

**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
)	

**REPLY COMMENTS OF COMCAST CORPORATION AND
NBCUNIVERSAL MEDIA, LLC**

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TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY.....2

II. APPS FULFILL THE GOALS OF SECTION 629 WITHOUT THE HARMS OF THE SET-TOP BOX MANDATE, AND CRITICISMS OF THE APPS MODEL ARE WITHOUT MERIT.....14

III. THE COMMISSION LACKS THE AUTHORITY TO ADOPT THE SET-TOP BOX MANDATE, AND THE RECORD REINFORCES THAT LEGAL CONCLUSION.18

IV. THE RECORD CLEARLY SUBSTANTIATES THAT THE COMMISSION’S SET-TOP BOX MANDATE WOULD ENDANGER THE ENTIRE CONTENT PRODUCTION ECOSYSTEM.23

V. THE RECORD UNDERSCORES THAT PRIVACY AND OTHER CONSUMER PROTECTIONS WILL BE WEAKENED UNDER THE SET-TOP BOX MANDATE.32

VI. COMMENTERS OVERWHELMINGLY DEMONSTRATE THE SUBSTANTIAL COSTS OF THE COMMISSION’S PROPOSAL.....40

VII. CONTRARY TO PROPONENTS’ CLAIMS, THE COMMISSION’S STANDARDS-SETTING PROPOSAL WOULD CHILL INNOVATION AND COULD NOT BE IMPLEMENTED IN THE TWO-YEAR TIMEFRAME CONTEMPLATED IN THE *NOTICE*.43

VIII. CONCLUSION46

Appendix A: Declaration of Dr. David P. Reed

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“Congress was clear. They said there should be competition. Now technology has advanced to a point where this is possible without changing the functioning of the pay-TV system and its copyright protections and its security.” So declared Chairman Wheeler in voting to approve the *Notice* on February 18.¹

The record compiled in this proceeding makes clear that the Chairman’s statement above was entirely correct. Video apps have revolutionized the marketplace, expanding consumers’ options for devices and services while still protecting copyright, honoring licensing agreements, and ensuring pay-TV customers enjoy the full privacy rights and remedies Congress intended.

But the record also overwhelmingly demonstrates that the complex, costly, and backward-looking technology mandate envisioned by this *Notice* (referred to herein as the “Set-Top Box Mandate”) fails each of these tests and does not align with the Chairman’s statement.² Unlike the apps approach advocated by MVPDs and many others in the record, the proposed

¹ Tom Wheeler, Chairman, FCC, Statement at FCC Open Meeting, at 55:43 (Feb. 18, 2016), <http://www.c-span.org/video/?404893-1/fcc-meeting-cable-settop-box-purch&start=3271>.

² See *Expanding Consumers’ Video Navigation Choices; Commercial Availability of Navigation Devices*, Notice of Proposed Rulemaking and Memorandum Opinion and Order, 31 FCC Rcd. 1544 (2016) (“*Notice*”).

mandate exceeds the Commission's authority under Section 629 and conflicts with other provisions of the Communications Act and the First Amendment; disregards copyright protections and licensing agreements; threatens to halt the unbridled innovation that has permeated the video marketplace for years; requires new in-home equipment; and strips consumers of privacy protections and legal remedies.

Choosing the deeply flawed Set-Top Box Mandate approach over the clearly superior and proven apps approach would require the Commission to ignore the overwhelming weight of evidence entered into the record by MVPDs, programmers, content creators, diversity advocates, labor organizations, economists, environmentalists, policy analysts, and over 70,000 concerned citizens. The record is clear: apps, not hardware mandates, are the quickest path to achieving the Commission's goal of increasing competition for video navigation devices.

I. INTRODUCTION AND SUMMARY

With the general exception of the same advocacy organizations that supported the Commission's 2010 AllVid proposal and companies that stand to gain a windfall from not having to follow the same rules as others in the marketplace, the Commission's proposed Set-Top Box Mandate was widely criticized by commenters. Notably, the record leaves little doubt that the Set-Top Box Mandate would exceed the Commission's limited authority under Section 629 and violate other provisions of the Communications Act, substantial copyright and other intellectual property protections, and the First Amendment. It would endanger the entire video distribution ecosystem by disregarding licensing requirements, jeopardizing content security, and promoting piracy and theft of service. It would weaken privacy and other critical consumer protections. It would impose substantial costs on MVPDs and consumers and chill innovation. And, like the Commission's prior CableCARD and IEEE 1394 interface rules, it would saddle

MVPDs and their customers with another unnecessary and costly technology mandate that would likely be obsolete before it could even be implemented.

Commenters also underscore that all this is completely unnecessary. The simple fact is that the video marketplace is, as the Commission itself has repeatedly recognized, vibrantly competitive, and consumers today have more device options than ever before to access their MVPD service via downloadable apps on smartphones, tablets, smart TVs, and other TV-connected devices. Furthermore, this apps revolution is rapidly accelerating, as evidenced by Comcast's announcement of its Xfinity TV Partner Program. By leveraging recently-completed open standard HTML5 technologies, the Program provides a common framework to which smart TVs and other TV-connected devices can build in order to make the Xfinity TV Partner app available to customers on their devices. Comcast is already working with launch partner Samsung Electronics to implement this app on its smart TVs, as evidenced by the recent demonstrations of the Xfinity TV Partner app on a Samsung TV at the INTX conference, and has received dozens of inquiries from others in just the few weeks since launching the Program. Comcast is also open to working with device manufacturers that do not use HTML5, as evidenced by its agreement to develop an app for Roku TVs and streaming devices.

Notwithstanding these developments, the *Notice* calls for the most intrusive regulations of the video ecosystem that the Commission has ever pursued. But a quick review of the record shows overwhelming concern with the Set-Top Box Mandate from a wide and diverse array of entities, including, among others:

- Over 150 bipartisan Members of Congress, including nearly half of the House Democratic Caucus, and 30 members of the Congressional Black Caucus;
- Numerous programmers from larger ones like Fox, CBS, Disney, Viacom to diverse and independent networks like Crossings TV, TV One, VMe, C-SPAN, Revolt, and ¡Hola! TV.

- Nearly 20 content community organizations, including the MPAA, Directors Guild of America, American Federation of Musicians, CreativeFuture, the Independent Film and Television Alliance, National Music Publishers' Association, Recording Industry Association of America, Screen Actors Guild/American Federation of Television and Radio Artists, and the Copyright Alliance;
- Thirty-five diversity and civil justice groups, such as the NAACP, Rainbow PUSH Coalition, National Action Network, National Black Chamber of Commerce, MANA – A National Latina Organization, Hispanic Technology and Telecommunications Partnership, the National Urban League, and the LGBT Tech Partnership;
- Accessibility advocates like the American Council of the Blind and Telecommunications for the Deaf and Hard of Hearing, Inc.;
- Environmental organizations like the Natural Resources Defense Council;
- Device manufacturers like Roku and ARRIS and other technology companies like Cisco;
- Dozens of academics and public policy groups, including a former Commission Chief Economist;
- Organizations representing more than 1.8 million members of the labor community, including the Communications Workers of America, the International Brotherhood of Electrical Workers, and the International Alliance of Theatrical Stage Employees; and
- Over 70,000 concerned consumers.

Even proponents of the Commission's proposal have raised concerns about significant aspects of the proposal. On the same day that the White House issued a blog post endorsing the Set-Top Box Mandate, its advisory arm on telecommunications policy acknowledged that, with respect to privacy obligations, the Commission's proposal "leaves important questions to be addressed" and that it is "important to consider the potential for an effect on specialized and minority programmers."

On issue after issue, the record undermines the various claims that have been made in support of the Set-Top Box Mandate. First, the Commission initially asserted that expansive new mandates are needed to provide consumers with competitive alternatives to operator-supplied set-top boxes. But, as numerous commenters have demonstrated, MVPD apps are

providing those device alternatives, fulfilling the requirements of Section 629 and the Commission's navigation device goals, and without any of the harms that would result from the Set-Top Box Mandate. And to the extent the Commission and commenters supporting the Set-Top Box Mandate – such as Google, Public Knowledge, and Consumer Video Choice Coalition (“CVCC”) – view the rulemaking as a way to enable third-party device makers and app developers to offer *competing video services* using the piece-parts of MVPD service,³ this view goes well beyond the Commission's authority. Section 629 makes clear that Congress intended to promote the retail availability of new *equipment* used by consumers to access an MVPD's service over the MVPD's network, not mandate the unbundling and forced sale (for free) of an MVPD's content and other data to favor Google's search and advertising businesses or other competing third-party video distribution *services*.

Second, the Commission has repeatedly claimed that the Set-Top Box Mandate will protect the sanctity of contracts, but the record makes plain that is not the case. Leading content companies have told the Commission point blank that “the rules would undermine the license agreements that maintain a positive viewing experience and preserve incentives to invest and innovate in both the production and distribution of high-quality video programming.”⁴ Of particular note, TiVo and other proponents of the new rules have expressly stated that these license agreements do not apply to them. Consequently, it is unsurprising that TiVo is already

³ See Google Comments at 1-4; Public Knowledge Comments at 15-19; Consumer Video Choice Coalition (“CVCC”) Comments at 27-28. Unless otherwise noted, comments cited herein are to those filed in MB Docket No. 16-42 and CS Docket No. 97-80 on or around April 22, 2016.

⁴ Letter from Kyle D. Dixon, VP, Public Policy, Time Warner Inc., et al., to Marlene H. Dortch, Secretary, FCC, at 1 (May 6, 2016).

engaging in the types of practices (e.g., ad overlays on existing programming streams) that programmers have warned would be commonplace under the Commission’s rules.⁵

Third, the Commission has maintained that the Set-Top Box Mandate will ensure robust content security. However, programmers and other stakeholders have explained that the proposal would actually create a *less* secure environment for MVPD content, contrary to the express language of Section 629(b) that the “Commission shall not prescribe regulations . . . which would jeopardize security of multichannel video programming and other [MVPD] services . . . or impede the legal rights of a provider of such services to prevent theft of service.” As the record makes clear, the Set-Top Box Mandate would conflict with the content security provisions in programmers’ agreements with MVPDs, and would “jeopardize[] content security” and “increase[] the risk of piracy.”⁶ Notably, content security companies themselves have raised concerns regarding the impact of the Set-Top Box Mandate:

The government-mandated reduction to a single, regulated standard for security would create unacceptable vulnerabilities, prevent future innovations, and hamper the current competitive marketplace. . . . Regulated standards that dictate what a security system can and cannot do will tie the hands of a security platform provider . . . which needs the flexibility to adapt to every changing security circumstance.⁷

And rather than explaining or demonstrating how content security will be ensured, proponents of the Set-Top Box Mandate simply state, without any support, that it will be so. Wishful thinking, however, is no basis for reasoned decision-making, particularly when dealing with the security of the very asset – content – that is driving this entire ecosystem.

⁵ See, e.g., National Cable & Telecommunications Association (“NCTA”) Comments at 44-47; Letter from Rick Chessen, Senior Vice President Law & Regulatory Policy, NCTA, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 15-64, at 5-8 (Jan. 15, 2016) (“Jan. 15 NCTA Ex Parte”).

⁶ MPAA Comments at 20-21.

⁷ Cisco Comments at 9-10.

Fourth, the Commission has claimed that its proposal would create new carriage opportunities for diverse programmers, but here again numerous independent diverse programmers and diversity groups strongly reject that view. Diverse and independent programmers have explained that the Set-Top Box Mandate, among other things, would be “catastrophic” and “pose[] an existential threat” to diverse and independent networks,⁸ and that “minority content is likely to be buried on the ‘lowest rung’ of . . . search results.”⁹ It also bears emphasis that nothing is stopping third-party device makers and app developers from promoting diverse programmers on their platforms today, but they have chosen not to do so. There is no reason to believe that their approach would change if new rules were adopted.

Fifth, the Commission repeatedly has contended that its proposal will maintain privacy and other consumer protections, but the record makes abundantly clear that the self-certification regime proposed in the *Notice* is legally impermissible and unworkable. As the Electronic Privacy Information Center explained, self-certification “fails to meaningfully protect consumers” and “fails to provide for effective oversight and enforcement.”¹⁰ There is simply no practical way for MVPDs to monitor the activities of third parties or enforce compliance in the absence of any contractual relationship with those third parties. In the case of privacy, after having the Commission’s original proposal widely denounced as ineffective and thoroughly debunked, the Commission and proponents of the Set-Top Box Mandate now have turned to outsourcing privacy enforcement to the Federal Trade Commission (“FTC”) as a potential solution to the significant privacy concerns that have been raised. Yet, far from providing any assurances on the privacy front, this latest round of whack-a-mole simply abdicates the

⁸ Crossings TV Comments at 2-3.

⁹ TV One Comments at 15.

¹⁰ Electronic Privacy Information Center (“EPIC”) Comments at 7.

Commission's responsibility in the important area of privacy to another agency. The Commission has no authority to subdelegate its regulatory and enforcement responsibilities under Section 631 and Section 338 in this manner. Notably, even with the FTC's involvement, consumers would still not receive all of the protections Congress granted to them under Section 631 and Section 338, such as the right to bring private legal action and their right to have a court order issued before their sensitive personal data may be handed over to the government.

Incredibly, proponents of the Set-Top Box Mandate, who would be the prime beneficiaries of the windfall should these rules be implemented, have explicitly stated that such privacy protections should not apply to them and that new rules are unnecessary. Chairman Wheeler has stated that he disagrees with this view and believes the privacy protections should apply to third-party device manufacturers and app developers.¹¹ Yet, he has not proposed any means that would ensure those entities can comply in any way the Commission can enforce since, for some reason, the Commission has protected edge providers from regulatory oversight at all cost. Moreover, the Commission's proposal refuses to allow contractual privacy for MVPDs to enforce the rules, and rejects the apps-based approach which would obviate this concern.¹²

¹¹ See Wash. Post Interview with Tom Wheeler, Chairman, FCC (Feb. 10, 2016), https://www.washingtonpost.com/video/business/technology/fcc-chairman-talks-set-top-boxes-consumers-right-to-choose/2016/02/10/5c19cdba-cff0-11e5-90d3-34c2c42653ac_video.html ("What we're going to do in our rulemaking is say [to new entrants], 'You have to have the same kind of [privacy] rules that cable companies have.'"); Tom Wheeler, Chairman, FCC, Press Conference at FCC Open Meeting (Feb. 18, 2016), <http://www.c-span.org/video/?404893-1/fcc-meeting-cable-settop-box-purch&start=3271> ("To be able to license the standard, you're going to have to comply with the Title VI Section 631 privacy rules which apply to cable operators.").

¹² With respect to accessibility protections, as commenters explained, the Commission's proposal would create significant gaps in accessibility enforcement since the existing accessibility rules do not apply to third-party apps, and would also raise significant questions around customer support when there are problems or failures with third-party devices and apps.

Finally, the Commission has insisted that the proposal will not require new operator-supplied equipment or impose other significant costs, but here again the record provides substantial evidence to the contrary. Neither the Commission nor any commenter has presented any credible evidence that the proposal can be implemented without additional equipment. In contrast, DBS providers have underscored that they will have to develop new in-home equipment to implement the proposed interfaces given the one-way nature of DBS platforms. Likewise, cable operators have demonstrated that the only practical way to avoid bandwidth and other network harms under the Commission's proposal would be to deploy a new in-home gateway device that could manage the interaction of third-party devices and apps with the network and serve as a firewall to protect the network and subscribers from security breaches.¹³ In his attached technical declaration (*see* Appendix A), Dr. David Reed confirms this conclusion.

Astoundingly, the single technical filing describing how the Set-Top Box Mandate could be implemented was a brief six-page technical appendix filed by the CVCC that lacks specifics, includes substantial gaps, and demonstrates that the proposal is otherwise unworkable. As Dr. Reed explains in greater detail, that filing essentially “has been weighed,” “has been measured,” and has been “found wanting”; even that proposal depends on operator-supplied equipment in the home. Other commenters similarly catalogued substantial harms with the Commission's proposal, including, among other things, forcing changes in network infrastructure, choking off innovation since any new features and services must comply with the new standards, and adding energy costs associated with a new in-home device.

