

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Expanding Consumers' Video Navigation Choices	)	MB Docket No. 16-42
	)	
Commercial Availability of Navigation Devices	)	CS Docket No. 97-80

**RESPONSE TO QUESTIONS ABOUT OPEN STANDARDS  
HTML5 APPS-BASED APPROACH**

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July 21, 2016

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On June 15, 2016, representatives from diverse independent programmers and MVPDs introduced and summarized an alternative approach to the NPRM based on an industry-wide commitment for all large MVPDs to develop and deploy video “apps” on TVs and other customer-owned navigation devices, as an addition to current MVPD support for apps on native platforms, such as Android, Android TV, Chromecast, iOS, and Roku. Proponents of this HTML5 apps-based approach have discussed the proposal and how it works with the Chairman’s and Commissioners’ offices, Office of General Counsel, Media Bureau, and Chief Technologist in at least half a dozen meetings since introducing the proposal, and responded to the questions that have been asked about the approach. Extensive detail on the underlying technology and standards of W3C’s HTML5, Media Source Extensions, Encrypted Media Extensions, and Web Cryptography API is also contained in the DSTAC Report and in the W3C standards referenced and explained in that Report. For ease of access to this previously-submitted information and to

provide further information,<sup>1</sup> we hereby submit this filing on technical and other aspects of the HTML5 apps-based approach.

## **I. W3C HTML5 STANDARDS**

### **A. About W3C**

The World Wide Web Consortium (W3C) is an international open standards body that defines the standards used to implement the Web today.<sup>2</sup> Many MVPDs, online video distributors (OVDs), consumer electronics manufacturers, security providers, content providers, consumer advocacy and privacy groups and other participants in the Internet, MVPD, television and creative communities are members of the W3C, including Adobe, Akamai, Apple, AT&T, BBC, Bloomberg, CableLabs, Cisco, Comcast, Dell, Deutsche Telekom AG, Dolby, Electronic Frontier Foundation, European Broadcasting Union, Facebook, Google, Hitachi, Huawei, IBM, Intel, LG, Microsoft, Mitsubishi, MovieLabs, Mozilla, Motion Picture Association of America, NAB, National Institute of Standards and Technology, Nielsen, Netflix, Opera, Panasonic, Recording Industry Association of America, Samsung, Sony, Toshiba, Twitter, Verimatrix, Verizon Wireless, Viacom, Walt Disney Company, and Yahoo, among many others.<sup>3</sup>

The W3C's Web and TV Interest Group provides a forum for Web and TV technical discussions to identify use cases and requirements for supporting television and other media services on the Open Web Platform.<sup>4</sup>

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<sup>1</sup> See Appendix F, Index of July 15, 2016 Questions and Answers.

<sup>2</sup> A description of W3C is available at <http://www.w3.org/>.

<sup>3</sup> Current membership is available at <https://www.w3.org/Consortium/Member/List>. The W3C also maintains liaisons with many television-related organizations, including Advanced Television Systems Committee (ATSC), Consumer Technology Association (CTA), Digital Living Network Alliance (DLNA), European Commission, Institute of Electrical and Electronics Engineers (IEEE), International Standards Organization (ISO), The Internet Engineering Task Force (IETF), International Telecommunication Union (ITU), Society of Motion Picture & Television Engineers (SMPTE), and the Federal Communications Commission (FCC) itself.

<sup>4</sup> See [https://www.w3.org/wiki/Open\\_Web\\_Platform](https://www.w3.org/wiki/Open_Web_Platform). A description of Web and TV Interest Group is available at <http://www.w3.org/2011/webtv/>.

## **B. Applicable Standards**

HTML5 represents the latest version of the W3C standards.<sup>5</sup> The HTML5 Media elements, Media Source Extensions (MSE) and Encrypted Media Extensions (EME) are the W3C specifications for processing multi-media, including protected audio/video content.

HTML5 Media elements are used to present video and/or audio data to the user. HTML5 media resources can have multiple audio, video and data tracks. HTML5 includes standard definitions for special media tracks, including alternative media, captions, descriptive audio, sign language, subtitles, translation and commentary.

The following W3C Standards are relevant to enabling competitive availability of devices that receive MVPD services:

- HTML5, A vocabulary and associated APIs for HTML and XHTML<sup>6</sup>
- Media Source Extensions<sup>7</sup>
- Encrypted Media Extensions<sup>8</sup> (which normatively references ISO Common Encryption)
- Web Cryptography API<sup>9</sup>

For completeness of the record, most of the text of HTML5 and all of the text of the MSE, EME, and WebCrypto extensions are attached as Appendices to this submission.

## **C. HTML5 Is an App Foundation for the Secure Delivery of Commercial Video Services**

HTML5 is a full application foundation, providing a common open-standard approach for the secure delivery of commercial video services based on the Internet and the HTTP protocol.

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<sup>5</sup> HTML is under continuous evolution. HTML 5.1 is currently in development, but W3C maintains backwards compatibility. The W3C Specifications are publicly available at: <http://www.w3.org/TR/>.

<sup>6</sup> The standard is publicly available at <http://www.w3.org/TR/html5/>.

<sup>7</sup> The standard is publicly available at <http://www.w3.org/TR/media-source/>.

<sup>8</sup> The standard is publicly available at <http://www.w3.org/TR/encrypted-media/>.

<sup>9</sup> The standard is publicly available at <http://www.w3.org/TR/WebCryptoAPI/>.

MSE extends HTML5 to support adaptive bit-rate video. EME extends HTML5 to support common-encrypted media decryption by one or more digital rights management (“DRM”) technologies. MSE and EME are designed to work closely together.

HTML5 plus MSE and EME provide a foundation on which commercial video apps may operate in a predictable trusted application execution environment on a wide variety of platforms using diverse security and hardware. This is described in detail in the DSTAC Report and illustrated in Figure 1.<sup>10</sup>

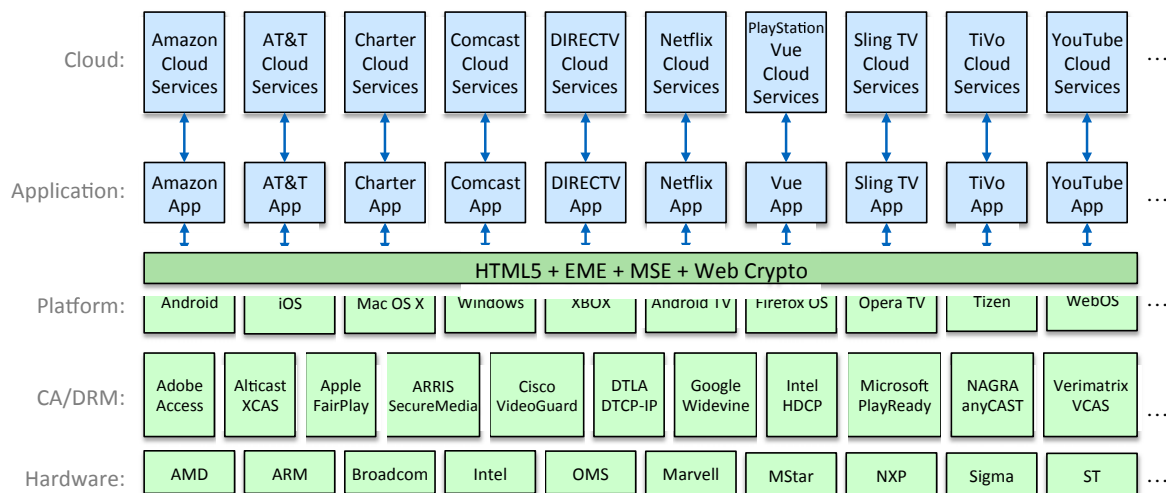


Figure 1: HTML5, EME, MSE & WebCrypto

The MVPD/OVD media is accessed over the well-understood HTTP(S) model. The CE/CPE HTML5, EME, MSE and WebCrypto APIs operate under the well-understood HTML runtime.

