.5% Stack Share</b>	<b>Total Hypothetical HEVC Advance Royalty for PPL Portfolio in Top Down Percentage Rate Analysis using 70% Stack Share</b>	<b>Actual HEVC Advance Highest Royalty</b>
4K UHD+ TV	\$600	\$5.16	\$10.50	\$1.60
Mobile Devices	\$300	\$2.58	\$5.25	\$0.533
Connected Home and Other Devices	\$80/\$350	\$1.38/\$6.05	\$2.80/\$12.25	\$1.067

The “top down” analysis set out above confirms that the HEVC Advance rates are fair and reasonable royalties for the licensing of the HEVC Advance portfolio of essential patents.<sup>107</sup> As discussed above, in light of Access Advance’s increasing share of

<sup>105</sup> *Supra* note \_\_.

<sup>106</sup> *Supra* notes \_\_, \_\_, \_\_.

<sup>107</sup> This purely mathematical approach is based on the conservative assumption that Access Advance’s share of the total value of HEVC is accurately portrayed by simply comparing the number of patents in the HEVC PPL (each of which has been determined to be essential based on close analysis by an independent patent expert) with the number of total HEVC SEP’s (based entirely on self-declarations of essentiality by patent holders); that approach greatly understates the value of the HEVC Advance portfolio for the reasons stated at pages 54-58, *infra*.

licensable HEVC-essential patents, the fairness and reasonableness of its rate has only become more apparent.

### The Qualitative Value of the Licensed Portfolio to HEVC.

Although the HEVC portfolio licensed in the PPL include more patents than the number of patents identified on the list of licensed patents (because Licensors license all of their essential patents in the PPL regardless of whether such patents are specifically identified), our analysis of the value of the licensed portfolio to HEVC focuses only on the identified patent list. Several factors confirm that the value of the licensed portfolio to HEVC is significantly greater than would be determined from assuming that all HEVC essential patents are of equal value, for at least three reasons. *First*, the inventions reflected in the PPL-licensed patents are critical to the newer HEVC innovations and the benefits these innovations provide. *Second*, the HEVC Advance licensors include some of the most innovative companies in the world which contribute to advances in compression technology. *Third*, the licensed portfolio has broad geographical reach and the great bulk of the portfolio extends for many years, giving implementers certainty of the availability of a license for essential IP for an extended period (through the expiration of the last HEVC SEP if desired) as implementers make determinations of what technology to include in their devices.

### *Innovations Available in the Licensed Portfolio*

HEVC is comprised of numerous tools, some of which provide greater contribution to HEVC improvements in compression efficiency and processing than the contributions of other tools. Among the key advances that led to the increased efficiency

of HEVC are (i) improvements to and simplification of CABAC lossless entropy coding; (ii) improvements in flexible block processing including larger block sizes and enhancements necessary for extensive use of parallel processing; and (iii) improvements in loop filtering, as well as improved multiview, and scalable video coding.

The HEVC Advance patent portfolio is strong in all these and other key areas of HEVC. For example, our analysis has confirmed that the HEVC Advance portfolio as of November 2018 included at least thirteen patent families related to entropy coding (and CABAC), at least six families related to data structure/tiles, slices, and predictive unit decomposition related to parallel processing, at least nine families related to loop filter improvement, three related to multiview, six to scalable video coding, and many others related to crucial HEVC goals. Based on our studies, we believe the HEVC Advance portfolio has made more contributions to key technologies than other independently evaluated portfolios and, in any event, there can be no dispute: the HEVC Advance portfolio includes inventions which make major contributions to those tools in HEVC that are critical to the value of HEVC as compared to other video compression technologies.

Thus, based on our review of the HEVC standard, the identified HEVC Advance portfolio, and studies of the universe of patents declared to be essential to HEVC, the HEVC Advance portfolio contributes a higher value to HEVC than if one simply compares the number of patents in the HEVC Advance portfolio to the total number of all essential patents. This factor alone—of a high-quality portfolio of patents that are critical to significant improvements in HEVC—would allow for an increase in

the fair and reasonable royalty rate over a rate based only on Access Advance's proportional share of the number of declared HEVC essential patents.<sup>108</sup>

*Access Advance's HEVC Licensors*

To further evaluate the appropriate share of total HEVC royalties attributable to the HEVC Advance portfolio, one must also consider the identity of Access Advance's HEVC Licensors and their reputation as leaders in the field of video compression. The HEVC Advance Licensors are well-known innovators in many fields, including video compression, with track records going back to the dawn of digital compression. The Licensors include some of the most innovative companies in the world.<sup>109</sup>

- Arris (an Affiliate of CommScope)
- Canon
- Dolby
- ETRI
- Fraunhofer-Gesellschaft
- Huawei Technologies Co., Ltd.
- GE Video Compression, LLC (an Affiliate of General Electric Company)

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<sup>108</sup> This conclusion is reinforced by the fact that the listed patents in the HEVC Advance portfolio have been independently evaluated and the patents confirmed to be essential to HEVC. This distinguishes the patents in the HEVC Advance portfolio from many other patents which simply have been “declared” to be essential by the patent owner.

<sup>109</sup> The most up-to-date list of licensors can be found on the Access Advance website at [https://www. https://accessadvance.com/hevc-advance-patent-pool-licensors/](https://www.accessadvance.com/hevc-advance-patent-pool-licensors/).