The apps-based model raises none of these issues. In contrast, the apps-based model complies with Section 629 and all other legal requirements; allows consumers to access MVPD

¹³ *See* Comcast Comments at 64-67; NCTA Comments at 18-22, 130-32.

service without the need to lease a set-top box; enables rapid innovation and new service and feature upgrades through automatic updates; complies with contractual, regulatory, and content security requirements; and allows MVPDs to deliver their services as intended and as customers expect on a wide and growing array of devices and platforms.

Remarkably, the Commission’s immediate response to Comcast’s Xfinity TV Partner Program – a no-set-top–box-needed alternative – was to dismiss it out of hand saying it would “allow only Comcast content on different devices.”¹⁴ This criticism makes no sense. Consumers will have access to all of the apps they use on these devices to access video content – whether Netflix, Hulu, Amazon Prime, or others – and will also be able to access Xfinity TV content on the same devices without having to lease a set-top box. They’ll get all of these apps with the user interfaces each provider has designed, as well as whatever umbrella user interface that the device itself provides. The Xfinity TV Partner Program is doing exactly what the statute seeks by offering Comcast’s service on competitive devices available through retail outlets. From the Commission’s dismissal of this new apps program, it seems the Commission’s real objective is not to provide alternatives to leased set-top boxes or even to eliminate set-top boxes, but rather to tilt the video ecosystem playing field in favor of a few tech giants. Chairman Wheeler later stated that the announcement was “a good win and an important thing,” but also suggested that Comcast’s recently announced app program shows that the Commission’s proposal would work, when, in fact, the opposite is true.¹⁵

¹⁴ John Eggerton, *Comcast Xfinity Program Cited in Set-Top Dust-Up*, Broad. & Cable (Apr. 20, 2016), <http://www.broadcastingcable.com/news/washington/updated-comcast-xfinity-program-cited-set-top-dust/155819>. Indeed, following Comcast’s announcement, even the Chairman’s staff made clear that the new rules are really about competing user interfaces: “Today’s cable apps force you to use the user interface cable chooses for you. Wouldn’t *you* like to choose?” @GigiBSohnFCC, Twitter (Apr. 20, 2016), <https://twitter.com/gigibsohnfcc/status/722903678697340930>.

¹⁵ See Amir Nasr, *Wheeler: Comcast “Proving Our Point” with Its New Set-Top Box Plan*, Morning Consult (Apr. 28, 2016), <https://morningconsult.com/alert/wheeler-comcast-proving-point-new-set-top-boxless-plan/>.

Comcast is proposing an apps-based solution that allows customers to receive their MVPD service without the need to lease a set-top box at all. In contrast, the Chairman's proposal favors a government-imposed set-top box mandate that goes well beyond expanding equipment options for consumers to instead taking apart existing video services to create new services. That approach not only exceeds the Commission's rulemaking authority, but also – in stark contrast to the apps approach – creates numerous harms, increasing consumer costs, weakening content security, eroding privacy and other consumer protections, and undermining intellectual property rights and content licensing agreements. In fact, Comcast's announcement proves the viability of a market-driven apps-based approach, which *avoids* the major issues with the Set-Top Box Mandate. To eliminate any doubt about the continued acceleration of apps, Comcast has put forward principles that could serve to advance the goals of Section 629 while preserving the rights of content owners and Title VI protections. Adopting the Set-Top Box Mandate with all of its associated harms and costs instead of the apps model alternative would be the epitome of arbitrary and capricious rulemaking.

As summarized in the chart below, an objective comparison of these two options clearly demonstrates that the Commission should take this opportunity to endorse the apps model as the best way and only rational path forward.



COMPLIES WITH LAWS	<ul style="list-style-type: none"> ✗ Far exceeds Section 629, violates various communications and copyright laws and constitutional protections, and is arbitrary and capricious 	<ul style="list-style-type: none"> ✓ Complies with Section 629 and all other legal requirements
FOSTERS INNOVATION	<ul style="list-style-type: none"> ✗ Unproven in the marketplace with speculative manufacturer and consumer demand ✗ Locks in technical solutions that will be overtaken by marketplace developments and deters innovation ✗ Requires development of new standards through an unworkable and time-consuming, multi-year standards-setting process ✗ Rigid "parity" rules delay creation of new features and services 	<ul style="list-style-type: none"> ✓ Allows for rapid innovation and new service and feature upgrades through automatic app updates and downloads
EASY TO IMPLEMENT	<ul style="list-style-type: none"> ✗ Requires substantial and costly changes to MVPD networks ✗ Requires a new in-home gateway device (a "second box") ✗ More costs to consumers ✗ Requires additional network bandwidth, reducing bandwidth available for other innovations and migration to all-IP services 	<ul style="list-style-type: none"> ✓ Compatible with existing MVPD networks and supported on many retail devices ✓ Same consumer-friendly approach as Netflix, Amazon, Apple, Google, and others in placing apps on third-party devices
MAINTAINS MVPD SERVICE	<ul style="list-style-type: none"> ✗ Customers don't receive their MVPD service ✗ Infringes on MVPDs' copyright interests in distinctive service offerings 	<ul style="list-style-type: none"> ✓ Allows MVPDs to deliver their services as intended and as customers expect ✓ Allows third-party device manufacturers, e.g., Roku and Samsung, to innovate through their own topline user interfaces
HONORS PROGRAMMING AGREEMENTS	<ul style="list-style-type: none"> ✗ Infringes on programmers' copyright interests by creating a zero-rate compulsory copyright for third parties ✗ Allows third parties to ignore programming agreements (i.e., overlay ads, disrupt channel lineups and content presentation) ✗ Disrupts economic incentives to invest in high-quality programming ✗ Hurts diverse and independent programmers 	<ul style="list-style-type: none"> ✓ Respects all terms in programming agreements



<p>PREVENTS PIRACY AND THEFT OF SERVICE</p>	<ul style="list-style-type: none"> ✗ Weakens content security and increases risk of piracy by limiting range of permissible DRMs and security technologies ✗ Eliminates MVPD security features in apps and user interface ✗ Prevents MVPDs from testing and certifying security of third-party devices and apps 	<ul style="list-style-type: none"> ✓ MVPDs maintain secure “chain of trust” with security features built into apps
<p>PROTECTS CONSUMER PRIVACY</p>	<ul style="list-style-type: none"> ✗ Unenforceable self-certification for statutory privacy protections, with no way to monitor compliance by third parties ✗ Even if a violation is detectable, only remedy is decertification of device, which makes device useless, thereby hurting consumers ✗ Requires disclosure of sensitive customer entitlement data to third parties without customer consent ✗ No private right of action for privacy violations by third parties 	<ul style="list-style-type: none"> ✓ MVPD apps comply with strict privacy requirements under Sections 631 and 338 of the Communications Act
<p>MAINTAINS OTHER CONSUMER PROTECTIONS</p>	<ul style="list-style-type: none"> ✗ Creates “app gap” since third-party apps are not subject to FCC’s accessibility rules and decisions; weakens accessibility compliance and enforcement regime ✗ No assurances that emergency alerts are transmitted via third-party devices and apps ✗ Third-party devices and apps would be free to overlay ads on children’s programming, exceeding children’s programming advertising time limits 	<ul style="list-style-type: none"> ✓ MVPD apps ensure compliance with accessibility, EAS, and children’s programming ad limit obligations
<p>ENSURES CUSTOMER SERVICE</p>	<ul style="list-style-type: none"> ✗ Customers confused about who is responsible for problems accessing MVPD content on third-party devices or apps ✗ No guarantee that third parties will have adequate customer service resources to assist customers 	<ul style="list-style-type: none"> ✓ Customers contact MVPDs to troubleshoot any issues, or use customer service resources within apps; facilitates innovative MVPD customer service solutions, e.g., remote diagnostic and support tools

II. APPS FULFILL THE GOALS OF SECTION 629 WITHOUT THE HARMS OF THE SET-TOP BOX MANDATE, AND CRITICISMS OF THE APPS MODEL ARE WITHOUT MERIT.

The record reflects broad consensus that apps are delivering an ever-growing number of options for consumers to access their MVPD services. From computers to smartphones and tablets to smart TVs and TV-connected devices, consumers today enjoy expanding device options when it comes to how they want to watch video programming, and these choices continue to proliferate. A broad range of commenters resoundingly support the apps-based model as the best path forward, and one that complies with Section 629 and is *already* achieving Congress's and the Commission's navigation device goals and benefitting consumers:

- “The applications approach is a creative, technology-neutral, and consumer-friendly solution that is already transforming the marketplace.”¹⁶
- “Consumers today enjoy unprecedented access to some of the highest-quality television programming ever produced, which they can watch anytime, anywhere, and on a wide variety of devices. . . . [I]t is unclear what purpose the new rules would serve in this era of unprecedented consumer choice.”¹⁷
- “It is not the Commission’s proposal but an app-based approach that aligns with customer needs and is supported by MVPD trends towards more app-based delivery of video content”¹⁸
- “App-driven innovations are already fostering unprecedented competition in the video market and providing diverse programmers more opportunities than ever for serving the nation’s growing Hispanic community.”¹⁹
- “[T]he apps-based model . . . fully protects consumers’ privacy interests and programmers’ copyright interests while achieving the Commission’s stated goals.”²⁰
- “Apps are providing consumers with numerous and new ways to access MVPD and other video services on more and more devices, and are achieving the navigation device goals

¹⁶ Multicultural Media, Telecom and Internet Council (“MMTC”) et al. Comments at 5.

¹⁷ Letter from 60 Bipartisan Members of Congress to Chairman Tom Wheeler, FCC, at 1 (May 5, 2016).

¹⁸ ACA Comments at 57.

¹⁹ Hispanic Technology and Telecommunications Partnership Comments at 2.

²⁰ LGBT Technology Partnership Comments at 1.

of Section 629 – all in response to consumer demand and in the absence of any government mandates.”²¹

- “Roku has found that in geographic markets where MVPD apps are available they are downloaded by large numbers of subscribers and are used on a regular basis once they have been downloaded. The Time Warner Cable app ranks among the most highly used apps of the more than 3,000 apps on Roku, even with the app currently available only in select markets. Roku also expects these positive trends to continue over time, especially as more MVPDs develop and promote Roku apps to their subscribers.”²²

And MVPD apps are meeting contractual, regulatory, and security requirements without creating any of the harms to innovation and high-quality programming, unnecessary costs to consumers, or legal infirmities that would result from the Commission’s Set-Top Box Mandate.²³

Criticisms of the apps-based approach are unfounded. Proponents of the Set-Top Box Mandate complain that MVPD apps are “proprietary” and present MVPD content in a “walled garden” that somehow prevents customers from accessing other content.²⁴ But there is nothing improper with MVPDs controlling how the service they have paid for, assembled, and curated is presented, which is precisely the MVPD service to which Section 629 applies. This ensures that MVPDs are complying with their programming agreements and regulatory obligations, and enables MVPDs to differentiate their services in the competitive video marketplace.²⁵ Indeed – and importantly – this is exactly the same approach that apps from Netflix, Hulu, Amazon Prime, and every other video distributor follow in the marketplace, but no one is suggesting that this is

²¹ ARRIS Comments at 5.

²² Roku Comments at 7.

²³ *See, e.g.*, Comcast Comments at 14-19, 32-60; AT&T Comments at 11-14; NCTA Comments at 148-54; ACA Comments at 57; ARRIS Comments at 11; Roku Comments at 6-8; Copyright Alliance Comments at 14-15; Independent Film & Television Alliance (“IFTA”) Comments at 5-6; Victor Cerda and Other Independent Content Creators (“Cerda et al.”) Comments at 3; MMTCC et al. Comments at 21-22.

²⁴ *See* Public Knowledge Comments at 3; Engine Advocacy and Fandor Comments at 10-13; TiVo Comments at 4-6; CVCC Comments at 36-37.

²⁵ *See* AT&T Comments at 13; EchoStar/Dish Comments at ii-iii, 19; Midcontinent Communications Comments at 2-3; NCTA Comments at 108-09.

“improper” or that Netflix be required to allow Hulu to deliver Netflix’s programming in the Hulu app. Furthermore, the MVPD app experience in no way interferes with customers’ ability to use other apps to access video programming on the retail device. Customers can access content using their MVPD’s app, or toggle to other apps on the device user interface to access content from other distributors.

Proponents of the Set-Top Box Mandate also claim that MVPD apps provide a limited range of content and do not support integrated search.²⁶ While some of Comcast’s first-generation apps presented only VOD content,²⁷ its current-generation apps support the linear channel lineup, including PEG and local broadcast channels, VOD programming, and cloud DVR capability. And, as Comcast explained in its comments, it has now launched the Xfinity TV Partner Program to enable smart TVs and other devices to access Xfinity TV service using an open-standards-based HTML5 app, without the need to lease a set-top box from Comcast.²⁸ Samsung joined as the first partner. Comcast is also open to developing apps for device platforms that do not support HTML5, and, in this regard, announced last month that it is developing a customized app for Roku TVs and streaming players. In the short time since the

²⁶ See Amazon Comments at 3-5; Engine Advocacy and Fandor Comments at 8-9; INCOMPAS Comments at 5.

²⁷ For example, Comcast’s Xfinity apps for certain Samsung smart TVs and Xbox 360 were developed very early in app deployment and only included VOD content. Ultimately, Comcast decided to sunset these apps and expand the availability of current-generation apps to support linear channels, VOD, and cloud DVR recording capability.

²⁸ See Press Release, Comcast Corp., Comcast Launches Xfinity TV Partner Program; Samsung First TV Partner to Join (Apr. 20, 2016), <http://corporate.comcast.com/news-information/news-feed/comcast-launches-xfinity-tv-partner-program-samsung-first-tv-partner-to-join>; Comcast Comments at 25-30. As Comcast explained, HTML5 with premium video extensions is an open W3C standard. See Comcast Comments at 28-29. HTML5 with premium video extensions was designed to enable service providers to present an interface to their services that includes interactive graphics and video, and this is the manner in which OVDs like Netflix and MVPDs like Comcast are using the standard today. Comcast’s HTML5-based app will appear in the umbrella user interface of device partners, alongside other apps, and once the consumer opens the Xfinity TV app, the Xfinity TV service is presented using the Xfinity user interface. Letter from Jordan B. Goldstein, Vice President, Regulatory Affairs, Comcast, to Marlene H. Dortch, Secretary, FCC, at 2 (May 11, 2016).

launch of the Xfinity TV Partner Program, Comcast has received inquiries from dozens of other companies, further demonstrating the success of the market-driven apps-based approach.²⁹

To eliminate any doubt about the continued acceleration of apps, Comcast put forward in its initial comments principles that will ensure (i) an open standards-based app is available to any interested third-party device manufacturer on commercially reasonable terms, and (ii) good faith negotiations on a customized app solution with device manufacturers that do not support that standard. As for integrated search, that is importantly not required by Section 629, since by definition it is concerned with services *not* provided by the MVPD, which clearly goes well beyond the objectives and related authority Congress authorized in the statute. That said, Comcast stated that it is prepared to provide consumers with a capability to search through Comcast's video assets from a device's user interface with playback of a selected asset handled in the Xfinity TV app. However, in order to provide a cohesive customer experience, such integrated search needs to include more than just MVPD apps; it must also include similar data from OVD and other video apps as well. Comcast believes these principles could serve to advance the statutory goals while preserving the rights of content owners and Title VI protections.