HTML5, EME, MSE and WebCrypto are being deployed across the Web today by multiple vendors on hundreds of millions of devices, including mobile, PCs, TVs, set-tops and game machines. HTML5 is supported by all major browsers (both on PCs and embedded

<sup>10</sup> Downloadable Security Technology Advisory Committee (DSTAC) Final Report at 81-91 (Aug. 28, 2015), <https://transition.fcc.gov/dstac/dstac-report-final-08282015.pdf> (Working Group 3 Report at 23-33); DSTAC Final Report at 230-234, 270-273, 301-308 (DSTAC WG4 at 95-99, 135-138, 166-173). For completeness of the record, this DSTAC Report text is also attached as Appendices to this submission.

devices) including Apple Safari, Google Chrome, Microsoft Edge, Mozilla Firefox and Opera. All major web browsers are implementing Media elements, MSE and EME to support video content.

TV standards groups in the U.S. and worldwide have adopted HTML5 standards as part of new television standards. These standards groups include W3C (worldwide); ATSC 3.0 and DLNA VidiPath (U.S.); HbbTV (Hybrid Broadcast Broadband TV) 2.0 (Europe); MSIP Smart TV 2.0 (Korea); and IPTV Forum Japan Hybridcast (Japan).

Smart TV platforms that support HTML5 as a platform for TV applications include: Android TV (Sharp, Sony), Tizen (Samsung), Firefox OS (Panasonic), and webOS (LG). Numerous smart TVs, as well as TiVo, also provide users with access to the Opera TV app store, which supports HTML5.

HTML5 is portable across content protection systems, device hardware and CPU architectures (including AMD, ARM, Broadcom, Intel, OMS, Marvell, MStar, NXP, Sigma and ST).

These specifications are currently being adopted by a wide range of video distributors, including both OTT and traditional MVPDs. HTML5, EME and MSE are already being used for multiplatform commercial services such as Netflix, YouTube movies, Google Play, and Apple movies. Comcast is developing an HTML5 application for its Xfinity TV Partner program.<sup>11</sup> HTML EME can also be used in devices that do not have browsers.

Further endorsement of this approach was evident at the 2016 Consumer Electronics Show. The Consumer Technology Association (formerly CEA), device manufacturers,

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<sup>11</sup> See Xfinity, *The Xfinity TV Partner Program: Bringing the Xfinity Experience to More Consumer Devices and TV Screens*, <https://developer.xfinity.com/cableapp> (last visited July 19, 2016); Mark Hess, *Comcast Seeks TV and Other Consumer Electronics Partners to Bring XFINITY TV Cable Service to More Retail Devices*, COMCAST VOICES BLOG (Apr. 20, 2016), <http://corporate.comcast.com/comcast-voices/comcast-seeks-partners-to-bring-xfinity-tvcable-service-to-more-retail-devices>.

distributors, content providers and security companies from across the worldwide video ecosystem launched the Web Application Video Ecosystem (WAVE). WAVE is using HTML5 with streaming media standards to assure “a playback environment that is consistent, reliable, and high performance, on TVs, phones, tablets, media players, gaming systems, laptops.”<sup>12</sup> Participants include equipment manufacturers LG, Samsung, Sony, Roku, Sharp, TiVo, and Vizio. The steering committee includes Adobe, Akamai, Comcast, LG, Microsoft, MLB Advanced Media, Samsung, Sky-UK, Sony, Starz, and WWE.<sup>13</sup>

EME extends HTML5 to support common-encrypted media decryption by one or more DRMs. Almost all content protection companies surveyed and discussed in DSTAC WG3 now support or plan to support EME, including Adobe Access, Alticast XCAS, Apple FairPlay, ARRIS SecureMedia, Broadcom, Cisco VideoGuard, Google Widevine, Intel SGX, Microsoft PlayReady, NAGRA anyCAST and Verimatrix VCAS. The diagram below shows how EME enables common encryption, which means sending a single commonly-encrypted video file to multiple devices supporting different DRMs, each of which can independently decrypt and display the commonly-encrypted video.

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<sup>12</sup> Troy Dreir, *CES '16: The GIVE Project Aims to Push HTML5 Video Forward*, STREAMING MEDIA (Jan. 7, 2016), <http://www.streamingmedia.com/Articles/Editorial/Featured-Articles/CES-16-The-GIVE-Project-Aims-to-Push-HTML5-Video-Forward-108444.aspx>. WAVE was formerly known as the Global Internet Video Ecosystem or GIVE.

<sup>13</sup> Additional information on WAVE is available at <https://standards.cta.tech/kwspub/wave/>.



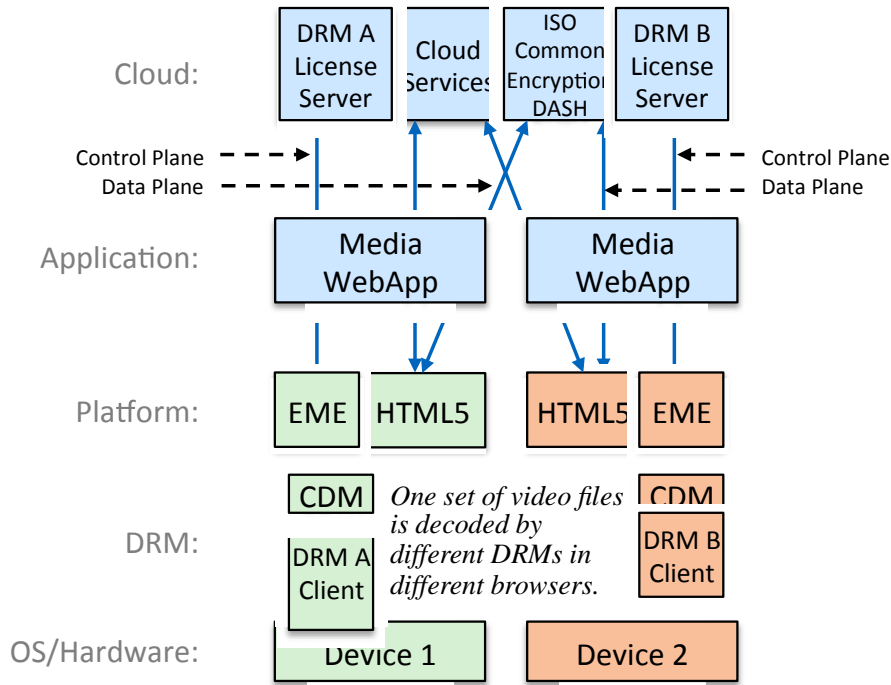


Figure 2: HTML5 EME Common Encryption

A browser may implement any number of DRM-specific content decryption modules (CDM) that handle license processing and content decryption. EME is the W3C specification that defines the APIs necessary to control the playback of protected content. As explained in the EME specification, the common API supports a simple set of content encryption capabilities, leaving application functions such as authentication and authorization to the video app developer. This is achieved by requiring content protection system-specific messaging to be mediated by the video app rather than assuming out-of-band communication between the encryption system and a license or other server.<sup>14</sup> EME does not specify any particular content encryption or any set of DRMs, nor does it define how a CDM is implemented in the browser. Thus, DRM competition is maintained and no single point of attack is created.

Common Encryption (which enables key-sharing or simulcrypt) allows multiple security systems of potentially diverse and divergent design to simultaneously operate on the same

<sup>14</sup> DSTAC Final Report at 88 (DSTAC WG3 at 30).

encrypted media stream or file. This property acts as a safety net for DRM choice and for countering attempts at DRM vendor lock-in. The technique is widely deployed in numerous systems today including several major U.S. MVPDs and almost all MVPDs outside of North America. It is also widely used in OTT and Internet delivery systems and called out in the related standards.