- Google
- HFI Innovation (an Affiliate of MediaTek, Inc.)
- JVC Kenwood
- Koninklijke Philips N.V.
- LG Electronics
- Mitsubishi Electric Corporation
- NTT Docomo
- Panasonic Corporation
- Samsung Electronics Co., Ltd.
- Toshiba Corporation

The identity of our Licensors confirms the high quality of their licensed inventions.

Moreover, to the extent a license from a licensor who is willing to enforce its patents against infringers is more valuable than one from a licensor who will not, the PPL provides additional value in light of the determination of our licensors to prevent chronic infringement of their valuable intellectual property through hold-out or any other improper means.

#### *Geographic and Temporal Scope of Portfolio*

Other factors that contribute to the enhanced value of the HEVC Advance patent portfolio include its long-life and its considerable geographic breadth. There is considerable value to licensees in obtaining in a single transaction license rights to all or most of the jurisdictions in which they operate, and in receiving a guarantee of the

availability of a license for a considerable period (further ensured by licensees' renewal rights in the PPL).

As of October 2021, HEVC Advance licenses patents in 75 jurisdictions. Approximately 90% of licensed patents will not expire until after 2025, and approximately 70% of all patents will not expire until after 2030.<sup>110</sup> In addition, a large percentage of the portfolio comes from jurisdictions more commonly recognized for honoring and enforcing intellectual property rights, such as China, Germany, the United States, and the United Kingdom. This high percentage of patents with significant life in key jurisdictions adds additional value to the HEVC Advance portfolio and further supports other analyses confirming that the HEVC Advance highest rates are fair and reasonable.

### *Conclusion*

While a purely numerical count of the patents licensed by Access Advance confirms that the HEVC Advance rates are fair and reasonable, a review of the quality of the licensed portfolio and how it relates to the key technologies of HEVC demonstrates that a pure numerical count alone does not fully reflect the actual value of the PPL. Thus, rates higher than those based solely on numerical computation would be justified as fair and reasonable for the HEVC Advance licensed portfolio.

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<sup>110</sup> As of November 2018 the number of jurisdictions was 70 with approximately 90% of licensed patents not expiring until after 2025. By April 2020, the number of jurisdictions had increased to 71, while the percentage of 90% remained unchanged.

### Market Input.

Even before Access Advance began accepting requests for licenses in January 2016, Access Advance regularly sought input from both implementers and patent holders on an appropriate, reasonable and fair rate that would meet the goals of the program, particularly rates that would address the goals of attracting as many licensors as reasonable, encouraging as many world-wide consensual licenses as possible, and enabling the widespread adoption of HEVC technology. On the one hand, Access Advance recognized that its licensors at the time rejected the rates of MPEG LA's HEVC program as not balancing the interests of implementers and patent holders. On the other hand, in connection with the analysis of appropriate rates to meet the program's goals, Access Advance recognized that adopting rates at the higher end of the range a FRAND analysis would support would not optimize achievement of all the program's goals. Therefore, Access Advance sought input from the market on what would be fair and reasonable rates and took that feedback into account in setting its licensing rates.

Access Advance issued its first royalty table in July 2015 before the PPL was made available, and solicited market feedback at the outset. Much of this feedback was positive. Market participants generally supported Access Advance's categorization of licensed products and generally recognized the fairness of a royalty structure that charged a base rate for the base profiles (Main and Main 10) (plus the since-eliminated smaller incremental royalties for additional HEVC profiles to licensees who elected to employ these additional features). Market participants generally agreed that rates that reflect certain geographic market differences in areas designated by the PPL as Region 1 and Region 2 also was a fair and reasonable structure.

Access Advance has also received constructive feedback that caused modifications to the rates originally proposed in July of 2015. Taking this feedback into account—and considering Access Advance’s goal to set rates that incentivize licensors to participate and to continue to innovate and that also attract implementers to execute licenses in a consensual business transaction—Access Advance chose to set rates that capture less than the full value that the licensed portfolio would be entitled to as measured by, *e.g.*, the value of HEVC to licensed devices, the value of the HEVC Advance licensed portfolio to HEVC, and a “top down” approach. Rather, Access Advance set rates to advance the other goals described above as well. Those rates are well within the range of fair and reasonable rates, neither at the top of the range nor at the bottom, consistent with the goal of balancing the interests of patent holders and implementers. In addition, and in response to ongoing consultations with the market, Access Advance has made changes to its program (including lower rates and royalty caps), fine-tuned it to achieve its ultimate goals, and ensure its final rates were fair and reasonable. Furthermore, the recent decision by Access Advance’s HEVC Licensors to offer licenses to all profiles and extensions in Versions 1-7 and to consolidate the royalty rates for Version 2-7 profiles/extensions into the Main/Main10 profile rate (*i.e.*, to eliminate any additional charges for profiles in Versions 2-7) has resulted in both expanded license coverage and a simplified rate structure, further underscoring the value of the HEVC Advance pool representing 70% of all essential patents.

### ***Summary***

In light of all the factors identified in this paper, the current rates offered by the HEVC Advance patent pool are undeniably fair and reasonable rates as determined

by multiple well-recognized frameworks. Moreover, Access Advance has seen that these rates have continued to meet Access Advance's strategic goals: to attract additional licensors, to encourage consensual execution of HEVC Advance licenses by implementers, and to further fuel the rapid adoption of HEVC.

 HEVC Advance<sup>®</sup>