Some proponents of the Set-Top Box Mandate suggest that rules are necessary to extend the CableCARD model into the IP environment.³⁰ But the notion that CableCARD should provide a template for new Commission rules ignores the fact that CableCARD has been a failure in the marketplace. Comcast has done more than any operator to support CableCARD

²⁹ See Comcast Comments at 5; David L. Cohen, "Back to the Future" Doesn't Work for Set-Top Boxes, Comcast Voices (Apr. 22, 2016), <http://corporate.comcast.com/comcast-voices/set-top-boxes>.

³⁰ See CVCC Comments at 23-24; Public Knowledge Comments at 10.

devices, but consumer adoption of those devices has been very limited.³¹ In contrast, the apps-based model has been an overwhelming success among consumers – and in fact improves upon the CableCARD model by providing access to a broader range of content on retail devices and ensuring that customers have access to the user interface developments that cable providers have worked very hard over the past decade to develop as part of the integrated entertainment experience that cable has become.

As Comcast noted in its initial comments, over 460 million connected, consumer-owned devices support one or more MVPD apps. Roku, an apps-based platform, outsells TiVo devices 10 to 1. Roku’s success belies the supposed need for competitive user interfaces. Providers distribute their video programming using their own branded apps and user interfaces, while Roku and other retail devices can differentiate themselves through top-level menus and guides. “In Roku’s experience, the user interface is an integral part of a video service, including its economics. Mandating that full control of a video service’s user interface be given to third parties would be a significant disruption to the industry that would also impact content owners, advertisers, consumers, and others.”³²

III. THE COMMISSION LACKS THE AUTHORITY TO ADOPT THE SET-TOP BOX MANDATE, AND THE RECORD REINFORCES THAT LEGAL CONCLUSION.

“When Congress enacted Section 629(a), it made unmistakably clear through the plain text, history, and structure of the statute that the scope of the FCC’s rulemaking authority was

³¹ Cable operators continue to support CableCARDs notwithstanding the *EchoStar* decision, which vacated the CableCARD support rules. Indeed, as NCTA noted, cable operators “continue to have a duty under Rule 76.1204(a)(1) to provide separate security.” NCTA Comments at 173. Thus, there is no need to reinstate the CableCARD support regulations, and “such rules could constrain innovation in the future as they become more and more outdated.” *Id.*

³² Roku Comments at 3.

limited to assuring the ‘commercial availability’ of ‘equipment’ used by ‘consumers’ to access their *MVPDs*’ service.”³³ Proponents of the Set-Top Box Mandate, however, make abundantly clear in their comments that they view this rulemaking as not being about enabling access to MVPD service on retail equipment, as the statute envisions, but rather about enabling device makers and app developers to offer derivative services using piece-parts of the MVPD service.³⁴ Google, for example, transparently describes the rulemaking as a way to enhance its search and advertising businesses.³⁵ Proponents of the rules do not explain how the text of the statute or legislative history support this expanded view of the Commission’s authority – nor can they.³⁶ No such support exists.

As NCTA points out, “the forced unbundling of MVPD service in order to facilitate the creation of new, derivative services provided by third parties using the disaggregated components of the subscriber’s MVPD service . . . is far beyond the permissible scope of Section 629.”³⁷ The D.C. Circuit and the Commission itself have both properly recognized these limitations,³⁸ and the legislative history of the statute confirms Congress’s intent to limit the scope of Section 629 and the Commission’s rulemaking authority to promoting retail devices that

³³ NCTA Comments, App. A at iii (emphasis in original).

³⁴ See TiVo Comments at 14-15 (alleging that true retail competition “involves innovative user interfaces, improved search functions including the ability to search across MVPD and OTT content, content recommendation, social media features, and so on that give consumers greater choice and an enhanced user experience”); CVCC Comments at 15; Public Knowledge Comments at 37-39; Consumer Federation of America (“CFA”) Comments at 3, 19-23.

³⁵ See Google Comments at 3-4.

³⁶ See, e.g., CVCC Comments at 21-24; Public Knowledge Comments at 4-9.

³⁷ NCTA Comments, App. A at iii; see also AT&T Comments at 59-63; ACA Comments at 67-70; NTCA—The Rural Broadband Association Comments at 25-27; Roku Comments at 14-16.

³⁸ See Comcast Comments at 39-40 (citing, among other precedent, the Commission’s *Gemstar Order*, which found that “Section 629 is intended to assure the competitive availability of *equipment*, including *converter boxes*, interactive communications *equipment*, and other *equipment* used by consumers to access multichannel video programming and other services offered over multichannel video programming systems.” (emphases in original)); see also NCTA Comments, App. A at 13-19.

receive services “*provided by*” MVPDs.³⁹ The D.C. Circuit has already warned the Commission against “unbridled” interpretations of Section 629,⁴⁰ and that it “cannot simply impose any regulation . . . as a means of promoting the commercial availability of navigation devices, no matter how tenuous its actual connection to [Section] 629’s mandate.”⁴¹ But this is precisely what proponents of the Set-Top Box Mandate would have the Commission do.⁴²

In addition, as Comcast and others explained in their initial comments, the proposed unbundling mandate would conflict with other provisions of the Communications Act by impermissibly subjecting MVPDs to common carrier regulation in violation of Section 621(c) and improperly interfering with the provision and content of cable service in contravention of Section 624(f).⁴³

Attempts to point to other sources of authority – Section 624A and STELAR – to adopt the proposed rules are likewise unavailing.⁴⁴ Section 624A “does not authorize the Commission to promulgate rules, such as those at issue here, that go beyond ensuring compatibility of cable systems with video cassette recorders.”⁴⁵ In addition, the notion that STELAR provides a substantive statutory basis for the Set-Top Box Mandate is entirely at odds with the deregulatory

³⁹ See Comcast Comments at 40; NCTA Comments, App. A at 24-26.

⁴⁰ See *EchoStar Satellite L.L.C. v. FCC*, 704 F.3d 992, 997 (D.C. Cir. 2013).

⁴¹ *Id.* at 997-98. Proponents’ repeated references to *Carterfone*, which merely established a right to attach third-party phone equipment and not the obligation to unbundle and disaggregate the underlying telephone service, do nothing to alter these limitations. Moreover, commenters further explained that, as the Commission has previously recognized, *Carterfone* and the telephone network are not analogous to the video device marketplace. See NCTA Comments at 155-61 (citing prior Commission statements on the issue); AT&T Comments at 67.

⁴² It is telling that, while supporting the Set-Top Box Mandate and lauding the purported benefits for consumers and competition, Amazon at the same time insists that the rules should only apply to MVPDs and not to its own video services. Apparently, Amazon believes that the apps model works perfectly well for OVDs and app-powered devices like Amazon Fire TVs and tablets, but not for MVPDs. See Amazon Comments at 9-10.

⁴³ See, e.g., Comcast Comments at 43-45; NCTA Comments at 163-64 & App. A at 29-30, 33-36.

⁴⁴ See, e.g., CVCC Comments at 24-25; INCOMPAS Comments at 10; TiVo Comments at 11-12.

⁴⁵ AT&T Comments at 75; see also Comcast Comments at 45; NCTA Comment at 163 & App. A at 64-65.

intent of the statute.⁴⁶ In STELAR, Congress *eliminated* the unnecessary integration ban (which cost consumers over \$1 billion dollars) and gave the Commission the very limited task of issuing a report on downloadable security. Once the Commission completed that task, its authority under STELAR was at an end.⁴⁷ Certainly, “Congress did not remotely contemplate the kind of heavy-handed government intervention in a working marketplace that the Commission has proposed.”⁴⁸ In fact, the legislative history of STELAR reveals that, during consideration of the STELAR bill in the Senate Commerce Committee, Senator Markey proposed an amendment that would have directed the Commission to adopt unbundling rules similar to those proposed in the Set-Top Box Mandate, but withdrew the amendment.⁴⁹

The Commission also cannot ignore the host of other legal issues its misguided Set-Top Box Mandate would create, and no commenter has provided a workable or lawful solution to these issues, which arise from the fact that the *Notice* would take the Commission well outside its statutory authority and expertise.⁵⁰ As discussed further below, the proposed rules would

⁴⁶ See CVCC Comments at 22-23; INCOMPAS Comments at 9-10; Public Knowledge Comments at 7; TiVo Comments at 10-11. *But see, e.g.*, CenturyLink Comments at 14 (noting that STELAR directed the Commission to form a working group to develop a not unduly burdensome downloadable security system and that “[t]he Commission’s use of the STELAR-mandated DSTAC process as a jumping off point for new burdensome rules that have as their core purpose fostering the development of an entirely new competitive MVPD navigation ecosystem, directly contravenes that Congressional mandate”).

⁴⁷ See *Motion Picture Ass’n of Am., Inc. v. FCC*, 309 F.3d 796, 807 (D.C. Cir. 2002) (“Congress authorized and ordered the Commission to *produce a report* – nothing more, nothing less Once the Commission completed the task of preparing the report . . . , its delegated authority on the subject ended.”).

⁴⁸ AT&T Comments at 65.

⁴⁹ See Comcast Comments at 42-43; AT&T Comments at 65.

⁵⁰ See NCTA Comments, App. A; see also NCTA, *Summary of Legal White Paper: The FCC’s “Competitive Navigation Mandate: A Legal Analysis of Statutory and Constitutional Limits on FCC Authority*, <https://www.ncta.com/sites/prod/files/Summary%20Set-Top%20Box%20Legal%20Issues%20White%20Paper%204-21-16%20FINAL.pdf>.

conflict with copyright law,⁵¹ as well as other intellectual property protections.⁵² The Set-Top Box Mandate would also run afoul of the First Amendment by impermissibly compelling speech and also restricting the protected speech of MVPDs and programmers,⁵³ and would authorize unlawful takings of property in violation of the Fifth Amendment.⁵⁴ Furthermore, the Set-Top Box Mandate is otherwise arbitrary and capricious. “The rules would impose tremendous costs on the industry and ultimately consumers, at tremendous risk to innovation and other societal benefits, to fix a ‘problem’ that the market is already efficiently resolving with the apps-based approach – a solution that fully satisfies Section 629.”⁵⁵

Beyond the fact that the Commission would be exceeding its authority with the Set-Top Box Mandate, it would also be acting in an area where the marketplace has already achieved the desired result, making additional requirements unnecessary, unauthorized and at best arbitrary. Notwithstanding the clear evidence that the apps model is being widely embraced in the marketplace, proponents of the Set-Top Box Mandate nevertheless insist that government intervention is somehow warranted. For example, despite the Commission’s repeated findings that the MVPD marketplace is highly competitive,⁵⁶ the Consumer Federation of America

⁵¹ See discussion *infra* Section IV.

⁵² See Comcast Comments at 51-54; NCTA Comments, App. A at 55-63.

⁵³ See AT&T Comments at 87-92; NCTA Comments, App. A at 69-74; Content Companies Comments at 41-42; Motion Picture Association of America (“MPAA”) Comments at 18-19.

⁵⁴ See AT&T Comments at 93-95; USTelecom Comments at iv, 17; Content Companies Comments at 42; MPAA Comments at 19-20.

⁵⁵ NCTA Comments, App. A at vii.

⁵⁶ The Commission itself has underscored that the video marketplace is “markedly different” than it was two decades ago, “with cable operators facing dramatically increased competition,” see *Amendment to the Commission’s Rules Concerning Effective Competition, Implementation of Section 111 of the STELA Reauthorization Act*, Notice of Proposed Rulemaking, 30 FCC Rcd. 2561 ¶¶ 6-7 (2015), and concluded just last year that cable systems nationwide were presumptively subject to effective competition in light of this changed marketplace, see *Amendment to the Commission’s Rules Concerning Effective Competition, Implementation of Section 111 of the STELA Reauthorization Act*, Report and Order, 30 FCC Rcd. 6574 ¶ 1 (2015); see also *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Seventeenth Report, DA 16-510, ¶ 20

suggests that new rules are necessary to promote greater MVPD competition.⁵⁷ CFA’s view of the MVPD marketplace bears no resemblance to current realities, where 99 percent of consumers can choose from three or more MVPDs, to say nothing of the plethora of online video options.⁵⁸ And this fierce competition is what is driving MVPDs to offer consumers more options for accessing their MVPD services and allowing MVPDs to differentiate themselves from their competitors.⁵⁹

IV. THE RECORD CLEARLY SUBSTANTIATES THAT THE COMMISSION’S SET-TOP BOX MANDATE WOULD ENDANGER THE ENTIRE CONTENT PRODUCTION ECOSYSTEM.

There is widespread agreement among the vast majority of programmers that have commented in the proceeding, as well as other commenters, that the Commission’s Set-Top Box Mandate “would apply the reverse-Midas touch” to the Golden Age of video and pose grave risks to the robust array of diverse and high-quality content choices consumers enjoy today.⁶⁰

The Commission’s proposed rules would undermine programming agreements, harm diverse and

& tbl. III.A.2 (May 6, 2016) (“Seventeenth Video Competition Report”); *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Sixteenth Report, 30 FCC Rcd. 3253 ¶¶ 30-31 & n.71 (2015) (finding that 99 percent of consumers can choose from three or more traditional MVPDs); *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Fifteenth Report, 28 FCC Rcd. 10496 ¶ 354 (2013) (finding that “the [device] marketplace is more dynamic than it has ever been.”).

⁵⁷ CFA Comments at 19-23; *see also* Public Knowledge Comments at 37-39.

⁵⁸ Seventeenth Video Competition Report ¶ 20 & tbl. III.A.2.

⁵⁹ This intense competition also undermines the rationale for any new anti-subsidy rules. Such rules are tantamount to rate regulation, and are particularly unwarranted given that the Commission concluded that there is a rebuttable presumption the cable operators are subject to effective competition. *See* discussion *supra* note 56; *see also* NCTA Comments at 169-72; AT&T Comments at 97-100. Indeed, the Commission itself has recognized that “subsidies by entities lacking market power present little risk of consumer harm and to impose restrictions would create market distortions.” *Implementation of Section 304 of the Telecommunications Act of 1996; Commercial Availability of Navigation Devices*, Report and Order, 13 FCC Rcd. 14775 ¶ 92 (1998); *see also* AT&T Comments at 98. As AT&T observed, these rules would “impose costly and artificial pricing requirements for no benefit.” AT&T Comments at 99.

⁶⁰ *See* Rep. Henry Waxman, *FCC Cable Box Proposal Affects More Than Just Cable Boxes*, The Hill, Congress Blog (Mar. 21, 2016), <http://thehill.com/blogs/congress-blog/technology/273590-fcc-cable-box-proposal-affects-more-than-just-cable-boxes>.

independent programmers in particular, infringe on copyright interests, jeopardize security, and facilitate piracy. These threats to the content production ecosystem are entirely unnecessary given that MVPD apps fully implement the contractual requirements in programming agreements and provide programmers with the necessary assurances to license the full range of content.

The Set-Top Box Mandate Ignores Licensing Agreements. Programmers observed that the Commission’s forced disaggregation mandate would enable third-party device manufacturers and app developers to create derivative services without permission from or compensation to programmers or content creators.⁶¹ These comments firmly rebut the Chairman’s conclusory and unsupported claim that the Set-Top Box Mandate will “honor[] the sanctity” of programming agreements.⁶² Rather, as the Content Companies explained: “[T]he Commission’s proposals as structured would allow third parties to appropriate, monetize, and distribute content without undertaking any of the risks or expenses associated with the creation of that content and without being bound by any of the duties or obligations that distributors agree to in order to obtain distribution rights.”⁶³

Under the Commission’s proposal, third-party device manufacturers and app developers would be free to ignore key licensing terms between MVPDs and programmers, such as those related to content protection, content integrity, and content promotion, enabling third parties to,

⁶¹ See, e.g., Content Companies Comments at 6-12, Revolt Comments at 2; Cerda et al. Comments at 1.

⁶² See Fact Sheet, FCC Chairman Proposal To Unlock The Set-Top Box: Creating Choice & Innovation, at 2 (Jan. 27, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-337449A1.pdf; see also Notice, 31 FCC Rcd. at 1601 (statement of Chairman Tom Wheeler) (“This proposal will *not* interfere with the business relationships or content agreements between MVPDs and their content providers or between MVPDs and their customers.”) (emphasis in original).