EME supports DRM integration to a hardware root of trust, as illustrated by “DRM A” in Figure 2. DRM providers typically provide porting kits to chip manufacturers, but it is the device manufacturer's choice to integrate to a hardware root of trust. Some media may have generic hardware requirements. For example, UHD (4K) content may require a hardware root of trust. HTML5 EME does not impose specific hardware requirements, such as a particular CPU architecture, a particular hardware root of trust or a particular chip or chip component.<sup>15</sup>

All of the major browsers have implemented EME, including Google/Widevine, Apple/Fairplay, Microsoft/Playready, and Adobe/Access.

#### **D. The HTML5 App Proposal**

The HTML5 apps-based proposal provides that each MVPD with 1 million or more subscribers would develop an app for delivering its MVPD service to TVs and many other customer-owned TV-connected devices based on W3C’s HTML5 Open Web Platform standards (or more advanced successor standards).<sup>16</sup> The app would include all the linear and all on-

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<sup>15</sup> Amazon recently claimed that HTML5 apps do not address security. *See* Letter from Gerard J. Waldron, Counsel to Amazon.com Inc., to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 15, 2016). As this review demonstrates, the DSTAC Report itself includes extensive discussion of exactly how HTML5 EME and MSE secures MVPD services, including support for hardware roots of trust. DSTAC Final Report at 81-91 (WG3 at 23-33), DSTAC Final Report at 230-234, 270-273, 301-308 (DSTAC WG4 at 95-99, 135-138, 166-173).

<sup>16</sup> This required HTML5 app is in addition to, not in replacement of, existing MVPD apps that already run on native platforms, such as Android, Android TV, Chromecast, iOS, Roku, and tvOS, and that have been downloaded and enjoyed by many millions of consumers. *See also* Section III *infra* for further discussion of these other apps solutions.

demand programming the MVPD has the rights to distribute through their MVPD service, as well as the MVPD's user interface included in the service. Consumers would access the app through the third-party device's own top-line or "umbrella" user interface.

The goal is to provide an MVPD's customer with a consistent video experience whether the customer is viewing the content on the MVPD's set-top box or the MVPD's app. As with all other offerings by MVPDs, the MVPD's scope of rights for programmer content included in the MVPD app is determined by its individual agreements with programmers and existing law.<sup>17</sup> Unlike the "information stream" proposal in the NPRM, the HTML5 apps-based proposal provides the technical tools (reinforced by an MVPD's license agreement with the device manufacturer) to protect and respect those rights and limitations. As is evident in the ever-expanding scope of apps-based offerings, MVPDs are motivated to provide the full suite of their linear and on-demand video programming, and are working as needed with their content providers to assure that their HTML5 apps will include that full suite. The HTML5 app is intended to be a set-top box substitute – designed to provide consumers a choice to access their Title VI cable service (or MVPD service by satellite or IPTV operators) without having to lease a set-top box from their provider. MVPDs have no interest in restricting the availability of the programming they include in their video services when offered via the app.

Because the HTML5 apps-based proposal supports interactive services from diverse networks, the app may also include interactive elements of modern MVPD service, which

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<sup>17</sup> MVPD services comprise many works protected by copyright and other intellectual property laws. Copyright protection is designed to incentivize the creation of new works by ensuring that creators reap the economic fruits of their labor. Copyright owners do so by licensing and/or assigning their rights in their works. Programmers have provided MVPDs with carefully delineated rights to distribute and use their content under copyright licenses and distribution agreements. These valuable deals are made possible by the copyright owner's ability to impose limitations on the rights granted to licensees and by the MVPD's ability to enforce those limitations by technical means, including by apps in set-top boxes, TVs, and other devices, and by the MVPDs' agreements with device manufacturers. Use of the app would not compel MVPDs to distribute and use content beyond their contractual obligations with Programmers.

MVPDs can include to differentiate themselves in a competitive marketplace, and which the “information stream” proposal in the NPRM fails to support. These elements might include, for example, sports scores, weather, watch list, reminders, channel history, and for interactive cable networks functions like on-screen service upgrades by consumers, request for information, interactive extras in VOD, startover, and electronic sell-through of VOD titles. In the first adoption of HTML5 apps, Comcast is including cloud recording in the HTML5 app in the Xfinity TV Partner program.<sup>18</sup> The precise features comprising MVPD service will vary by MVPD and evolve over time. Use of the app model accommodates rapid updates in service features by each MVPD.

Some video service features depend on available device resources and capabilities. For example, one MVPD has designed voice controls for its guide to operate through specialized protocols from a specialized remote control provided by that MVPD. As another example, an MVPD service that supported mosaic or other simultaneous displays of multiple video streams requires sufficient resources in the set-top box to decode multiple video streams simultaneously. As a third example, if a retail manufacturer does not include a hardware root of trust that certain content providers require for UHD, then there might be a difference in the resolution available to that device. Unless specific resource requirements were imposed on all retail manufacturers, one cannot assume that all service features will be supported on all devices.

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<sup>18</sup> MVPDs are currently investigating potential for local recording onto retail hard drives at the customer premises. Content providers and MVPDs have raised serious and legitimate concerns about recording of content that is decoupled from an MVPD’s app because NPRM and “information flows” proponents continue to insist that they are not and may not be bound by the agreed-upon terms for presentation and use of content contained in programmer-MVPD programming and licensing agreements. Letter from Consumer Video Choice Coalition to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 1, 2016) at 4 (“CVCC July 1, 2016 *Ex Parte*”); Letter from Consumer Video Choice Coalition to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 7, 2016) at 3-4 (“CVCC July 7, 2016 *Ex Parte*”).

## **E. Rendering Service Using the HTML5 App**

Apps provide service providers with end-to-end control over the presentation of their service on the apps hosting device. The MVPD, like any other app developer, designs the app to deliver the service in a way that honors and respects the myriad content license agreements upon which distributors build their offerings. These agreements vary by programmer and address complex and dynamic issues such as license obligations, breach resolution, warranty, indemnification, intellectual property rights, audit trails, financial responsibility and data protection – protections without which MVPDs could not gain access to content. There is no means to standardize those terms (given the uniqueness of each agreement, their diversity and their continuous evolution), but neither is there a need for retail devices to receive the details of their myriad terms. Video control, protected content playback, subscriber authentication and all other service logic resides in the app. The MVPD's app allows it to present its service consistent with those licenses in the trusted application execution environment *within* the app that runs on the smart TV or TV-connected device.

The HTML5 apps-based proposal relies upon this modern world-wide app-based technology as the key technical means to protect content and enforce program licensing terms and the full array of measures that secure and protect the copyrights, agreements, advertising, presentation and promotional terms that are essential for the creation and distribution of programming, thereby ensuring that consumers can continue to benefit from a video programming ecosystem that produces unprecedented levels of high-quality programming. In the same way, the MVPD utilizes the app to meet all requirements for privacy, children's programming, accessibility, must carry channel location, and other consumer protections that come with their MVPD subscriptions. The MVPD also uses the app to properly operate its interactive features, video-on-demand, user authentication, security and cybersecurity best

practice – among other features that would not be supported under the “information stream” proposal of the NPRM.

The HTML5 apps-based proposal also preserves and promotes an environment for innovation by all participants. Competition among MVPDs has led to the use of a wide variety of technologies and network architectures for delivery of Pay TV service which change constantly, and the pace of technological change within the video industry has only accelerated. Each network has fundamental differences in network architectures and technologies, metadata and entitlements that reflect retail offerings to consumers, and many more variations explored in depth in the record – and those elements are constantly changing.<sup>19</sup> Apps written by MVPDs are designed as an integral part of the end-to-end system from the unique technical elements of its network through service delivery on the device. As each MVPD makes changes, the MVPD can update its app, knowing precisely what has changed in its unique network and services, and the feature set becomes available through the app on retail devices.<sup>20</sup> Apps abstract the diversity and complexity of service providers’ networks and services for delivery to the diverse array of customer-owned devices, thereby allowing MVPDs to utilize and rapidly change their network capabilities, infrastructure and services, and also allowing device manufacturers to rapidly innovate their devices and device platforms.<sup>21</sup> Under the HTML5 apps-based approach,

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<sup>19</sup> Sidney Skjei, A Technical Analysis of the FCC’s Navigation Device Proposal at 24-36, attached to NCTA Comments as Appendix B (“Technical White Paper”).

<sup>20</sup> This approach is common across the apps world. “Uber has unique network resources that keep track of Uber drivers, enable users and drivers to coordinate on transport requests, and arrange for payment. Drawing on its unique network and resources, it uses an app to create end-to-end interactions between the Uber drivers, Uber customers, and Uber billing. They expose these resources through their app in a compelling and competitive manner. Lyft, meanwhile, has a rival set of resources that it integrates using its own app. Both apps run in a trusted application execution environment on the various apps platforms that they support. Neither operates by broadcasting one-way driver location information.” Technical White Paper at 28.

<sup>21</sup> By contrast, by inserting fixed interfaces for streaming video, service discovery, or entitlements into the network, the “information stream” proposal of the NPRM compromises the ability of MVPD networks and MVPD services to innovate. *See* Rebuttal Comments of NCTA at 22-24 (“NCTA Rebuttal”) and citations therein.

consumers would continue to receive the benefits of continuous innovation and variety in retail devices *and* in MVPD networks and service because this apps-based approach would allow rapid updates by third-party device manufacturers and by MVPDs without the need for either to seek permission from the other.

#### **F. Delivery Via the HTML5 App**

The MVPD app would be delivered using technologies that match its purpose as a software replacement for the set-top box for use in the customer's premises for delivery of a Title VI cable service (or MVPD service by satellite or IPTV operators). The cable HTML5 app would be offered over managed IP channels, not over the Internet. Consumers who want to watch their subscription MVPD service on different devices in the home could download the MVPD app (e.g., from the appropriate app store associated with the retail device) to the smart TV or other TV-connected device at the customer premises and start viewing without an MVPD-provided set-top box.

The HTML5 apps-based approach does not require a new cable gateway device. The NPRM seeks a solution that would enable a retail device to receive MVPD services and OVD services on the same retail device. The customer would use the same leased or customer-owned DOCSIS modem to receive the managed IP Title VI cable channels via the cable HTML5 app as is used to receive Internet-based content through apps from Netflix, Amazon, Hulu or others.<sup>22</sup> Because of satellite's one-way architecture, satellite subscribers would need one satellite-provided device to bring the satellite signal to the home and provide features competitive with two-way services, but satellite providers would also offer downloadable HTML5 apps for third-

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<sup>22</sup> By contrast, the "information stream" proposal of the NPRM requires MVPDs to create a new hardware gateway device in the home, a new device implementation, sufficient memory, new processing power and new network protocols to provision and manage that device, and new operational support systems. *See, e.g.,* DSTAC Final Report at 287 (DSTAC WG4 at 152); NCTA Comments at 128, 130-132; Comcast Comments at 64-67; AT&T May 24, 2016 *Ex Parte* at 2; NCTA Rebuttal at 30-31.

party smart TVs and other TV-connected devices at the customer premises that connect to the satellite-provided device.<sup>23</sup>

With respect to app-related data usage, not all ISPs employ usage-based billing or data caps, but where they are used, they only apply to data running over the broadband Internet access service and not to managed services such as cable services, whether delivered via set-top box or via an app. Satellite typically uses third-party ISPs to deliver additional VOD titles that are not delivered over the satellite link. In that case, satellite VOD delivered over the third-party ISP would be subject to whatever policy the third-party ISP applies to the individual customer.

Although the NPRM's primary use case is for a retail device that receives MVPD services and OVD services, the HTML5 apps-based approach would also support video-only customers that do not have a broadband Internet connection. Cable customers subscribing only to a cable operator's video service would use a standard DOCSIS modem (including a customer-owned modem) to access the IP cable service via the app.<sup>24</sup> For AT&T some form of two-way connectivity will be necessary to support the content and privacy protections embedded in the HTML-5 app. In addition, for satellite customers without Internet, the MVPD app would not include the supplemental VOD titles that would otherwise be available over the Internet.

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<sup>23</sup> As AT&T integrates satellite and IPTV architectures, it plans to share the same infrastructure.

<sup>24</sup> Under an IP video implementation available today, a cable operator provides a modem configured to "tune" to the managed IP channels. However, under the proposal cable operators could also support customer-owned DOCSIS modems to receive the managed IP channels used in the HTML5 app. The HTML5 app can also support the rare case of a customer who wishes to receive their MVPD app from a cable provider and their broadband Internet service from an unrelated ISP. The MVPD app does not operate over the open Internet supplied by the unrelated ISP, but cable operators could also support retail DOCSIS modems to receive the managed IP channels. Under DOCSIS specifications, a cable modem module can also be embedded in a third-party product.



## **G. Additional Benefits of HTML5 Apps-Based Approach**

As detailed in the DSTAC Report, the HTML5 apps-based approach also offers many additional advantages.

*Royalty Free.* HTML5, EME, MSE, WebCrypto and all W3C APIs are available royalty free under the W3C Patent Policy with royalty-free licensing commitments from over sixty companies.

*Open source.* HTML5, EME, MSE, and WebCrypto software implementations are available at no cost from at least three open source libraries – Chromium, Gecko and WebKit – which have been integrated into hundreds of millions of devices.

*Portable applications.* The single HTML5 API – supported across all major CPU architectures, all major DRMs and on all types of devices from smart phones, tablets, PCs, Macs, smart TVs, set-tops and game systems – enables write-once, run everywhere applications.

*Evolving functionality.* By requiring usage of the latest specification APIs, the architecture will evolve to meet new requirements rather than being stuck with the technology at the initial definition.

*Support for TV and Internet.* By basing the proposal on leading Web and Internet protocols, the proposal supports a common framework for TV and for Internet media services.

*Field proven.* HTML5 has been implemented by all of the commercial browser vendors and is already being used by multiple content distributors for premium content, including Netflix, Google YouTube and Apple.

*Uniform API.* HTML5, EME, MSE and WebCrypto provide a uniform architectural framework and provide uniform JavaScript APIs.

*Technology- and platform-neutral.* The HTML5 architecture is technology- and platform-neutral as it does not mandate specific software or hardware technologies or platforms. Nor does it mandate a particular network technology or architecture.

*Competitive security systems.* A common abstraction for different DRM systems allows for a competitive and dynamic market for security systems in which content protection providers can compete based on the robustness of their implementation, their countermeasures, threat monitoring, etc. Additionally, EME enables innovation in both hardware and software implementations that can advance ahead of, or in response to, the growing sophistication of attacks on these security systems. Most importantly, by not mandating a single security system, EME avoids creating a single point of attack for hackers.

*Software-based downloadable security systems.* HTML5 and EME are software-based solutions and provide access to downloadable security systems.

*CE/CPE choice.* A device manufacturer can choose one or more security technologies from a competitive market of commercial content protection technologies to implement on their device. These technology choices can be updated or changed after the device is sold and in the market as a device manufacturer chooses to renew the security systems on its devices.

*MVPD/OVD choice.* MVPDs and OVDs can choose from a competitive content protection market which technologies to support on their network to secure their content. MVPD/OVDs can also add to or replace their content protection systems over time.

*Chip manufacturer competition.* Hardware chip manufacturers can continue to compete on the quality of their hardware roots of trust and on their integration with security technologies and trust models.