⁶³ Content Companies Comments at 2.

for example, overlay advertising, alter channel placement, and display pirated content next to lawful content.⁶⁴ Proponents of the rule claim that such concerns are unwarranted,⁶⁵ but commenters point out that TiVo is overlaying ads today and such practices are likely to become more widespread under the Commission's proposal.⁶⁶ And because MVPDs and programmers would not have a direct contractual arrangement with these third parties under the proposed rules, there would be no effective method for enforcing licensing terms.⁶⁷ The Set-Top Box Mandate would, thus, reduce programmers' incentives to create programming and diminish their ability to monetize the content they do produce.⁶⁸

The Set-Top Box Mandate Harms Diverse and Independent Programmers. Proponents of the Set-Top Box Mandate claim that the proposed rules would somehow create new opportunities for programmers, particularly diverse and independent programmers, by making it easier to search for their content and enabling them to find an audience.⁶⁹ But these claims are without merit.

Diverse and independent programmers have explained that the Commission's proposal would be particularly harmful for their networks.⁷⁰ For example, Revolt noted that "the first

⁶⁴ See Comcast Comments at 73-74, 77-82; EchoStar/Dish Comments at 2, 18-19; IFTA Comments at 5-7.

⁶⁵ See TiVo Comments at 20 (claiming that TiVo devices have always protected content); INCOMPAS Comments at 21-22.

⁶⁶ See NCTA Comments at 44-47; NAB Comments at 11-12; Comcast Comments at 81; see also Letter from Neal M. Goldberg, Vice President & General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 15-64, at 2 (Jan. 21, 2016) ("Jan. 21 NCTA Ex Parte").

⁶⁷ Indeed, TiVo clearly stated that it "is not, and never has been, bound to programming agreements entered into by MVPDs to which TiVo is not a party." TiVo Comments at 19.

⁶⁸ See, e.g., Directors Guild of America Comments at 7-8; Mnet America Comments at 1.

⁶⁹ See CVCC Comments at 49-53; Greenlining Comments at 4-5; TiVo Comments at 6-7; INCOMPAS Comments at 7; Public Knowledge Comments at 39-44.

⁷⁰ See, e.g., TV One Comments at 13-15; Mnet America Comments at 1; Crossings TV Comments at 2-3; MMTc et al. Comments at 8-11; see also Creators of Color Comments at 1-2.

victims [of the Commission’s mandate] will be diverse and independent voices.”⁷¹ A group of independent content creators echoed these concerns, stating that the proposal “will result in audiences having fewer and less diverse options for programming on TV.”⁷² Furthermore, claims that the Set-Top Box Mandate will benefit diverse and independent programmers are belied by what device makers are doing in the marketplace today. They have every opportunity to make diverse and independent content easier to find and watch, but these device makers are not doing so.⁷³ There is no reason to believe that would change under the proposed rules. In contrast, as explained below, Comcast has created dedicated VOD libraries for diverse content and has provided other features like enhanced search and voice remote to enable subscribers to easily find and access diverse and independent programming in a variety of ways.

Public Knowledge alleges that Comcast disadvantages diverse programming in its VOD menu, and points to this as “evidence” of the harms associated with MVPD-controlled user interfaces.⁷⁴ These allegations are baseless. Comcast has a section of its VOD library dedicated to diverse programming, and has been an industry leader in supporting diverse and independent programming. In the last five years, Comcast has expanded the quality and quantity of diverse VOD programming to nearly 12,000 hours as of the end of 2015, an increase of 70 percent over 2014 and more than 1,100 percent over year-end 2010.⁷⁵ In addition, Comcast has substantially

⁷¹ Revolt Comments at 2.

⁷² Cerda et al. Comments at 1.

⁷³ See Comcast Comments at 82.

⁷⁴ See Public Knowledge Comments at 25. In addition, CVCC’s claims that Comcast seeks an equity interest in diverse networks in exchange for carriage are false, see CVCC Comments at 50, and Comcast no longer has any ownership stake in TV One, see Opposition of Comcast Corporation to Petition of the National Association of African American Owned Media and Entertainment Studios, Inc., MB Docket No. 10-56, at 10-11 (Apr. 4, 2016) (rebutting similar claims).

⁷⁵ See Comcast Comments, MB Docket No. 16-41, at 19 (Mar. 30, 2016).

expanded carriage of over 141 independent networks by more than 217 million subscribers since 2011.⁷⁶ One hundred of the independent networks carried by Comcast are focused on diverse programming, and Comcast is exploring innovative ways to feature independent content across multiple screens.⁷⁷

Furthermore, Public Knowledge’s absurd and misleading claim that Comcast does not display VOD programming according to some negotiated channel line-up does not make any sense in the context of a VOD menu, which does not have “channels.”⁷⁸ Linear services, not VOD, are presented in the channel lineup menu. Moreover, Comcast’s VOD offerings indeed are displayed fully consistent with any programming contract provisions that govern such display, e.g., children’s programming not being displayed next to R-rated programming.

The Set-Top Box Mandate Infringes on Copyright Interests. There is likewise no merit to the claim that the Set-Top Box Mandate will ensure that copyright interests will continue to be protected exactly as they are now.⁷⁹ Programmers and other commenters explained that the Set-Top Box Mandate would essentially create a zero-rate compulsory copyright license.⁸⁰ Third parties would be able to “use copyrighted content to enhance their commercial services without

⁷⁶ This includes “expanded carriage of networks tailored to diverse audiences such as The Africa Channel (by more than two million), Crossings TV, a channel focused on Asian American programming (by more than three million), Mnet, a South Korean-based music television channel (by more than four million), TV One (more than 600,000), and African-American religious programmers UP (f/k/a Gospel Music Channel) and Word Network (by six million and three million, respectively).” *See id.* at 17-19.

⁷⁷ *See id.*

⁷⁸ *See* Public Knowledge Comments at 24.

⁷⁹ Comcast and other commenters explained that, in addition to infringing on programmers’ copyright interests, the Set-Top Box Mandate would also infringe on MVPDs’ copyright interests in their works and the copyright interests of guide data providers and metadata providers. *See, e.g.,* Comcast Comments at 50-51; EchoStar/Dish Comments at 22-23; NCTA Comments at 168 & App. A at 48-55; Gracenote Comments at 10-13 (expressing concern that the Commission’s proposal would force MVPDs to pass through Gracenote’s proprietary metadata – Entertainment Identified Register ID – to third parties).

⁸⁰ Content Companies Comments at 34-40; Comcast Comments at 73-74; MPAA Comments at 7-8.

compensating the content company,” thus interfering with copyright holders’ exclusive rights to control how their original content is published and used and enabling the creation of unauthorized derivative works.⁸¹ Numerous commenters point out that the Commission has no jurisdiction over copyright and certainly no authority to mandate a zero-rate compulsory copyright license.⁸²

Public Knowledge suggests that the Set-Top Box Mandate does not create copyright concerns because the proposal is simply a successor to CableCARD.⁸³ That argument is wrong. The Commission’s proposal goes well beyond the CableCARD model. Manufacturers of retail CableCARD devices are subject to a privately-negotiated and administered agreement that gives cable operators and programmers rights to enforce specific warranties protecting programming, security, and operations; provides for certification and testing of retail devices; and was designed to be transitional to an apps-based approach for two-way interactive services – all of which are prohibited under the Commission’s proposal.⁸⁴

The Commission has suggested that a DFAST-type license may address the copyright and other programming-related concerns with the proposal,⁸⁵ but that ignores the fact that DFAST is ill suited for today’s video ecosystem. The DFAST license was created exclusively for delivering one-way linear channels to retail CableCARD devices.⁸⁶ The programming and

⁸¹ MPAA Comments at 4-5; *see also* Content Companies Comments at 34-40.

⁸² *See, e.g.*, Content Companies Comments at 34-40; Copyright Alliance Comments at 1; MPAA Comments at 7-8.

⁸³ Public Knowledge Comments at 10.

⁸⁴ *See* NCTA Comments at 60-61; *see also* Jan. 15 NCTA Ex Parte.

⁸⁵ *See Notice* ¶ 71; *see also* CVCC Comments at 32-33; INCOMPAS Comments at 21-22; TiVo Comments at 20.

⁸⁶ NCTA Comments at 60-61.

other rights used to create today’s competing MVPD services have evolved far beyond the unenhanced linear rights covered in DFAST.⁸⁷ Rather, programmers today rely on highly individualized and tailored business-to-business licensing agreements with MVPDs to establish, for example, linear and on-demand rights, in- and out-of-home viewing rights, trusted devices and security arrangements, and acceptable advertising – going beyond what any DFAST-type license would be capable of addressing.⁸⁸ And, as NCTA has observed, “the DFAST warranty has not even sufficed for one-way services. It has not stopped TiVo from overlaying ads on top of broadcast signals carried on cable or streaming signals out of the home without license.”⁸⁹

Moreover, regardless of whether the Commission contemplates managing the licensing itself or tasking a third party to do so, such heavy-handed government intrusion into the marketplace would be unwarranted given that programmers, distributors, device makers, and other participants in the video ecosystem are successfully negotiating licenses all the time. In short, a DFAST-type license would displace business-to-business arrangements that are driving today’s flourishing video marketplace.

Although the *Notice* suggests that programmers retain “rights or remedies under copyright law” to sue third parties for infringing uses of their content, programmers noted that it would be patently unfair for the Commission to rely on litigation to solve problems of its own creation and shift substantial burdens onto programmers. NAB remarked that “[i]t is

⁸⁷ *Id.* at 60-63.

⁸⁸ These agreements are negotiated and updated every few years to account for new products, usages, security threats, and devices.

⁸⁹ Letter from Neal M. Goldberg, Vice President & General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, MB Docket No. 15-64, at 2 (Jan. 21, 2016) (“Jan. 21 NCTA Ex Parte”) (also noting that “[t]he fact that TiVo’s practices have not invited litigation may merely reflect TiVo’s limited market share, rather than demonstrating the success of the DFAST model”).

unreasonable to expect content providers to shoulder the logistical and economic burden of monitoring many competing consumer device and application options, litigating to protect the value of their content with third-parties”⁹⁰ The Content Companies similarly stated that “[r]elying on copyright litigation is no substitute for the entire contractual structure that supports the development and delivery of great content to consumers.”⁹¹

The Set-Top Box Mandate Weakens Security and Facilitates Piracy. Programmers and numerous other commenters warned that the Set-Top Box Mandate would jeopardize content security and facilitate piracy.⁹² Programmers and content owners increasingly require a trusted execution environment as a key element of a strong content security regimen. This environment ensures that all apps and software processes operate within strictly enforced memory partitions that are inaccessible to one another, that content in video and audio decoding pipelines is accessible only to the requesting app, and that apps and software processes consist of “signed code” with a security certificate, so that the integrity of the software can be monitored to prevent hacks, malware, and “jailbreaks” that bypass content security measures. These and other security requirements would be ignored under the Commission’s proposal.⁹³ The proposed rules

⁹⁰ NAB Comments at 12; *see also* Content Companies Comments at 28-31 (“[A]ll programmers would confront an environment in which they are forced to play ‘whack-a-mole’ – repeatedly having to fight to undo damaging violations after the fact each and every time a third party attempts to commercialize content (perhaps in the guise of ‘innovation’) by ignoring programmers’ rights.”); MPAA Comments at 17-18 (“The primary mechanism for copyright holders to enforce their exclusive rights is program license agreements. It is misplaced to assume that enforcement via litigation could compensate for the displacement of detailed arrangements that have been carefully negotiated between programmers and distributors.”); TV One Comments at 18 n.42 (“[B]ringing a copyright infringement case would be far too expensive and take far too long to resolve to be an effective means of relief for a small programmer like TV One.”).

⁹¹ Content Companies Comments at v.

⁹² *See, e.g.*, Content Companies at 20-25; Copyright Alliance Comments at 15; Comcast Comments at 86-87.

⁹³ *See, e.g.*, Letter from Jordan B. Goldstein, Vice President, Regulatory Affairs, Comcast, to Marlene H. Dortch, Secretary, FCC, at 1 (May 11, 2016); Content Companies Comments at 24-25; MPAA Comments at 21-22; Copyright Alliance Comments at 15; AT&T Comments at 45-47; NCTA Comments at 100-03. An ecosystem that denies content providers and MVPDs the ability to reach commercial agreements that provide certainty on appropriate levels of platform security will simply motivate content owners to distribute their highest value content

also would remove key mechanisms for ensuring the secure delivery of content that MVPDs use in their apps and user interfaces, and would rely on outside entities to test and certify third-party devices and apps. In light of these various threats and harms, the Set-Top Box Mandate would contravene the clear statutory directive that the Commission not adopt rules that would jeopardize security.⁹⁴

Security vendors and several other commenters also observed that the Commission’s proposal would threaten the diversity of security solutions.⁹⁵ According to Cisco, “[a] government-mandated, monolithic security requirement like the [Notice] contemplates is directly contrary to the nimble quality of the highest-level security. . . . Organically-evolved, diverse security models reduce the risks of a single point of attack.”⁹⁶ ARRIS noted that the proposed rules also would limit the content security options for MVPDs by requiring MVPDs to support a security solution that is available on RAND terms.⁹⁷ Proponents of the Set-Top Box Mandate seemingly disregard these critical security concerns, and some go so far as to suggest that the Commission even further limit security options for MVPDs.⁹⁸

on more secure systems that are outside the scope of government regulation. *See, e.g.*, Comcast Comments at 75-76 & n.206.

⁹⁴ *See* 47 U.S.C. § 549(b); *see also* AT&T Comments at 81-82; CenturyLink Comments at 15-16; NCTA Comments at 165; Content Companies Comments at 20-25.

⁹⁵ *See, e.g.*, MPAA Comments at 23 (“Uniformity in security or use of a single content protection system creates a *single point of failure*, making content vulnerable and exposing it to attacks.”); ARRIS Comments at 13; Cisco Comments at 7-8.

⁹⁶ Cisco Comments at 7-8. Verimatrix, another content security company, has underscored the drawbacks of standardization of usage rights, such as “creating overly complex formats to try to capture all future possible ways that content might be offered to a consumer, and even then, the potential of foreclosing an innovative offer that is elemental to a novel business model.” Letter from Jim C. Williams, President, Verimatrix, to Marlene H. Dortch, Secretary, FCC, at 2 (May 10, 2016) (“Verimatrix Ex Parte”).

⁹⁷ *See, e.g.*, ARRIS Comments at 12-15; *see also* Cisco Comments at 9-13; NCTA Comments at 90-100; Comcast Comments at 86-97; Verimatrix Ex Parte at 2 (“[W]e are most familiar with RAND in patent licensing statements before standards bodies, not in the context used in the proposed rule.”).

⁹⁸ *See* TiVo Comments at 18-19 (asking that the Commission limit the number of security solutions MVPDs would be permitted to rely on under the Set-Top Box Mandate by requiring that such solution be supported by

Some proponents claim that the Set-Top Box Mandate would reduce piracy and infringement by making it easier to access lawful content.⁹⁹ However, these claims do not withstand scrutiny. The Copyright Alliance explained that “the standardization in security measures will make devices easier to hack, thus making copyrighted content easier to steal, and the proliferation of illegal copies will make it more difficult for copyright owners to police their copyrights.”¹⁰⁰ Moreover, MVPD apps are *already* increasing access to lawful content without any of these attendant security risks.

V. THE RECORD UNDERSCORES THAT PRIVACY AND OTHER CONSUMER PROTECTIONS WILL BE WEAKENED UNDER THE SET-TOP BOX MANDATE.

The record reflects deep concerns about the harms to consumers that would result from the Set-Top Box Mandate. Numerous commenters, including consumer and public interest groups, observed that the proposed rules would erode critical consumer protections granted by Congress in the Communications Act. They emphasized that these harms are entirely of Commission’s own making, and would be avoided under the apps-based approach. The self-certification regime contemplated in the *Notice*, under which third parties would simply certify to MVPDs compliance with Title VI consumer protections, is completely unworkable, fails to address these harms, and is not a viable “work around” to the Commission’s lack of jurisdiction over third-party device manufacturers and app developers. Consumers would have no guarantee

MVPDs that, in the aggregate, serve at least 15 million subscribers without being tied to an MVPD-specific Trust Authority, chipset, or other hardware requirement); *see also* CVCC Technical Appendix at 4 (singling out Google’s Widevine and Microsoft PlayReady as the preferred DRMs); Amazon Comments at 8-9; Computer & Communications Industry Association Comments at 22-23.

⁹⁹ See Google Comments 4-5; Public Knowledge Comments at 47-50.

¹⁰⁰ Copyright Alliance Comments at 15.

that third-party devices and apps would provide the same consumer privacy protections,¹⁰¹ comply with requirements relating to EAS messages,¹⁰² or comply with commercial limits in children’s programming.¹⁰³ MVPDs would have no practical way to monitor third parties and no contractual or regulatory mechanisms to enforce compliance with these consumer protections. Further, the proposal could undermine the Commission’s efforts to ensure the accessibility of video programming to the detriment of consumers.

In contrast, as numerous commenters conclude,¹⁰⁴ the existing apps-based model provides the dual benefits of advancing the Commission’s navigation device goals in this proceeding while preserving bedrock consumer protections, demonstrating that the Commission’s proposal is all the more indefensible. MVPD-supplied apps protect consumer privacy, deliver EAS alerts, observe ad limits on children’s programming, and abide by closed captioning and other accessibility requirements.

Privacy. The clear evidence in the record is that the Set-Top Box Mandate will result in the loss of consumer privacy rights.¹⁰⁵ Although proponents of the Set-Top Box Mandate claim

¹⁰¹ See, e.g., NCTA Comments at 75-85; Comcast Comments at 93-97; EPIC Comments at 3-8; Center for Digital Democracy at 2; Letter from Lawrence E. Strickling, NTIA, to Chairman Wheeler, at 5-6 (Apr. 14, 2016 (“NTIA Letter”).

¹⁰² See, e.g., NCTA Comments at 85-86, 89; AT&T Comments at 53-54; Content Companies Comments at 26-27; Letter from Jessica L. Rich, Director, Bureau of Consumer Protection, FTC, to Marlene H. Dortch, Secretary, FCC, at 2 n.3; Cox Communications Comments at 3.

¹⁰³ See, e.g., NCTA Comments at 75-77; AT&T Comments at 53-54; Content Companies Comments at 26-27; Cox Communications Comments at 3.

¹⁰⁴ See, e.g., ACA Comments at 57; AT&T Comments at 48-53; NCTA Comments at 148-54; Frontier Comments at 16; NTCA – The Rural Broadband Association Comments at 23-24; Cerda et al. Comments at 3; Copyright Alliance Comments at 14-15.

¹⁰⁵ See, e.g., EPIC Comments at 4-8; NCTA Comments at 75-85; Center for Digital Democracy Comments at 2. Comcast focuses here on privacy issues, but commenters also detail threats to EAS and advertising limits on children’s programming. See NCTA Comments at 75-77, 85-86; Content Companies Comments at 26-27.

that existing privacy protections will remain intact,¹⁰⁶ these assurances ring hollow. Sections 631 and 338 of the Communications Act restrict MVPDs' use and disclosure of subscribers' personally identifiable information ("PII"), including subscriber viewing history, absent prior customer consent. In this regard, as the record shows, it is not at all clear how the Commission can conclude that MVPDs are authorized, consistent with Section 631 or Section 338, to disclose sensitive PII to unaffiliated third-party device makers and app developers for the purposes envisioned in the *Notice* absent consumer consent.¹⁰⁷

Even assuming the Commission could overcome this initial hurdle, there are significant problems with its proposed method for addressing the serious privacy concerns created by a self-certification approach. Notably, as explained in Comcast's initial comments and reinforced by numerous commenters, there is no way for the MVPD to understand, let alone enforce, the privacy practices of the third-party device maker or app developer, especially given that the proposed rules prohibit any contractual arrangement between these parties.¹⁰⁸ In this respect, it is especially troubling that Google – one of the key proponents of the Set-Top Box Mandate – explicitly states its intent *not* to comply with the privacy obligations imposed on MVPDs under Section 631 and 338. Rather, Google underscores the Commission's lack of authority to impose or enforce similar consumer privacy obligations on third-party device manufacturers and app developers, stating unequivocally that "limitations on the FCC's jurisdiction under Section 629 of the Communications Act prevent it from applying the rules that apply to 'cable operators' and

¹⁰⁶ See Amazon Comments at 7-8; CVCC Comments at 44-46; Google Comments at 5-8; Public Knowledge Comments at 30-36; TiVo Comments at 25-27.

¹⁰⁷ See Comcast Comments at 94; NCTA Comments, App. A at 40.

¹⁰⁸ See, e.g., EPIC Comments at 6-8; AT&T Comments at 48-53; Comcast Comments at 95-97; NCTA Comments at 75-77.

‘satellite carriers’ to suppliers of devices.”¹⁰⁹ In short, Google believes that the more stringent privacy protections that apply to an MVPD-supplied device or app should not apply to its own devices or apps even when the consumer would be accessing the same MVPD content. This may serve Google’s data collection and monetization goals, but it would not serve the interests of consumers. While Chairman Wheeler has stated that he disagrees with Google’s view and believes the privacy protections should apply to device makers and app developers,¹¹⁰ he has not proposed any means that would ensure those entities can comply in any way the Commission can enforce since, for some reason, the Commission has protected edge providers from regulatory oversight at all cost. Moreover, the Commission’s proposal refuses to allow contractual privacy for MVPDs to enforce the rules, and rejects the apps-based approach which would obviate this concern.

Google and other proponents of the Set-Top Box Mandate claim that existing federal, state, and EU laws would ensure privacy protections to MVPD customers, but these protections are a mirage. These laws simply are not coextensive with the consumer rights and protections under Sections 631 and 338. NCTA explained that there are many states that lack *any* applicable privacy rules, and those state laws that do exist generally fail to offer protection equivalent to that afforded by Title VI.¹¹¹ And NTIA further observed that “the baseline privacy protection a

¹⁰⁹ Google Comments at 7.

¹¹⁰ See Wash. Post Interview with Chairman Wheeler (Feb. 10, 2016), https://www.washingtonpost.com/video/business/technology/fcc-chairman-talks-set-top-boxes-consumers-right-to-choose/2016/02/10/5c19cdba-cff0-11e5-90d3-34c2c42653ac_video.html (“What we’re going to do in our rulemaking is say [to new entrants], ‘You have to have the same kind of [privacy] rules that cable companies have.’”); Tom Wheeler, Chairman, FCC, Press Conference at FCC Open Meeting (Feb. 18, 2016), <http://www.c-span.org/video/?404893-1/fcc-meeting-cable-settop-box-purch&start=3271> (“To be able to license the standard, you’re going to have to comply with the Title VI Section 631 privacy rules which apply to cable operators.”)

¹¹¹ See NCTA Comments at 84.

subscriber receives should not hinge on where the consumer lives.”¹¹² Proponents also claim that EU privacy rules and the federal Video Privacy Protection Act (“VPPA”) can provide adequate privacy protections,¹¹³ but EU privacy rules offer little practical protection or recourse for U.S. video consumers and there is substantial uncertainty whether the VPPA would even apply to third-party devices and apps used to access MVPD content.¹¹⁴

Likewise, contrary to the comments filed by the FTC’s Director of the Bureau of Consumer Protection, who is not empowered to speak on behalf of the FTC as a whole, relying on the FTC to enforce the Commission’s proposed privacy self-certification scheme pursuant to its authority under Section 5 of the FTC Act does not resolve these consumer privacy concerns. As an initial matter, the FCC has no authority to subdelegate its regulatory and enforcement responsibilities under Section 631 and Section 338 to the FTC or to any other federal agency. Indeed, it is black letter law that an agency may *not* subdelegate its own delegated power to another agency *without authorization from Congress*. As the D.C. Circuit has made clear:

[T]he cases recognize an important distinction between subdelegation to a *subordinate* and subdelegation to an *outside party*. . . . We therefore hold that, while federal agency officials may subdelegate their decision-making authority to subordinates absent evidence of contrary congressional intent, *they may not subdelegate to outside entities – private or sovereign – absent affirmative evidence of authority to do so*.¹¹⁵

¹¹² NTIA Letter at 5 & n.27.

¹¹³ *See, e.g.*, Public Knowledge Comments at 33.

¹¹⁴ NCTA Comments at 84. With respect to the VPPA, it is not clear a retail provider of devices used to view cable service programming could be classified as a “video tape service provider,” which is a prerequisite to coverage under that statute. *See id.* (noting that Google has convinced a judge that the VPAA does not apply to Google, and that TV manufacturer Vizio has made similar arguments).

¹¹⁵ *U.S. Telecom Ass’n v. FCC*, 359 F.3d 554, 565-66 (D.C. Cir. 2004) (emphases added); *see also G.H. Daniels III & Assocs. v. Perez*, 626 F. App’x 205, 207 (10th Cir. 2015) (“Courts are quite tolerant of the administrative practices of agencies, but passing the buck on a non-delegable duty exceeds elastic limits.”).

Congress knows how to authorize inter-agency delegations,¹¹⁶ and it did not do so here. Such subdelegation would be particularly inappropriate where, as here, the Commission has no authority to regulate third-party device manufacturers and app developers under Sections 631 or 338 in the first place, and the entire scheme would be a patent effort to avoid those statutory limits.¹¹⁷

Moreover, an FTC enforcement model would not preserve all of an MVPD customer's existing privacy rights under Sections 631 and 338. At the very least, MVPD customers would be deprived of their right to bring private legal actions for misuse of their viewing data by retail device makers and app developers, as well as their right to have government agencies obtain a court order before an agency can obtain their viewing data, as is now the case for MVPD subscribers.¹¹⁸ The FTC (and the Commission for that matter) cannot legally authorize such relief against device makers and app developers – only Congress can do so.¹¹⁹

¹¹⁶ See, e.g., 31 U.S.C. § 3726(g) (“The Administrator may delegate any authority conferred by this section to another agency or agencies if the Administrator determines that such a delegation would be cost-effective or otherwise in the public interest.”).

¹¹⁷ The FTC also lacks independent authority to interpret or enforce the Communications Act. The Commission, not the FTC, possesses general authority to implement the Communications Act. 47 U.S.C. § 151. The Act specifically references the particular instances in which the FTC has a role to play – none of which makes any mention of Sections 631 or 338. See *id.* §§ 228(c)(1), (3), (10), 313. Because the FTC has not been entrusted with implementing the Communications Act, it may not authoritatively interpret or enforce it.

¹¹⁸ See 47 U.S.C. §§ 551(f)(1), (h). In fact, the Commission itself has recognized that Section 631 cannot be construed or administered in a manner that negates the court order requirement for government access to viewing data. In a 1992 order rejecting LFA attempts to gain access to cable company complaint records containing individually identifiable customer viewing information, the Commission said that such complaint information could not be disclosed under the “legitimate business activity” exception to the statute and stated that: “Including regulatory compliance within the ‘legitimate business activity’ exception might negate the separate court order requirement that would otherwise limit governmental access to this type of information. This does not appear to have been intended.” *Cable Television Technical and Operational Requirements; Review of the Technical and Operational Requirements of Part 76, Cable Television*, Memorandum Opinion and Order, 7 FCC Rcd. 8676 ¶ 39 n.34 (1992).

¹¹⁹ See, e.g., *Alexander v. Sandoval*, 532 U.S. 275, 291 (2001) (holding that federal agencies may not create private rights of action through their rules: “Language in a regulation may invoke a private right of action that Congress through statutory text created, but it may not create a right that Congress has not. . . . Agencies may play the sorcerer’s apprentice but not the sorcerer himself”); *Bonano v. E. Caribbean Airline Corp.*, 365 F.3d 81, 84 (1st Cir. 2004) (“A private right of action, like substantive federal law itself, must be created by Congress. . . . [R]egulation, on its own, cannot create a private right of action.”).

This reduction in consumers' privacy protection is highlighted by how the enforcement approach would presumably apply in practice. Under the Commission's proposal, a consumer might use an MVPD-supplied device or app as well as a third-party device or app. To the extent there were privacy-related issues with the MVPD, enforcement would be handled pursuant to the standards and full consumer protections set forth in Sections 631 and 338, but if there were issues with the third-party device or app, enforcement would instead be administered by the FTC pursuant to its Section 5 standards with the reduced privacy protections noted above. This bifurcated and unequal enforcement approach would clearly fail to meet the privacy expectations of MVPD consumers, and is thus a far inferior approach when compared to the existing app-based model, under which privacy obligations are clearly defined by the Communications Act, consumer expectations are clearly established, *and the same substantive privacy standards and protections apply to all consumers regardless of whether they lease a set-top box from their MVPD or access their MVPD service on a retail device.*

Finally, it is unclear who would be ultimately responsible for adjudicating the *Notice's* proposed "remedy" of decertifying third-party devices and apps for non-compliance. And regardless of how the Commission attempts to enforce this self-certification regime, ultimately it is consumers who would be punished. As Congresswoman DeGette and Congressman Barton explained, "[s]hould the MVPD believe that the third party has violated the self-certification requirement, the only remedy to immediately protect customer information would be to shut off service to all users of a third-party device or application found to be in violation of the self-certification. This outcome will harm consumers equally if not more so than it would the third

party in violation of sections 631 and 338.”¹²⁰ In short, the group most at risk under this regime would be consumers.

This new idea of a convoluted, indirect enforcement through certifications that will provide fewer protections than direct enforcement of the statute (e.g., loss of a private right of action for consumers and required court order before sensitive PII is disclosed to the government) is simply an unlawful delegation of the FCC’s authority, an abdication of its statutory responsibilities, and just one more example of the difficulties and consumer harms created by this flawed approach – an approach that is entirely unnecessary given that the apps approach completely avoids these difficulties and consumer harms.

Accessibility. Commenters also highlighted the proposal’s shortcomings with respect to accessibility protections. The American Council of the Blind, Telecommunications for the Deaf and Hard of Hearing, Inc., NCTA, and others noted that, unlike MVPD-supplied devices and apps or even third-party devices, third-party apps are not subject to the Commission’s accessibility rules regarding support for closed captioning, video description, and audible emergency information.¹²¹ Thus, the proposed Set-Top Box Mandate would create an “app gap” that would “undermine the accessibility of video programming required by the [Twenty-First Century Communications and Video Accessibility Act or “CVAA”].”¹²² Beyond this, the Commission’s proposal would create customer confusion and frustration in resolving any issues

¹²⁰ See Letter from Reps. Diana DeGette & Joe Barton to Chairman Wheeler, FCC (May 11, 2016); see also Comcast Comments at 96-97; AT&T Comments at 52; NCTA Comments at 80. As such, simply “shutting off” devices and relying on revocation of the Information Flows as Public Knowledge proposes, is ineffective and anti-consumer. See Public Knowledge Comments at 34.

¹²¹ See American Council of the Blind Comments at 1-2; NCTA Comments at 87-90; Telecommunications for the Deaf and Hard of Hearing et al. (“TDI et al.”) Comments at 3-6.