Some contend that the HTML5 apps-based approach goes “backwards” from CableCARD-supported unidirectional cable ready products (“UDCPs”).<sup>25</sup> But in fact, any comparison between a UDCP and an HTML5 app from a cable operator shows what a vast improvement the HTML5 apps-based approach is over CableCARD. The HTML5 apps-based approach vastly expands the scope of MVPDs covered, from the 50% of multichannel subscribers served by cable operators, to approximately 94% of all multichannel subscribers. A cable operator’s HTML5 app includes VOD, interactive services and new marketing offers like electronic sell through that UDCPs do not support. As noted, it also uses the most modern app-based technology and global standards for commercial video; provides critical protections for copyright, advertising, and privacy that are given short shrift by UDCPs; and enables equal access to online video programming rather than treating the cable linear channel lineup as the primary source of programming. As Figure 3 demonstrates, a cable operator’s HTML5 app also enables a retail device to have its own user interface, create its own recommendation engine, and create its own grid guide. It makes content accessible to other home devices, and a cable implementation already underway supports personal cloud recording.

<b>UDCPs with CableCARD</b>	<b>Cable HTML5 Apps</b>
<ul style="list-style-type: none"> <li>• Access lineup of one-way linear cable channels <b>only</b></li> </ul>	<ul style="list-style-type: none"> <li>• Access linear channels plus Video-on-Demand (VOD)</li> <li>• Access cable two-way Services such as Interactive Features (news, weather, sports, etc.), Switched Digital Video (SDV), MVPD Guide, shop-by-remote, Caller-ID on TV</li> </ul>
<ul style="list-style-type: none"> <li>• Device may create own grid guide from metadata it licenses from third party suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• same</li> </ul>
<ul style="list-style-type: none"> <li>• Device may have its own user interface</li> </ul>	<ul style="list-style-type: none"> <li>• same</li> </ul>
<ul style="list-style-type: none"> <li>• Device may create recommendation engine</li> </ul>	<ul style="list-style-type: none"> <li>• same</li> </ul>
<ul style="list-style-type: none"> <li>• Requires broadband Internet subscription or telephone line</li> </ul>	<ul style="list-style-type: none"> <li>• Can operate without broadband Internet subscription or telephone line</li> </ul>
<ul style="list-style-type: none"> <li>• Supports personal local recording</li> </ul>	<ul style="list-style-type: none"> <li>• Cable implementation already underway support personal cloud recording</li> </ul>
<ul style="list-style-type: none"> <li>• Search across all <b>linear cable content</b> from</li> </ul>	<ul style="list-style-type: none"> <li>• Search across <b>all cable linear and VOD</b></li> </ul>

<sup>25</sup> See Letter from Henry Goldberg and Devendra T. Kumar, Counsel for TiVo, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (June 27, 2016) (“TiVo June 27, 2016 *Ex Parte*”).

retail interface	content from retail interface
<ul style="list-style-type: none"> <li>• Content accessible to other home devices via LAN</li> </ul>	<ul style="list-style-type: none"> <li>• Cable content accessible to other home devices via WAN</li> </ul>
<ul style="list-style-type: none"> <li>• Relies on 20 year old PCMCIA card technology</li> </ul>	<ul style="list-style-type: none"> <li>• Relies on software apps and modern W3C global standards for commercial video</li> </ul>
<ul style="list-style-type: none"> <li>• Modern cable offerings not available</li> </ul>	<ul style="list-style-type: none"> <li>• Supports modern cable offerings like electronic sell through</li> </ul>
<ul style="list-style-type: none"> <li>• Requires in-home UDCP cable set-top box</li> </ul>	<ul style="list-style-type: none"> <li>• Supports cable service delivered from cloud</li> </ul>
<ul style="list-style-type: none"> <li>• Treats cable lineup as primary source of programming</li> </ul>	<ul style="list-style-type: none"> <li>• Enables equal access to online video programming</li> </ul>

Figure 3: Comparison of CableCARD and HTML5 Cable App

**H. Integrated Search through Retail Device User Interface**

The HTML5 apps-based proposal expects the retail manufacturer’s distinctive device user interface to present consumers with choices among MVPD services, online video services, and other device features (as Samsung, Roku or Apple TV do today). The MVPD’s app would also enable the retail device to use its own user interface to obtain and display for the consumer combined search results from MVPD content and from OVDs offering licensed content on the same device. Once selected from the combined search results, the MVPD content would be presented and played through the MVPD’s app.

Previous submissions have detailed how integrated search is developing organically in the market today on various platforms using different approaches.<sup>26</sup> Proponents of the HTML5 apps-based approach do not believe that integrated search is required by Section 629, but have nonetheless offered a commitment that would be supportive of integrated search that includes MVPD content. The device manufacturer, of course, would need to reach its own commercial agreements with OVDs, programmers who have their own standalone apps, and other content sources as necessary to include those sources in its integrated search.

Guide data, like other content included in MVPD offerings, is licensed by MVPDs for limited uses from third parties such as Rovi and Gracenote (formerly Tribune Media Service).

<sup>26</sup> See, e.g., NCTA Comments at 66.

Under the HTML5 apps-based proposal, device makers would license guide data from third parties, as TiVo and other device manufacturers do today for their respective guides.<sup>27</sup>

Integrated search today takes a variety of forms. In order to search MVPD content, the device manufacturer would design its own search algorithm, and could use commercially-available metadata for searches. For example, such commercially-available metadata typically provides detailed scheduling data for linear content. As another possible alternative, the MVPD could return a link to present and play linear and VOD content through the MVPD's app as discussed in the example below. In the case of VOD, some additional information may be appropriate, such as availability (calendar start and end time) of VOD titles. The MVPD would not provide individual subscriber entitlement data through the search: for example, the search could return a link to present and play a VOD title through the MVPD's app, but would not disclose the personally identifiable information that the individual subscriber subscribed to a particular programming package. The two-year implementation period (discussed below) will provide sufficient time to implement search, and the Commission should not prescribe or foreclose a particular method.

An illustrative example from Roku shows how a consumer can move from search returns to the app. Search for a title will show a title available in multiple apps. If the consumer clicks on the MVPD option in the search result, he will be taken into the MVPD's app to watch the content within the MVPD's app (as Roku consumers do with Netflix, Amazon, Hulu and Time Warner Cable apps today). A consumer need not re-enter the search when they click on the MVPD app. In all cases the search return includes a link to the specific "landing point" inside the MVPD app. The "landing point" may vary by MVPD and by transaction. An MVPD may

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<sup>27</sup> Likewise, Open Cable Unidirectional Receiver ("OCUR") manufacturers like Hauppauge rely on Microsoft to do the same.

have multiple offers of the same VOD title—one for rental, a second to purchase to own (electronic sell through), a third under a promotion offering a discount for package purchases, and perhaps another offering if the customer has already purchased the title on another device. In such a case, the landing page for that title would include these different offers. Another MVPD may have “start-over” available for a program already in progress. Another may have a programming agreement requiring prominent display of the network brand that includes the program before the program commences, or pre-roll of a promotional video before the main video begins. As content agreements and consumer offerings change over time, so may the precise “landing point” inside the app.

The MVPD does not control the retail search or the retail device user interface, but there is a key requirement to address piracy. In the television ecosystem, licensed MVPDs do not offer pirate sites, and the integrated search included in the HTML5 apps-based proposal is designed not to extend piracy into this ecosystem. The proposal requires that a device shall only combine search results from MVPD content and from other video providers offering licensed content.

## **I. Licensing**

The tools and technological protection measures in the HTML5 app do most of the heavy lifting in providing protections for copyright, advertising, and privacy, but an app license agreement between the MVPD and the device manufacturer is required to ensure consumer protections and to provide enforceable contractual rights that protect MVPD service and content that is included in the app.