¹²² TDI et al. Comments at 4.

with accessibility features since MVPDs would have no way of knowing how third parties deliver and provide support, if any, for such features.¹²³ And without any contractual or regulatory mechanism to address accessibility features in third-party apps, the Set-Top Box Mandate would also weaken the Commission’s accessibility compliance regime by undoing the Commission’s efforts to create bright-line compliance rules.¹²⁴

The accessibility gaps in the Commission’s proposal stand in stark contrast to the apps-based model. Today, MVPD devices and apps comply with closed captioning, video description, and other accessibility requirements.¹²⁵ Furthermore, MVPD customers can turn to their MVPD when they have an issue with accessibility features, and the MVPD can troubleshoot the issue and, if necessary, coordinate with programmers or others to fix the problem.¹²⁶

VI. COMMENTERS OVERWHELMINGLY DEMONSTRATE THE SUBSTANTIAL COSTS OF THE COMMISSION’S PROPOSAL.

It is apparent from the record that the Commission’s proposed Set-Top Box Mandate would impose substantial implementation costs. MVPDs have submitted extensive technical reports and engineering declarations detailing these impacts. Yet, the proponents of the rules have provided little to no analysis that could rebut these expert conclusions, simply offering a

¹²³ As Comcast and others explained, the Set-Top Box Mandate would create customer confusion and frustration with respect to more general customer service issues and troubleshooting since customers would not know who to contact or who is responsible if there is a problem accessing video programming through a third-party device or app. And MVPDs may not be able to resolve implementation issues that are within the third party’s control. *See* Comcast Comments at 70-73; AT&T Comments at 57-59; Cox Comments at 11; EchoStar/Dish Comments at 24-25; Frontier Comments at 15-16; Roku Comments at 13.

¹²⁴ Some commenters urge the Commission to extend its accessibility rules to third parties to close the “app gap.” *See* American Council of the Blind Comments at 1-3; TDI et al. Comments at 4-5. However, it is unclear whether the Commission has the authority to regulate these entities under the CVAA. Even if it did, the Commission gave no notice that such expansion of the accessibility rules was within the scope of this rulemaking.

¹²⁵ *See* Comcast Comments at 100-01; NCTA Comments at 87-90; American Council of the Blind Comments at 1-3; TDI et al. Comments at 4-8.

¹²⁶ *See* Comcast Comments at 100-01; NCTA Comments at 87-90.

vague, six-page technical appendix that, as discussed further below, contains numerous flaws and raises more questions than it answers.¹²⁷

Notwithstanding the consensus recommendation in the DSTAC Report that “[i]t is not reasonable to expect that all MVPDs will re-architect their networks in order to converge on a common solution,”¹²⁸ the Set-Top Box Mandate would force MVPDs to make costly network changes in order to deliver the three standardized Information Flows.¹²⁹ Public Knowledge contends that the Commission’s proposal provides MVPDs with more flexibility than under the CableCARD regime or the 2010 AllVid proposal.¹³⁰ As an initial matter, the notion that the Set-Top Box Mandate is somehow an improvement over CableCARD is absurd. As discussed above, the CableCARD model was limited to presentation of a cable operator’s linear channel lineup on retail devices and was subject to licensing and certification requirements. It did not, as contemplated in the Commission’s proposal, mandate the disaggregation of MVPD service using the three Information Flows or require the standardization of entitlements and other aspects of the service or remove MVPDs entirely from licensing and certification decisions.¹³¹ Furthermore, rather than giving MVPDs flexibility, the Commission’s proposal would require MVPDs to re-engineer their networks to support a government-imposed standard,¹³² and would

¹²⁷ See CVCC Technical Appendix.

¹²⁸ DSTAC Report, Executive Summary at 3.

¹²⁹ Given the fundamental differences in how MVPDs deliver their services, it is not technically feasible to make cloud DVR service available to third parties under the proposed rules as some proponents request. See TiVo Comments at 14; WGAW Comments at 11. Cloud DVR is not delivered through a standard interface and cannot be delivered to third parties using the Commission’s proposed Information Flows. See Comcast Comments at 61 n.160.

¹³⁰ See Public Knowledge Comments at 3.

¹³¹ Comcast Comments at 61-63; DSTAC Report at 30-32.

¹³² See, e.g., Public Knowledge Comments at 3. Dr. Reed confirms that the *Notice* “establishes new technical requirements that will necessitate significant changes in the technical design of current MVPD networks to address network reliability, network security and innovation needs.” Declaration of Dr. David P. Reed, Appendix A at 6 (“Reed Decl.”).

create a host of other harms. For example, delivering the standardized Information Flows to third-party devices and apps would likely take up additional network bandwidth,¹³³ diverting bandwidth from other services like broadband and complicating IP transition efforts by Comcast and other operators.¹³⁴ As Dr. Reed concludes, “constraining the flexibility of MVPDs to implement technical strategy in a highly competitive market where rapid technological changes are the norm is not the right regulatory approach since it will be the customers of the MVPDs that ultimately will suffer with suboptimal services.”¹³⁵

The record also makes clear that the Set-Top Box Mandate would require the development and deployment of costly new in-home equipment in order to deliver MVPD content to third-party devices and apps,¹³⁶ undermining the Commission’s key goal of reducing reliance on MVPD-supplied equipment. As the Natural Resources Defense Council and others noted, additional equipment would also undercut industry efforts to curb energy consumption of set-top boxes and other equipment and would raise energy costs.¹³⁷ Contrary to the suggestion advanced by some commenters that existing in-home equipment like a modem or router will suffice,¹³⁸ these devices are not designed to support the Commission’s proposed Information Flows. Furthermore, although CVCC claims that its Technical Appendix demonstrates that a “cloud-based” implementation of the proposal is feasible, Dr. Reed finds that the Technical

¹³³ See ARRIS Comments at 11; NCTA Comments at 113-14; *see also* ACA Comments at 48-49.

¹³⁴ See Comcast Comments at 63-64, 68.

¹³⁵ Reed Decl. at 14.

¹³⁶ See Comcast Comments at 64-67; ACA Comments at 53-54; NCTA Comments at 130-32; *see also* AT&T Comments at 25 (explaining that, because of the one-way architecture of DirecTV’s satellite network, it would need to make changes to its set-top box to include new outputs capable of supplying the three Information Flows).

¹³⁷ See NRDC Comments at 1-3; NCTA Comments at 132-34.

¹³⁸ See Public Knowledge Comments at 20.

Appendix lacks sufficient detail and fails to substantiate that the standards listed can support delivery of the Information Flows on a cloud-to-ground basis, and concludes that “the new video system architecture that MVPDs will need to build to support the [Notice] will require a new device in the home.”¹³⁹

VII. CONTRARY TO PROPONENTS’ CLAIMS, THE COMMISSION’S STANDARDS-SETTING PROPOSAL WOULD CHILL INNOVATION AND COULD NOT BE IMPLEMENTED IN THE TWO-YEAR TIMEFRAME CONTEMPLATED IN THE NOTICE.

The Set-Top Box Mandate would bring the unparalleled innovation in today’s dynamic video marketplace to a grinding halt. Many commenters warned that the proposed rules would saddle MVPDs with a one-size-fits-all technology mandate that would, contrary to Congress’s instructions, “have the effect of freezing or chilling the development of new technologies and services.”¹⁴⁰ Such forced standardization would lack the flexibility needed to respond to the rapid changes in the marketplace and technology, resulting in increased (and often unnecessary) costs to consumers and, critically, at further expense to innovation itself.¹⁴¹ As with the Commission’s prior attempts at technology mandates in this fast-changing environment, such as with CableCARD and with IEEE 1394 set-top box interfaces, the Commission’s proposed Set-

¹³⁹ Reed Decl. at 3; *see also id.* at 2-7. Dr. Reed further notes that “the lack of attention in the [Notice] to any issues associated with the cost of implementation to the proposed solution is troubling” and that “[i]n an ideal world, policy makers have a deep, quantitative understanding of the costs and benefits of their policy proposals and the alternatives.” *Id.* at 16. However, in this case, “[t]here are too many uncertainties and the regulatory framework mandates too many technical details for which the [Notice] has not performed the necessary cost-benefit analysis to insure this is the right direction to pursue” and “[t]here is simply too much risk associated with rushing to adopt an approach that has yet to be described in sufficient detail to be able to seriously conclude that benefits will outweigh the costs of adoption.” *Id.* at 17-18.

¹⁴⁰ H.R. Rep. No. 104-458, at 181 (1996); *see also* NCTA Comments at 106-13.

¹⁴¹ *See, e.g.*, Comcast Comments at 106-08; AT&T Comments at 29-32; ARRIS Comments at 11-12; NCTA Comments at 106-08, 114-18.

Top Box Mandate is likewise destined for almost immediate obsolescence, and will very likely result in substantial (and completely unnecessary) costs to consumers and harms to innovation.¹⁴²

Beyond the well-documented substantive concerns with government-imposed standards, the record makes clear that the Commission's proposed two-year deadline to develop and implement any new standard is entirely unrealistic.¹⁴³ Even putting aside the fact that standards setting alone generally takes many – and far more than two – years to complete,¹⁴⁴ the *Notice* fails to account for the significant time it would take for MVPDs to, as discussed above, redesign and re-architect their networks or to develop new in-home equipment to implement such a burdensome mandate.¹⁴⁵

Proponents of the Set-Top Box Mandate nevertheless continue to insist that the two-year deadline is feasible because standards could be developed quickly using off-the-shelf

¹⁴² See ACA Comments at 42-43; Comcast Comments at 106-08; NCTA Comments at 114-18.

¹⁴³ See, e.g., ARRIS Comments at 9; MPAA Comments at 30; USTelecom Comments at 11-12.

¹⁴⁴ See, e.g., AT&T Comments at 21-22 (“Establishing new standards from scratch has generally taken as long as ten years, even where the parties were aligned in purpose and the task at hand was far simpler.”); NCTA Comments at 123-24 (stating that it took ten years to develop the HTML5 standard, six years for CableCARD, and nine years for IEEE 1394, and noting that “such six-to-ten year period are typical even when there is widespread agreement on core objectives”). As Dr. Reed explains, “[A]lmost all estimates are overly optimistic of the time it will take to create a standard in an open standards body. . . . One of the first steps in well-managed standards development is to establish specific requirements and use cases for how the technology will be applied. Once rigorous effort is applied to develop specific and detailed descriptions of use cases for the standardized technology, the usual outcome is a much larger number of requirements than originally contemplated for coverage by the standard.” Reed Decl. at 9.

¹⁴⁵ AT&T Comments at 25 (“[T]he Commission has recognized that a normal product cycle is 18-24 months. . . . Thus, if these rules must be implemented within two years, at best the [*Notice*] would leave at most six months and as little as no time whatsoever for establishing Open Standards Bodies, developing standards, and creating certification test regimes. That fact alone demonstrates the folly of the Commission's proposed timeline.”); Comcast Comments at 64-67 (noting that MVPDs would need the same lead time to develop the new in-home gateway device); Cox Communications Comments at 12; EchoStar/Dish Comments at 11; NCTA Comments at 19-20. Moreover, the *Notice* fails to recognize that, even in addition to the time needed to develop commercial products, those products need to be tested for compliance with the standard before being released for manufacturing and sale. The Commission proposes no realistic framework for how this will be accomplished or what body is empowered to adjudicate issues uncovered in compliance testing. See, e.g., Comcast Comments at 103-06.

technologies.¹⁴⁶ But these claims have already been disproven. There is no off-the-shelf technology upon which new standards can be developed.¹⁴⁷ Although some proponents claim that it would be possible to build upon VidiPath to develop a standard quickly,¹⁴⁸ DLNA explains that the Commission’s proposal “is *materially different* than the DLNA VidiPath architecture.”¹⁴⁹ Rather, VidiPath *is an apps-based solution* and “is not designed to support a disaggregation model, and does not support access to MVPD service without the MVPD-supplied app.”¹⁵⁰ In fact, DLNA estimates that a more realistic expectation for a project of this magnitude is approximately three years, and this does not even account for the necessary implementation time.¹⁵¹ Based on his extensive experience with standards-setting efforts, Dr. Reed likewise concurs that the two-year timeframe set forth in the *Notice* is not realistic.¹⁵²

¹⁴⁶ See, e.g., CVCC Comments at 30-31; INCOMPAS Comments at 18-21; Public Knowledge Comments at 15. CVCC also has claimed that the functionality of the implementations described in its Technical Appendix is the same as the demonstrations provided to the FCC by CVCC. NCTA has previously raised substantial questions about those demonstrations, see Jan. 15 NCTA Ex Parte, and as Dr. Reed further notes, “little technical analysis has been conducted regarding how the features were demonstrated, specific devices used, actual protocols used between devices and technical diagrams of the use cases shown,” Reed Decl. at 12. He further underscores that: “Technology demonstrations can be useful tools to help perform early due diligence on technical options, but they also can engender false confidence, like ‘fool’s gold’ with regard to the actual technical complexity associated with applying technology to solve a particular solution.” *Id.*

¹⁴⁷ See, e.g., ARRIS Comments at 9; Comcast Comments at 104; ITTA Comments at 12-13.

¹⁴⁸ See CVCC Comments at 28-29 & n.61; Public Knowledge Comments at 20 & n.30.

¹⁴⁹ DLNA Comments at 2 (emphasis added).

¹⁵⁰ Comcast Comments at 104; see also NCTA Comments at 122 & n.291.

¹⁵¹ See DLNA Comments at 2. CVCC’s reliance on DLNA and UPnP specifications, see CVCC Technical Appendix at 3, has another drawback. As Dr. Reed points out, “[E]xisting technologies can only bend so far to support use cases that the technology was not developed to support before an entirely new approach is warranted” Reed Decl. at 9-10. “[I]t appears the [*Notice’s*] proposal supports the notion that DLNA and UPnP specifications can be modified to quickly provide a cloud-based solution for delivering the Information Flows, even though these technologies have been completely developed to only extend a remote user interface between devices connected over home networks. There is no evidence that DLNA and UPnP technology can make this leap in functionality.” *Id.* at 10.

¹⁵² See *id.* at 9 (“Given DLNA’s range for how long it would take to create a DLNA profile, the total time for the development of standards to the point of certification of equipment plus the time for implementation on MVPD networks will likely take 3 – 5 years.”).

Given that the standards-setting process could not be completed and implemented in the two-year timeframe contemplated in the *Notice*, the Commission should recognize calls from the CVCC and others to adopt their preferred fallback standard for what they are: a thinly veiled attempt to have their favored technical solution codified into rules.¹⁵³ Comcast and others explained that standards-setting is a consensus driven process, and any fallback standard that would automatically become effective would only undermine incentives for proponents of the fallback standard to come to the table in the standards-setting process.¹⁵⁴ That would hardly qualify as an open standards process, and instead would further highlight the arbitrary and capricious nature of the Commission’s proposed approach. Moreover, as Dr. Reed observes, “no technical standards exist today to support the [Commission’s] proposal, and thus “no set of specifications exist today that can function as a fallback if the Open Standards Body is unable to create a standard on a timely basis.”¹⁵⁵

VIII. CONCLUSION

The record confirms that the Commission’s Set-Top Box Mandate is entirely unnecessary to achieve the goals of Section 629, and would threaten the dynamism and innovation in today’s video marketplace. Instead, the Commission should embrace the proven apps-based approach – as MVPDs, OVDs, programmers, device manufacturers, and consumers have done – which will

¹⁵³ See CVCC Comments at 35-36; Public Knowledge Comments at 55.

¹⁵⁴ See, e.g., AT&T Comments at 25-26 (adopting a fallback proposal by the proponents of the Set-Top Box Mandate “would give all the leverage to third-party navigation device manufacturers, which would have no incentive to compromise in the development of workable standards”); NTCA—The Rural Broadband Association Comments at 19 (The “use [of] the ‘Competitive Navigation’ approach as a ‘safe harbor’ or ‘fallback’ . . . is effectively an open invitation to proponents of Competitive Navigation – an approach that found *no consensus* as part of the DSTAC process – to ‘run out the clock’ on finding a truly workable solution so that the ‘fallback’ becomes the *de facto* standard.”) (emphasis in the original).

¹⁵⁵ Reed Decl. at 12-13.

only continue to expand device options for consumers consistent with Congress's statutory objectives.