Each MVPD would make its app license available to any interested device manufacturer without discrimination on standard, commercially-reasonable terms so there would be no need for device manufacturers to negotiate individually with MVPDs to obtain the license (although

they would be free to do so). There will undoubtedly be a core of common licensing terms across MVPDs, but there may also be some differences in terms among MVPDs arising from such matters as differences in technology, technical arrangements or content-specific requirements. MVPDs are currently working with programmers to assure that such licensing terms provide for the full enforceability of rights and appropriate remedial measures enforceable from the U.S.

Commercially-reasonable terms would include, among other clauses:

*Advertising.* No advertising may be overlaid or presented in connection with use of the MVPD app.

*Anti-tampering.* There shall be no alteration or attempt to alter the MVPD app or programming presented by the app during the launch, operation or use of the MVPD app or programming.

*Anti-piracy.* Integrated search results may combine MVPD content only with content from other sources offering licensed content.

*Customer privacy.* The device may not attempt to track subscriber usage inside the MVPD app.

*Technical Support for the HTML5 App.* The Device must support the applicable W3C HTML5 standards, including HTML5, MSE and EME specifications. The device must also follow the HTTP User-Agent protocol to identify its hardware, operating system and software versions and verify that the manufacturer is party to the MVPD license.

*Technical integrity.* The device may not attempt to hack or otherwise defeat or circumvent the app and authentication measures that protect the app, programming and MVPD user interface presented by the app.

*Enforcement.* The license will provide for enforcement and for rights and remedies for non-compliance.

The HTML5 app license is not intended to exclude other video programming provided by another licensed distributor from the device or from integrated search.

Licenses will be extended to individual manufacturers, even if they have some commonalities, in order to bind each to the terms and because of the variation among device platforms, search functionalities, and other device features.

There is no need for the Commission to micromanage MVPD licensing for the MVPD app. In previous dockets, it has rightly avoided this role, but retained its authority to provide a forum for complaints under Rule 1.41.<sup>28</sup>

Likewise, the Commission need not micromanage MVPD use of DRMs with HTML5 apps. HTML5 supports multiple DRMs. Today, service providers license CAS and DRMs as a service from security vendors, and retail devices license DRM clients from the same vendors. Adobe and PlayReady are among the DRMs used by MVPDs to secure IP-based apps. Through the use of common encryption, MVPDs may support more than one DRM to reach a wider set of devices, and devices may support more than one DRM to receive a wider set of services. The DRM market has been working in this manner and sustains a highly competitive market for agile

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<sup>28</sup> In the 2003 Plug and Play Order, the FCC chose not to adopt or administer DFAST, and not to agree to any specific enforcement role beyond its general complaint procedures and review of disputed output decisions. *Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices; Compatibility Between Cable Systems and Consumer Electronics Equipment*, Second Report and Order and Second Further Notice of Proposed Rulemaking, CS Docket No. 97-80; PP Docket No. 00-67, 18 FCC Rcd 20885 (2003). The DFAST license was filed with the FCC for informational purposes and the Commission held itself out as a forum for resolving complaints. In the *Broadcast Flag Table A* order, the FCC certified a wide variety of security regimes and a variety of licensing agreements and specifically decided not to dictate license terms. The Commission took a similar approach in the *BST Encryption* order. *Basic Service Tier Encryption*, Report and Order, MB Docket No. 11-169, 27 FCC Rcd 12786 at ¶ 24 (2012) (“*BST Encryption*”); *Digital Output Protection Technology and Recording Method Certifications*, Order, MB Docket No. 04-55 *et al*, 19 FCC Rcd 15876 (2004) (“*Broadcast Flag Table A*”).



DRMs that can evolve rapidly, support new business models and respond to ever-more sophisticated threats.<sup>29</sup>

The Commission need not manage DRMs in order to prevent an MVPD from adopting a DRM that serves few or no devices. The market has already created multiple, widely available DRMs that compete with one another, and these competing DRMs are in wide usage already to support apps from multiple MVPD, programmer, and online video sources to a wide variety of retail devices. Selecting a mandatory DRM would recreate the mistake of picking 1394 as a digital connector and displacing DRM competition. It is fair to expect MVPDs to utilize one or more DRMs that are available for licensing to consumer electronics manufacturers, whether the device is offered for lease by MVPDs or at retail for sale.<sup>30</sup> The Commission could monitor the deployment of HTML5 apps and the content protection systems utilized so that an MVPD's choice of DRM did not foreclose the availability of the app to retail devices. The Commission could also provide a forum for complaints under Rule 1.41 for aggrieved manufacturers with concerns that cannot be addressed with the MVPD. But it need not do more.

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<sup>29</sup> The insufficiency of DTCP has been previously briefed in this docket. *See* NCTA Rebuttal at 21-22 and citations therein. DTLA continues to promote itself as the security solution that the Commission should select for navigation devices. *See* Letter from Seth D. Greenstein, Chair, DTLA Policy Group, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 8, 2016). But the most recent DTLA submission does not contest what NCTA, AT&T and others have been saying throughout this docket: DTCP requires an in-home device; does not support common encryption for recovery or competition, and therefore presents single point of attack; and refuses to revoke for non-compliance. DTLA implies that if only MVPDs moved to the last update of DTCP, all would be well; but it does not contest that DTCP still fails to support all the modern business models like electronic sell through; that it was not nimble enough to provide timely support of 4K for DIRECTV; or that when DTCP confronts the many devices that do not support later versions, content reverts to the limited copy freely, copy once, copy never, copy no more states from a decade ago, or does not pass to the device at all. It makes no mention of any cloud-based DTCP, which we have previously described as slideware. Its careful wording – limiting its capability as “appropriate to their role in the ecosystem” and admitting that MVPDs would need to use other forms of revocation – reflects that DTCP is an insufficient security solution. DTCP was invented 20 years ago for in-home use in a very different world. It cannot work as the FCC's chosen security system for the future.

<sup>30</sup> In the *BST Encryption* order, the FCC required only that the software solution be “commercially available.” *BST Encryption* at ¶ 24 (2012). In the *Broadcast Flag Table A* order, the FCC said that it will “closely monitor the deployment of these content protection technologies” (¶ 64); “largely defer to the private licensing mechanisms established by these technology proponents ... but provide aggrieved parties with a forum for recourse [under 1.41]” (¶¶ 80, 83); and it determined that the risk of unreasonable licensing fees was adequately addressed by the number and varieties of technologies available (¶ 91).

## **J. Cost**

MVPDs would license their HTML5 apps without charge to manufacturers of third-party navigation devices for their app stores, provided that the device manufacturers and stores do not impose any fee or surcharge on MVPDs or consumers for providing or using the app or for transactions enabled through the MVPD service.<sup>31</sup> Moreover, because the MVPD HTML5 app is offered as a software replacement for the set-top box for use in the customer's premises for delivery of a Title VI cable service (or MVPD service by satellite and IPTV operators), MVPDs do not intend for any additional fees to be incurred from or imposed on programmers for the HTML5 app. With respect to consumers, in the case of cable, with no leased box, there is no box charge or app charge to the consumer beyond the standard fees that apply to their cable service. This proposal, however, does not address service pricing. For example, AT&T service pricing may continue to vary with the number of outlets in the home, as does its current pricing today, but there would be no box charge or app charge for devices served with its HTML5 app.

HTML5 apps-based proposal will enhance consumers' choices for receiving MVPD service over retail navigation devices, but does not require MVPDs to cease providing all set-top boxes. Consumer demand varies and Section 629 assures MVPDs the continued right to meet demand with their own set-top boxes. However, under the HTML5 apps-based proposal it will be consumer demand that will define consumers' relative use of MVPD-provided set-top boxes, retail set-top boxes that use apps and offer their own innovations, or apps that can be downloaded directly to Smart TVs with built-in enhancements and no need for a box at all.

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<sup>31</sup> Amazon has recently suggested that MVPDs should be required to provide the HTML5 app and to pay tithes or surcharges assessments by device manufacturers. *See* Letter from Gerard J. Waldron, Counsel to Amazon.com Inc., to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 15, 2016). While such an approach might serve Amazon's financial interests, it would raise consumer costs. There is also no basis in Section 629 for requiring MVPDs to pay for the privilege of making the services they offer and provide available to retail devices.

## **K. The HTML5 Apps-Based Approach Meets the Requirements of Section 629**

The HTML5 apps-based proposal meets all of the requirements of Section 629 and more:

- It enables consumers the choice to access their MVPD service on a smart TV, tablet or other choice of retail navigation device without a cable set-top box.
- It delivers the multichannel services and other services “offered” and “provided” by MVPDs, as required by Section 629(a), including the cable operator’s user interface “required for the selection or use of such video programming or other programming service,” which Congress defined to be part of the service.
- It goes over and above Section 629 requirements by supporting integrated search and further enhancing retail manufacturers’ distinctive device user interfaces.
- It uses the most modern apps-based approach and new international open standards for media developed by the W3C, meeting Congress’s direction that the Commission “take cognizance of the current state of the marketplace and consider the results of private standards setting activities.”<sup>32</sup>
- It does not “jeopardize security” of MVPD services or “impede the rights of providers of [MVPD] services to prevent theft of [their] service,” as required by Section 629(b).
- It respects and protects all other requirements of law – including copyright law, contract law, Title VI privacy and consumer protections, and Title VI and intellectual property protections for the provision, composition and content of cable services.<sup>33</sup>

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<sup>32</sup> Joint Explanatory Statement of the Committee of Conference, S. Conf. Rep. 104-230, 104th Cong., 2d Sess. at 181 (1996).

<sup>33</sup> Section 624(f) directs the Commission and other federal and state authorities not to “impose requirements regarding the provision or content of cable services, except as expressly provided in [Title VI],” and Section 621(c) prohibits the Commission from imposing any type of common carrier regulation on a cable operator’s provision of cable services. Theodore B. Olson, Helgi C. Walker, and Jack N. Goodman, The FCC’s “Competitive Navigation” Mandate: A Legal Analysis of Statutory and Constitutional Limits on FCC Authority, Attached to NCTA Comments as Appendix A, at 26-29, 31-36. By utilizing the app to render service consistent with programming agreements, the HTML5 apps-based proposal meets the FCC’s commitment to protect the “sanctity of contract” and that, “[e]xisting

➤ This modern app-based technology allows rapid updates by device manufacturers and by MVPDs, ensuring that consumers receive the benefits of continuous innovation and variety in retail devices and in MVPD networks and service, and meeting Congress’s directive that the Commission “avoid actions which could have the effect of freezing or chilling the development of new technologies and services.”<sup>34</sup>

**L. “Bolting On” “Information Streams” Would Undo the HTML5 Approach and Recreate All the Failings of the NPRM Proposal**

A majority of Commissioners themselves now acknowledge the NPRM to be flawed,<sup>35</sup> but some proponents of the NPRM’s original proposal have nonetheless sought to “bolt on” the “information flows” from the NPRM to the HTML5 apps-based proposal.<sup>36</sup> Some seek those unbundled flows in the name of stripping out the MVPD’s user interface in favor of their own, or in favor of allowing third party app developers to write their own apps from the unbundled flows. But they continue to make crystal clear that they do not consider protecting channel lineup, agreed-upon presentation of service, or limiting the spread of pirate content to be within the permissible rights of copyright owners or even tolerable under FCC rules, and seek to use “information flows” to defeat all such protections.<sup>37</sup> This approach would undo the entire HTML5 approach and recreate the failings of the NPRM proposal.

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content distribution deals, licensing terms, and conditions will remain unchanged.” *FCC Chairman Proposal to Unlock the Set-Top-Box: Creating Choice & Innovation* (Jan. 27, 2016), [http://transition.fcc.gov/Daily\\_Releases/Daily\\_Business/2016/db0127/DOC-337449A1.pdf](http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0127/DOC-337449A1.pdf); NCTA Rebuttal at 6-11.

<sup>34</sup> H.R. REP. NO. 104-458, at 181 (1996) (Conf. Rep.), reprinted in 1996 U.S.C.C.A.N. 124, 194.

<sup>35</sup> Daniel Frankel, *Rosenworcel Sides with Pai and O’Rielly, Agrees Wheeler Set-Top Proposal Is ‘Flawed,’* FIERCECABLE (July 13, 2016), <http://www.fiercecable.com/story/rosenworcel-sides-pai-and-orielly-agrees-wheeler-set-top-proposal-flawed/2016-07-13>.

<sup>36</sup> See CVCC July 1, 2016 *Ex Parte*; Chip Pickering, CEO of INCOMPAS, *Competition and Innovation Principles Will Help FCC “Unlock the Box,”* MEDIUM.COM (July 11, 2016), <https://medium.com/@ChipPickering/competition-and-innovation-principles-will-help-fcc-unlock-the-box-faa67f53a980#tyweb4x72>.

<sup>37</sup> CVCC July 1, 2016 *Ex Parte* at 4; CVCC July 7, 2016 *Ex Parte* at 3-4.

MVPD apps protect copyright, advertising, privacy,<sup>38</sup> children’s programming, accessibility<sup>39</sup> and other consumer protections that come with their MVPD subscriptions because they maintain an MVPD’s end-to-end control to present its service in the trusted application execution environment *within* the app that runs on the smart TV or other retail device. If the app were to be converted into a vehicle from which unbundled content, metadata, and private entitlements data may be extracted by third-parties for use regardless of these requirements and limitations, it would fail its essential purpose.

A bolted together version of HTML5 apps with “information streams,” a third party app, or a replacement interface is not an apps-based approach or a compromise. The NPRM itself proposed that MVPDs provide unbundled information streams to enable third-party app developers to write their own apps and interfaces for third-party device;<sup>40</sup> as exhaustively briefed, the mandated “information flows” – even when “bolted” onto an HTML 5 app – would dismantle the technical, licensing and business agreements that fund great programming and fuel the video market. No proponent of “information flows” – not even those who acknowledge how vulnerable the NPRM would leave content and advertising – have advanced a means for protecting content licensing and advertising requirements without MVPD apps and enforceable licenses to back them up. Unlike an MVPD app which can be written and updated to account for each unique network and service offering, the rapid changes the MVPD makes in its networks and services, and the myriad requirements of its licensing agreements, a third-party app would

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<sup>38</sup> The MVPD app will abide by the same statutory privacy protections and MVPD privacy notices that govern data collected from MVPD set-top boxes, which is not possible under the “information flows” proposal. Thus, for example, a programmer’s access to aggregated viewing data is defined by its affiliation agreements with MVPDs, and if a programmer has certain rights under those agreements to receive reports on such data, the MVPD can assure that such reports meet all requirements to protect against the disclosure of personally identifiable information.

<sup>39</sup> HTML5 apps will meet the accessibility requirements in FCC rules. HTML5 also has APIs to support device passing of caption settings to the application, and an API to enable the application to turn display of the captions by the platform on and off.

<sup>40</sup> NPRM at ¶ 28.

have no such constraints for protecting content licensing and advertising requirements. An “information flows” mandate would erode the economic underpinnings of television production and distribution. It would especially jeopardize program diversity by disproportionately impacting minority and independent entrepreneurs and programmers and diverse audiences.

“Bolting on” the “information flows” proposed in the NPRM would also mean that every device manufacturer and app developer would have the ability to capture details of individual consumers’ television viewing data and then use or sell that data to insert personally-targeted ads to follow consumers and their children around the television and beyond. It would dismantle the security systems that protect the distribution of the highest value content, combat piracy and theft of service. It would once again roll back cable’s modern interactive feature-rich services and would not deliver the service “offered” and “provided” by MVPDs (as required by Section 629). And it would forbid MVPDs – and MVPDs alone – from exercising the right to innovate and compete in the same way that Netflix, Google’s YouTube, Amazon and other OVDs do.