Respectfully submitted,

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APPENDIX A

Declaration of Dr. David P. Reed

Technical Analysis of the FCC NPRM on Navigation Devices

My name is David P. Reed. I have published widely on telecommunications technology, wireline and wireless engineering economics and spectrum management. I am currently the Faculty Director and Scholar in Residence for the Interdisciplinary Telecom Program at the University of Colorado Boulder. In this role I conduct research with Ph.D. and M.S. students on topics in telecommunications and teach graduate courses in Interdisciplinary Telecom Analysis, Principles of Telecommunications Policy, Future of Video: Technology, Policy, and Economics, Research Methods and Capstone Projects. I have served as an expert consultant to different companies in the telecommunications, media and Internet industries.

Previously I have been the Associate Faculty Director, Interdisciplinary Telecom Program at the University of Colorado Boulder (2012 – 2014). I worked for Cable Television Laboratories for 18 years as the Executive Vice President and Chief Strategy Officer, (2004 – 2012); Senior Vice President and Chief Technology Officer, (2000 – 2004) and Vice President, Strategic Assessment Department (1994 – 2000). I also worked for the Federal Communications Commission (FCC) as a Telecommunications Policy Analyst, Office of Plans and Policy, (1991 – 1994).

I hold a Ph.D. in Engineering and Public Policy and M.S. in Electrical Engineering from Carnegie Mellon, and B.S. in Electrical Engineering from Colorado State University.

My Curriculum Vitae is included as Attachment A to this Declaration.

Executive Summary

At the request of Comcast, this declaration provides an expert analysis of the technical information that has been provided to the FCC in the submitted comments to the Notice of Proposed Rulemaking (NPRM) regarding new set-top box regulations.¹ Based upon my 25 years of experience in the government, industry and academia, I believe that the NPRM will not achieve its policy objectives. The NPRM proposes to pursue a new set of regulations to establish and implement three new technical interfaces to multichannel video programming distributor (MVPD) networks through open standards bodies within two years. This approach is not likely to succeed over this timetable given the lack of technical detail provided to describe the proposed technical approach, nor is it clear that it makes sense due to

¹ Expanding Consumers' Video Navigation Choices; Commercial Availability of Navigation Devices, Notice of Proposed Rulemaking, MB Docket No. 16-42, 81 Fed. Reg. 14033 (Mar. 16, 2016) ("NPRM").

the lack of a clear cost-benefit analysis of the proposed approach versus the alternatives. I have identified in this technical analysis the following three major problems regarding the NPRM proposal to support this conclusion:

1. Information provided by NPRM commenters indicates that the new video system architectures needed by MVPDs to support the NPRM will require new MVPD-supplied or MVPD-controlled devices in the home. This will add substantial cost and complexity to the implementation of these regulations.
2. The technical implementation described in a new technical appendix from the Consumer Video Choice Coalition, proponents of the proposal, is incomplete and fails to establish that the NPRM proposal can be implemented within two years based upon “off-the-shelf” standards.
3. NPRM implementation costs are non-trivial, and the NPRM fails to conduct the cost-benefit analysis necessary to consider these costs against the potential benefits, or in comparison to other alternative solutions such as the MVPDs’ “apps” approach.

Introduction

At the request of Comcast, this declaration provides a technical analysis of the set-top box regulations proposed by the Federal Communications Commission in the recent navigation devices NPRM. This technical analysis focuses upon the predominantly technical information that has been provided to the Commission in the submitted comments to the NPRM.² In particular, I focus upon three important questions relevant to this proceeding:

1. Will the NPRM result in a new MVPD-supplied or MVPD-controlled set-top box or device in consumers’ homes?
2. Is the two-year timetable for modifying existing standards to meet the NPRM requirements realistic?
3. Has reasonable consideration been given to the technical costs of the NPRM?

The declaration covers each of these questions in sequential order.

MVPDs will require new devices in the home to support the NPRM

An important point of disagreement in this proceeding has been whether or not a “new box” would have to be deployed by MVPDs in order to comply with the NPRM regulations. The proponents of the apps-based approach generally believe the NPRM will result in a new set-top box or device in the home, while the proponents of the NPRM’s approach generally believe the MVPDs can avoid the deployment of a new set-top box or device.

² Comments to the NPRM, MB Docket No. 16-42, were due April 22, 2016.

In this section I review the technical commentary included in NPRM comments addressing this issue. My analysis of this information indicates that the new video system architecture that MVPDs will need to build to support the NPRM will require a new device in the home. In short, given the network requirements described by technical experts in the design of MVPD networks, the new set-top box will serve as an “adaptor” between the retail navigation devices the NPRM contemplates and the MVPD network, and is unavoidable over current systems.

The NPRM, in contrast, takes the position that its proposal will not require most MVPDs to deploy new equipment to subscribers in the home.³ Perhaps in recognition that this position was not based upon any in-depth analysis of the technical details of the MVPD proposal, the NPRM sought comment on this “belief.”⁴

Several commenters provided technical information in response to these questions of whether a new box will be needed to support the NPRM. AT&T, Comcast, Digital Living Network Alliance (DLNA) and NCTA each provided detailed technical commentary on this topic.⁵ All four of these technical submissions state that a new device will be needed in the home as a result of the NPRM. Overall, these commenters agree that new devices such as set-tops or gateways will be required to support the NPRM solution.

Comcast addresses this specific question in the most detail in stating that the only practical technical option under the NPRM approach is to deploy a “new in-home gateway device” in order to best manage against network harm and permit regular network innovation to occur.⁶ Comcast has built its existing network without consideration or knowledge of the NPRM solution and therefore it has not been designed to support the NPRM’s three open interfaces of Service Discovery, Entitlement, and Content Delivery data (the “Information Flows”). Support for these interfaces will require changes to the Comcast network in terms of network capacity, network management processes and network security. An in-home gateway device addresses this concern by serving as a buffer or translator between the network and navigation devices to prevent network harms. In addition, the

³ See NPRM, para 46: “We believe that our proposal does not require most MVPDs to develop or deploy new equipment, nor would it require subscribers to obtain additional or new equipment.”

⁴ NPRM para 46: “Would our proposal necessitate any changes to the MVPD’s network, or would it give the MVPD the discretion to decide whether to modify its system architecture, as we intend?”

⁵ The submitted comments of each of these parties included a technical appendix or declaration. See Technical Declaration of Stephen P. Dulac, AT&T Comments; Declaration of Tony G. Werner, Comcast Comments; DLNA Comments, and Appendix B: A Technical Analysis of the FCC’s Navigation Device Proposal, Sidney Skjei, NCTA Comments.

⁶ See Werner Declaration, Comcast Comments, para 15-16.

translator function of the gateway effectively provides ongoing support of the three interfaces while still allowing for network innovation to occur in spite of potentially slow-moving actions by the standards bodies setting the interface standards.⁷

NCTA likewise states that a “two-box in-home solution is inevitable” to provide the Information Flows to a new retail box.⁸ AT&T says the NPRM solution precludes deployment of its RVU technology that eliminates the need for a set-top box associated with every television in the home.⁹ DLNA said its VidiPath solution, which the FCC has suggested could be a technical basis for its proposal, is “a two-device solution.”¹⁰

The Consumer Video Choice Coalition outlines a technical implementation (hereafter “CVCC Technical Appendix”) that supports use cases that both include and do not include use of an MVPD-supplied set-top box depending upon the preferred implementation of the MVPD.¹¹ CVCC says the functionality of the implementations described in the technical appendix is the same as the demonstrations provided to the FCC by CVCC.¹² The CVCC refers to the extensions included in the use case that would not require an MVPD-supplied device as the “cloud-based” implementation.¹³

The identification of the cloud-based extensions does provide more technical detail compared to the information provided by CVCC on October 20, 2015, in describing its “Virtual Headend” proposal.¹⁴ This earlier proposal did not describe any extensions needed for a cloud-based solution, and the CVCC Technical Appendix

⁷ The concern is that mandated support of technical interfaces will limit the ability of MVPDs to introduce new technologies or more efficient network changes over time. This is not a theoretical concern, as proponents of the NPRM solution already assert the technical requirement that these new devices “will operate on MVPD systems as designed and advertised for a reasonable period of time.” See CVCC Comments, p. 31.

⁸ See Appendix B, NCTA Comments, p. 46.

⁹ See Dulac Declaration, AT&T Comments, para 43. AT&T also notes that DirecTV will need to make changes to its set-top boxes to include new outputs to deliver the three Information Flows. AT&T Comments, p. 25.

¹⁰ See DLNA Comments, p. 3.

¹¹ See Technical Appendix to CVCC Comments, p. 1.

¹² There is no way to confirm this since details of the CVCC demonstrations (*e.g.*, network features and functions, types of devices, *etc.*) are not public. *Ex parte* submissions provide descriptions of the technical interfaces associated with the Information Flows, but no context in how they were used, which devices supported which interfaces, nor which subset of those interfaces were demonstrated. Most notably, the CVCC Technical Appendix shows no details on the Entitlement Flow.

¹³ See Technical Appendix to CVCC Comments, p. 5.

¹⁴ See “Implementing the Virtual Headend Proposal,” Public Knowledge Ex Parte, MB Docket No. 15-64, 10/20/2015.

does provide a list of four proposed extensions that it believes address how to provide access, authentication and authorization in the cloud-based model. However, evaluation of the overall implementation and this set of proposed extensions raises the following observations:

1. A point of disagreement in the FCC's Downloadable Security Technology Advisory Committee ("DSTAC") deliberations was the mechanism to support the necessary user interactivity features of video services. Some of this interactivity, such as authentication and authorization, is essential to support the FCC's proposal, while other events such as purchasing, electronic sell-through or technical support lacked consensus within DSTAC. Proponents of the FCC's proposed rules initially advocated widgets that were unsupported by an application, though this approach was largely dropped by October 2015 and was not addressed in the NPRM.¹⁵ At least two of the extensions in the CVCC Technical Appendix attempt to fill holes in interactive mechanisms in the NPRM proposal by specifying browser-based solutions for authentication and other interactive events.¹⁶ Notably, there was no consensus on the appropriate mechanisms for user interactivity in the DSTAC Report.
2. Another important observation is that the set of four extensions provided by CVCC lacks sufficient detail to gain an adequate description of the cloud-based solution. The Public Knowledge *ex parte* submission of the "Virtual Headend" proposal did not address a cloud implementation. Thus, the only differences between the in-home and cloud solutions are currently these four extensions. No system diagram or a list of proposed requirements has been provided. Serious evaluation of the extensions is not possible without this information.
3. The CVCC Technical Appendix provides some additional detail describing how to implement DLNA and Universal Plug and Play (UPnP) into the FCC's proposal. This submission maps the technology details of its proposed implementation to the three technical interfaces in the NPRM proposal. The NPRM framework does not cleanly map to the DLNA and UPnP standards, or at least such a mapping has not been provided by CVCC. Consequently, it is very difficult to accurately assess the technical details of the CVCC proposal, and its ability to fully utilize existing standards. The CVCC proposal does specify the use of UPnP Content Directory Service (CDS) and DLNA Media Server (DMS) that are implemented in an MVPD-supplied device located on the home network. DLNA comments make clear that the VidiPath cloud

¹⁵ There was no mention of widgets in the submission "Implementing the Virtual Headend Proposal," Public Knowledge Ex Parte, MB Docket No. 15-64, 10/20/2015.

¹⁶ The extensions include an authentication mechanism "similar to what MVPDs use for TV Everywhere login" and an UPnP event mechanism using WebSockets, which opens interactive communication sessions, usually between browsers and servers.

solution is only possible as described in the DSTAC report, which is a remote user interface (UI) solution.¹⁷ CVCC's proposal regarding the standardization of entitlement flows also is undefined. Each MVPD handles entitlements differently and there is no precedent for standardizing entitlements across MVPD networks using DLNA or any other standard.¹⁸

Given this new information in the submitted comments, what are we to surmise?

The short, straightforward answer to the NPRM's question on this topic is clearly that the NPRM solution will require changes to the MVPDs' networks and will also require a new in-home device, which is not the intended outcome of the NPRM. In fact, the new devices could actually increase the amount paid by MVPD subscribers for their in-home set-top equipment.

Another important issue that becomes clear in examining the technical literature throughout this proceeding is that different technical solutions are being proposed to satisfy different sets of technical and business requirements. The NPRM solution establishes new technical requirements that will necessitate significant changes in the technical design of current MVPD networks to address network reliability, network security and innovation needs. CVCC and the NPRM propose a technical solution that meets a different set of technical and business requirements. Keeping only to technical requirements in this analysis, the largest difference is the technical interface requirements to establish more competition in the navigation function of video service. The disassembling of the video service into Information Flows changes the MVPDs' system architecture that is required to deliver video service to meet this requirement. It has to, given that these Information Flows were not otherwise exposed with well-defined technical interfaces in the normal operation of the existing competitive market. The reaction of the MVPDs to this new technical requirement is to manage third-party device interaction on their networks through

¹⁷ See DLNA Comments (p.2): "DLNA notes that the architecture of the Competitive Navigation proposal is materially different than the DLNA VidiPath architecture."

¹⁸ See Comcast Ex Parte Letter (May 11, 2016) ("Entitlements reflect marketing and business models, which vary among providers and change rapidly in retail video offerings. We explained that Comcast and other MVPDs do not deliver entitlements in a standardized way, so the Commission's proposal would require significant changes to entitlement servers and other parts of MVPD networks. We also discussed why the current approach is preferable, for both MVPDs and programmers, to a standardization model, including that the current approach provides flexibility to accommodate experimentation and innovative changes in business models, usage patterns, and delivery methods; accommodates differences in how content is distributed over different MVPD networks; and enables industry stakeholders to respond rapidly to emerging security and piracy threats. In contrast, mandated standardization would have the effect of "freezing" business models and delaying consumers' ability to access content in new ways until standards could be updated or new standards developed.").

the use of gateways or set-top boxes. This approach to risk management will keep their video networks operating at competitive levels of reliability, security and ability to innovate, as much as is possible under the weight of the NPRM requirements.

This is not only a discussion therefore of what is technically possible. Instead, it is the reality of the way the current MVPD networks are designed to function based upon network operations tuned to succeed in highly competitive video markets. The NPRM establishes new requirements that the current network architecture are not designed to support. In my opinion, the MVPD comments provide a reasonable response to these changed circumstances and requirements, and that response will be to include deployment of new in-home devices, which will be an unintended consequence of the NPRM.

The NPRM sets an unrealistic timeline for a standard

The second important area of disagreement in the technical community concerns the question of whether the two-year timetable for modifying existing standards to meet the NPRM is realistic. In order to address this technical issue, I will break down the discussion to address the realism of the following three assumptions behind the NPRM proposal: 1) likelihood of achieving a two-year timetable, 2) ability to use existing standards, and 3) other related interoperability issues. My analysis of these issues given the technical details filed in response to the NPRM finds that the proposed technical implementation set forth in the comments and CVCC Technical Appendix fail to establish that the NPRM proposal can be implemented within two years based upon existing standards.

At the outset, the NPRM is clear that it does not explicitly require the adoption or use of an existing standard, and instead allows MVPDs to choose the specific standards they wish to support on their networks.¹⁹ The NPRM does seek comment, however, on whether the specifications presented by advocates of the FCC's proposed rules for the Information Flows could achieve the FCC's proposal rapidly with modifications that should not take more than a year.²⁰ Indeed, the NPRM expresses confidence that specifications necessary to support the Information Flows already exist today.²¹ Citing the presence of these DLNA specifications, the NPRM also seeks comment on the feasibility of a two-year implementation deadline for a standard. Finally, the NPRM also asked for comment on three other key issues relevant to this discussion:

¹⁹ See NPRM, para 34: "we propose to allow MVPDs to choose the specific standards they wish to use to make their services available via competitive navigation devices or solutions, so long as those standards are in a published, transparent format that conforms to specifications set by an open standards body."

²⁰ NPRM, para 43.

²¹ NPRM, para 35: "the specifications necessary to provide these Information Flows appear to exist today."