“Bolting on” the “information flows” in the name of a third party app or a replacement interface would also halt the diversity and rapid technological evolution of competing MVPD networks. MVPD apps support a wide variety of technologies and innovation in network architectures created by a competitive market and MVPDs’ abilities to introduce new features. Third party apps would introduce fixed interfaces as a “choke point” that would lock in network technologies and capabilities dictated by the interfaces. Attempting to bolt on third party apps or replacement guides is not an apps-based approach: it defeats the entire function of apps.

## **II. TIMETABLE**

### **A. HTML5 Today**

HTML5 MSE and EME is a new standard, but as we have described above it already enjoys widespread support in the market.<sup>41</sup> No MVPD has yet launched an HTML5 EME app, but the first adopter, Comcast, has announced its availability as part of the Xfinity TV Partner program and is now developing the app for deployment on Samsung Smart TVs.

### **B. Work Required**

As detailed in DSTAC, many MVPDs have apps available for iOS and Android devices, PCs and Macs, and for many other retail devices, but the HTML5 apps-based proposal will require additional work. For example, even an MVPD that currently supports iPad apps and HTML4 apps in PC and Macs will need to convert the video format, encryption format and DRMs, develop an HTML5 application and an HTML5 video player, and adjust from fixed bandwidth to adaptive streaming. For Title VI service, broadcast and PEG signals that are currently received by cable at a local headend pickup location need to be converted, transcoded, and backhauled to a central distribution hub and then inserted into the appropriate app.

Two years is an aggressive timetable, but by utilizing actual W3C standards, apps, and MVPD licensing, the proponents of the apps-based proposal are prepared to commit to implementation within two years. This would not be possible if the “information flows” approach were adopted or “bolted on” to the HTML5 apps-based approach. That approach

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<sup>41</sup> Roku claims that “HTML5 is a bulky and expensive architecture that would require third-party device manufacturers to include additional processing power and memory to support it, even in their lowest-priced devices.” Letter from Trey Hanbury, Counsel for Roku, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 8, 2016) at 1 (“Roku July 8, 2016 *Ex Parte*”). Marketplace realities belie these concerns. For example, the Comcast Xfinity TV Partner Program, which will utilize an HTML5 app, has been well received in the marketplace, with Samsung as an initial partner and many other device manufacturers showing strong interest in the program. Likewise, as detailed above, numerous entities, including major OVDs like Netflix and Google YouTube and the broad range of participants in WAVE, are embracing HTML5.

offers no effective standards, would require re-architecting MVPDs' networks, and does not utilize apps-based technology or commercial licensing, all of which makes it infeasible and far beyond the reach of an implementation within two years.

### **C. Five-Year Initial Term**

Proponents of the HTML5 apps-based proposal have previously expressed profound concerns with government technology mandates, and have shaped the proposal to balance those concerns with the Commission's desire for a stable development path and the opportunity for retailers to sell consumer products with a reasonable lifespan. The proposal offers a five-year initial term, renewable by the Commission. The five-year term is based on the sum of the two-year window within which HTML5 apps will be launched plus the three-year period previously utilized by the Commission in the *BST Encryption* docket for software-based solutions for IP-enabled devices.<sup>42</sup> As in that docket, the Commission would have the opportunity to review the state of technology and the market and determine whether to permit the mandate to expire or to be extended.

### **III. OTHER COMMERCIAL AGREEMENTS**

The HTML5 apps-based approach is offered as a supplement to, and not a replacement of, the diverse and dynamic approaches that continue to evolve in the market. Some have expressed concern that FCC intervention in the market may create a de jure or de facto standard that would displace and frustrate the operation and innovation in the market.<sup>43</sup> Indeed, the record demonstrates overwhelmingly that it is the NPRM's proposal that presents this very threat, as

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<sup>42</sup> See *BST Encryption*, 27 FCC Rcd 12786 (2012).

<sup>43</sup> Roku expresses concern that the HTML5 apps-based proposal "would, as a practical matter, establish HTML5 as the *de facto* standard in the video distribution marketplace. Such an approach would be ill advised given that consumers have clearly demonstrated their preference for an array of devices with diverse user experiences at various price points, which has spurred competition and innovation in the marketplace." Roku July 8, 2016 *Ex Parte* at 1.



evidenced by submissions by the undersigned; by large, small, and minority programmers; by diverse and minority advocacy groups; by unions; by bipartisan Members of Congress; by academics; by educated industry observers; and by think tanks.

In order to ensure that the HTML5 apps-based approach does not present such threats, the HTML5 apps-based proposal would require MVPDs to offer HTML5 to device manufacturers, but it does not require device manufacturers to adopt that approach, nor does it foreclose alternatives. Instead, we expect that MVPDs and device manufacturers would continue to negotiate and execute bilateral commercial agreements, such as those that support Roku today without the use of HTML5. As the Apps Proposal states: “*Other Commercial Agreements Welcome*. MVPDs and manufacturers of retail navigation devices may continue to enter into other bilateral commercial agreements, such as the agreements that support major retail platforms today.” Thus, the HTML5 apps-based proposal would actually *encourage* competition and innovation by, among other things, specifically allowing MVPDs and device makers to continue and expand pro-consumer agreements like the ones MVPDs have with iOS, Android, and Roku – as long as the HTML5 app is also available as one option. For example, all of the large MVPDs have already written apps for the native Android platform; it is likely that an Android device would choose to use those MVPD Android apps that have already been written, but it could also choose to provide an HTML5 platform for the HTML5 app.

We do not propose any regulation of those other MVPD apps or terms linking such apps with this HTML5 option. Business-to-business arrangements around other apps may reflect different terms depending on business model, different forms of integration, marketing or other variations we cannot predict. We have previously briefed how the FCC’s proposed parity

clauses, however well-intended, would have the effect of handicapping innovation, the development of new services and experimentation.<sup>44</sup>

#### **IV. SCOPE OF THE HTML5 PROPOSAL**

The HTML5 apps-based approach is offered only with respect to MVPDs with more than 1 million subscribers. As one retail consumer electronics manufacturer pointed out, a retail market could be readily established without the need to impose a regulatory mandate on smaller operators,<sup>45</sup> and it would be reasonable to establish an exemption for slightly larger MVPDs, as suggested by ITTA.<sup>46</sup> We share the widely expressed view that the Commission should not mandate that the limited resources available to smaller operators be allocated by an FCC mandate to navigation devices.<sup>47</sup>

Even with such an exemption, the HTML5 apps-based approach would represent a massive expansion of consumer choice. It would double the footprint from CableCARD to approximately 94% of all multichannel subscribers. It would also expand the service available from just digital linear cable channels (available to CableCARD-enabled UDCPs) to all MVPD linear, VOD, and their user interfaces.

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<sup>44</sup> NCTA Comments at 141-143; NCTA Reply at 76-77; NCTA Rebuttal at 22-23.

<sup>45</sup> See TiVo June 27, 2016 *Ex Parte*.

<sup>46</sup> See Letter from Michael J. Jacobs, Vice President, Regulatory Affairs, ITTA, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 14, 2016) at 2. Because HTML5 is a royalty-free open standard with an international development community, this remains an option. But smaller operators could also solicit other retail solutions from their current vendors, including solutions that do not require them to develop the network capacity for simulcasting in IP.

<sup>47</sup> See, e.g., Letter from Michael R. Romano, Sr. Vice President – Policy, and Brian J. Ford, Regulatory Counsel, NTCA, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 16-42, CS Docket No. 97-80 (July 15, 2016).

The HTML5 apps-based proposal is a constructive, lawful, and achievable path for moving forward and meeting the goals of Section 629 while fully protecting the commercial and consumer rights we enjoy today.

Respectfully submitted,

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July 21, 2016