- i. The specific additional work that needs to be done for an Open Standards Body to develop the necessary standards.²²
- ii. Whether a “fallback” or “safe harbor” set of specifications is available to ensure that MVPDs and other interested parties cooperate in prompt development of standards.²³
- iii. Whether the NPRM provides enough flexibility to MVPDs while still sufficiently defining a standard for a device built for a nationwide market.²⁴

Practicality of a two-year timetable

As described above, the NPRM proposes a two-year timetable for MVPDs to comply after adoption of the NPRM rules, and seeks comment on this implementation deadline.²⁵

AT&T, Comcast and DLNA provided technical information supporting the position that the implementation deadline is not realistic. AT&T and Comcast both unequivocally believe the deadline is unrealistic.²⁶ AT&T adds that it took DIRECTV 44 months in DLNA from start to certification of a standardized RVU device. DLNA comments reinforce this timing by stating that a “more realistic expectation is 36 months +/- 12 months for end-to-end projects including project definition, guideline creation, test program creation, plugfests, certification program creation and validation.”²⁷

The CVCC Technical Appendix did not provide an estimate of how long it would take to standardize its implementation in an open standards body.²⁸

This new technical information provided in NPRM comments clearly questions the practicality of the two-year deadline. The DLNA comments hold particular force here given its relevant experience in developing profiles of its specifications. Note also that DLNA’s time estimate does not include the time it takes the MVPDs to do system integration with certified equipment. My experience suggests this step can

²² NPRM, para 43.

²³ NPRM, para 43.

²⁴ NPRM, para 48.

²⁵ See NPRM, para 34, and 43 “We seek comment on whether the standards-setting process, if pursued in good faith, could allow MVPDs to meet that proposed implementation deadline.”

²⁶ See Dulac Declaration, AT&T Comments, para 25: “The Commission’s proposed two-year deadline is impossibly short given the substantial work that must be done by the OSB, and this does not even consider the normal product update cycle of 18-24 months that can only begin once the OSB work is nearing completion.” See also Werner Declaration, Comcast Comments, para 11 and 20.

²⁷ See DLNA Comments, p. 2.

²⁸ CVCC does believe a standard can be achieved within a two-year period. See CVCC Comments, p. 31: “This environment can be achieved within the proposed two-year time period.”

easily add at least another 12 – 18 months to the implementation deployment timeline for standardized equipment.²⁹ Given DLNA's range for how long it would take to create a DLNA profile, the total time for the development of standards to the point of certification of equipment plus the time for implementation on MVPD networks will likely take 3 – 5 years.

There is no question that projecting how long it will take to create a technology standard is a notoriously difficult task. Unfortunately, my experience in managing R&D projects that rely upon open standards has found that almost all estimates are overly optimistic of the time it will take to create a standard in an open standards body. The reason for this is two-fold. First, the devil is in the details. One of the first steps in well-managed standards development is to establish specific requirements and use cases for how the technology will be applied. Once rigorous effort is applied to develop specific and detailed descriptions of use cases for the standardized technology, the usual outcome is a much larger number of requirements than originally contemplated for coverage by the standard.

The NPRM raises an unusually large number of complex issues associated with the implementation of its proposed solution. Consequently, I would anticipate that the first step of identifying and documenting use cases will result in a much larger than expected number of mandatory requirements due to the current lack of detailed documentation of the NPRM proposal. Remember that early definition work completed by Working Group 1 in the DSTAC to document requirements for downloadable security will only be partially applicable since the NPRM significantly expands the scope of the standard to include the Information Flows as well. The standard will need to support a large number of requirements (*e.g.*, interactivity, independent content protection system, advanced video services, complex entitlement scenarios) in different scenarios (*e.g.*, in-home, cloud-based).

Second, after the list of required use cases is well understood and has gained agreement, the legacy or existing technical solutions usually lack sufficient capability to meet the necessary requirements. Inevitably, the preferred use cases are forward looking and capture a sophisticated and enhanced use of technology that is well beyond the capability of existing technologies. It is not uncommon that the first solutions in standards bodies are to modify existing standards to try to meet these advanced use cases in new profiles or versions. Unfortunately, it has been my experience that existing technologies can only bend so far to support use cases that the technology was not developed to support before an entirely new approach is warranted due to the inefficiencies of implementations based upon modified existing standards.

²⁹ A short-cut that companies will sometimes employ to cut deployment time is to deploy early implementation devices that are not fully certified, but can be made compliant using software updates once certification has been achieved. This option, of course, would not be available under the NPRM proposal.

We are seeing this same process of trying to fit existing standards into new use cases in this proceeding. Today, it appears the NPRM proposal supports the notion that DLNA and UPnP specifications can be modified to quickly provide a cloud-based solution for delivering the Information Flows, even though these technologies have been completely developed to only extend a remote user interface between devices connected over home networks. There is no evidence that DLNA and UPnP technology can make this leap in functionality. Other key technological components of the NPRM solution are being criticized as well for establishing unintended technical bottlenecks and consumer harms.³⁰

Without better understanding of the technical requirements, the ability of this “quick-fix” solution to support the basic capabilities of the Information Flows, let alone other important regulatory requirements mandated by the NPRM, is unknown. As noted above, already we are seeing new proposals to support interactivity based upon browser-based solutions that were not supported in earlier approaches to the FCC’s proposed rules. At what point will all these technology short-cuts ultimately flip to a “Rube Goldberg” solution that needs to be scrapped in favor of a new approach based upon more modern technologies and techniques than provided by the legacy technologies?

This normative discussion of the standards development process based upon my experience is offered to provide technical support behind the concern that the NPRM two-year deadline is not realistic. The prospects for rapid agreement are not optimistic based upon the lack of consensus reflected in the final report of the DSTAC. DSTAC was able to develop a list of nearly 200 different line items or requirements, but many of these requirements were organized by industry function, and thus did not reflect consensus of the full working group compiling the list.³¹ Moreover, the economic literature on technical standards setting indicates the prospects for stalemate are high when dealing with technologies that are changing rapidly and there is considerable uncertainty about the costs and benefits of the alternatives.³² This characterization would seem to fit the current proceeding very well given the frequent changes to the proposal by proponents of the proposed rules over just the past 6 months and the lack of discussion regarding the costs of these changes, as will be discussed later in this declaration.

Use of existing standards

There were several important comments to the questions posed in the NPRM regarding the possible use of existing standards.

³⁰ See Gracenote Comments, p. 1: “The Commission’s proposal to pass through the EIDR ID will not work and has the potential to wreck the robustly competitive metadata market.”

³¹ Working Group 1 (WG1) to DSTAC was formed to develop commercial requirements for a standard. See Report of Working Group 1 to DSTAC, “WG1 Report #1”, April 21, 2015.

³² See Besen Declaration, Comcast Comments, para 30.

AT&T and Comcast both emphasized that there is no “off-the-shelf” or existing technology upon which the new standards can be quickly adopted.³³ AT&T, Comcast and DLNA also emphasized that DLNA VidiPath technology is not designed to support the NPRM’s Information Flows. AT&T describes VidiPath as an industry standard that has been developed to support remote user interface (RUI) technology, not the separated Information Flows envisioned by the NPRM.³⁴ Likewise, Comcast believes using VidiPath technology to implement the NPRM proposal is technically incorrect and overlooks the fact that VidiPath is an app-based solution that relies upon an MVPD-supplied app running on VidiPath-certified retail devices.³⁵ DLNA notes that VidiPath is “materially different” from the proposal and cannot answer the question of what work remains to be done by an Open Standards Body due to a lack of clear requirements for the proposed standard, and that the Electronic Program Guide (EPG) Controller support as specified by the DLNA guidelines within the CVCC Technical Appendix has no active testing and certification program.³⁶

The CVCC Technical Appendix states that existing technologies “may be readily formulated to support full compliance with the FCC’s objectives and proposed rules” with specific minor changes.³⁷ This appendix then describes an implementation that is “based on existing DLNA & UPnP specifications.”³⁸ CVCC also says a complete specification is under development for release soon, though no specific date for the release was provided.³⁹

My analysis of this new information provided in the NPRM comments indicates that the amount of reliance that can be achieved by using existing standards to implement the NPRM proposal is impossible to assess with current information. Until better requirements are developed to meet the NPRM solution, it simply is not possible to develop an accurate assessment of how applicable existing specifications such as DLNA and UPnP will be for a solution to the NPRM. Particularly troubling is the lack of specificity within the CVCC Technical Appendix to answer the question of what more work needs to be done by an Open Standards Body to develop standards for the Information Flows. Within this vacuum of critical information, it is difficult, if not unwise, to make any decision regarding the ability to create a standard on any timeline.

³³ See Dulac Declaration, AT&T Comments, para 7; and Werner Declaration, Comcast Comments, para 20.

³⁴ See Dulac Declaration, AT&T Comments, para 11.

³⁵ See Werner Declaration, Comcast Comments, para 20.

³⁶ See DLNA Comments, p. 2 and 3; Technical Appendix to CVCC Comments, p. 3.

³⁷ See Technical Appendix to CVCC Comments, p. 1.

³⁸ *Op. cit.* p. 3.

³⁹ *Op. cit.* p. 1.

The NPRM does point to submitted evidence by advocates of the FCC's proposed rules to support its proposed two-year implementation deadline and implied reliance upon DLNA and UPnP specifications for the NPRM proposal. Assuming this is in reference to the CVCC's Virtual Headend demonstration noted earlier (and I have no way of knowing for sure if this is the case since there is no citation describing the location of this submitted evidence), again I would urge caution basing any significant decision-making upon technology demonstrations alone. This is particularly the case where little technical analysis has been conducted regarding how the features were demonstrated, specific devices used, actual protocols used between devices and technical diagrams of the use cases shown. Technology demonstrations can be useful tools to help perform early due diligence on technical options, but they also can engender false confidence, like "fool's gold" with regard to the actual technical complexity associated with applying technology to solve a particular solution. For example, we do not know if the "modifications" to UPnP fields would pass DLNA certifications, or might not create other issues for how these fields are used for existing purposes. Just because you can make it work in a demonstration does not automatically mean that the standard can be applied in this fashion in commercial deployment.

The comments on this issue also indicate that it will be difficult to reach technical agreement given the wide gap in confidence expressed that DLNA technology represents the correct solution to implement the NPRM's Information Flows. As noted above, CVCC is proposing to develop a new profile based upon DLNA specifications, with RVU and VidiPath representing existing different profiles of the DLNA specifications as well. Stated differently, the reason that RVU and VidiPath exist as different profiles is because DLNA members were not able to gain consensus on a single profile that met the RUI requirements of all the DLNA members. In the case of VidiPath, MVPDs and consumer electronics companies were interested in developing a DLNA profile that relied heavily upon HTML5 technology to support a RUI for MVPD services, while DIRECTV wanted to use a lower-level graphics protocol to support its RUI. If DLNA is selected as the Open Standard Body for the NPRM standard, then the NPRM will attempt to force consensus on a single profile of the DLNA specifications to support the Information Flows, which would be an outcome that DLNA could not achieve through voluntary participation in the past.

Other standards and interoperability concerns

The technical commentary studied in this declaration did not address directly the NPRM's question regarding whether a "fallback" or "safe harbor" set of specifications is available to ensure that MVPDs and other interested parties cooperate in prompt development of standards. All of the technical commenters are in agreement that no technical standards exist today to support the NPRM proposal. Even the CVCC Technical Appendix notes that modifications are necessary to the DLNA and UPnP specifications.

Given this, the simple answer in this case is that no set of specifications exist today that can function as a fallback if the Open Standards Body is unable to create a

standard on a timely basis. Moreover, if such a fallback solution did exist, then the rules would be explicitly defining all terms of a technical mandate, which would be contrary to the stated policy principles of the NPRM. This is true since any groups or participants in the standards process that prefer the fallback standard would be motivated to sabotage development of a new standard in an Open Standards Body environment secure in the knowledge that their preferred fallback solution would be adopted by the FCC at a preordained point in time.

The NPRM also did not receive any direct feedback on its question of the needed degree of flexibility required in its regulatory approach.

In my analysis, the flexibility afforded to the MVPDs in the NPRM to develop a standard is precarious at best even without a fallback standard. The NPRM would allow each MVPD to choose its preferred Open Standards Body and its preferred technology to provide the Information Flows, but the overall framework to establish three technical interfaces to deliver Service Discovery, Entitlement and Content Delivery data is inherently a technology-focused effort. In this sense the NPRM's assertion that its approach is technology neutral is a difference without a distinction. True, it does not specify the use of DLNA, but it does require establishment of three new technical interfaces in an Open Standards Body that can be used to connect to MVPD networks.

I also should note that the flexibility for MVPDs to quickly react and implement their technical strategies would be severely compromised by these proposed regulations. There is widespread agreement that video markets have been undergoing extraordinary competitive disruption with the emergence of online video distributors (OVDs), and that trend will only accelerate – in fact, in the order approving the AT&T-DirecTV transaction, the FCC confirmed this when it stated the “[t]he number and types of OVDs have grown significantly over the last few years.”⁴⁰ Like other broadband application markets, the ability to execute a technical strategy that permits rapid new service and feature creation capabilities will be crucial to compete effectively in these markets.

The different technical approaches employed by MVPDs to support their video apps demonstrate this highly dynamic market situation, and need for flexibility to respond. MVPDs deploy their video apps using HTML5 on Mac laptops and PCs, and native applications on iOS, Android, Roku, and other platforms. They have developed VidiPath/RVU solutions, and Comcast has now launched its Xfinity TV Partner Program to deploy an HTML5-based app for smart TVs and other IP-

⁴⁰ Federal Communications Commission, Memorandum Opinion and Order In the Matter of Applications of AT&T Inc. and DIRECTV For Consent to Assign or Transfer Control of Licenses and Authorizations, MB Docket No. 14-90 (July 28, 2015) at para 58 on p. 26.

enabled devices.⁴¹ In this rapidly evolving environment, technical choices about how MVPD video will be delivered on different device platforms are best dictated by marketplace circumstances rather than by a government-imposed technology mandate. The market-driven apps model can adapt to new device platforms, changing technology, and evolving business models. In contrast, the Commission's proposal would essentially freeze the technical interfaces through which MVPD video is delivered for all circumstances, whether it makes good sense or not.

Under the NPRM solution, even minor incremental technical changes for each interface will have to be routed through an Open Standards Body that may or may not be motivated for achieving consensus. Today, the NPRM views DLNA and UPnP as expedient technology choices, but the marketplace is already migrating to HTML5, as evidenced by its greater global adoption, and might embrace a different service discovery protocol over time.⁴² The NPRM mandate for a standard limits the flexibility of the MVPDs to adapt their technical strategy, particularly if entities emerge whose business model is based upon the Information Flows from the MVPD networks using DLNA and UPnP implementations, and would therefore be resistant to change technology.

The key point is that constraining the flexibility of MVPDs to implement technical strategy in a highly competitive market where rapid technological changes are the norm is not the right regulatory approach since it will be the customers of the MVPDs that ultimately will suffer with suboptimal services. The reduced flexibility afforded by the NPRM to MVPDs to adjust to market conditions is also counter to the trends elsewhere in regulation. For example, modern spectrum management has moved to flexible licensed spectrum models away from the command-and-control approach that specified the technical standards that must be used on specific spectrum bands. The NPRM solution will limit the flexibility of MVPDs by imposing a difficult and time-consuming process to route any technical changes to the Information Flows through an Open Standards Body for approval. Given the criticality of the Service Discovery, Entitlement and Content Discovery information to all video services, this regulatory requirement will make it extremely difficult for MVPDs to execute an innovative and agile technical strategy.

NPRM costs are non-trivial, and the FCC has failed to conduct the necessary cost-benefit analysis

The final area of disagreement concerns the costs associated with implementing the NPRM.

⁴¹ Comcast recently announced its Xfinity TV Partner Program based upon this approach, with Samsung and Roku TV early participants in deploying Smart TVs and streaming players using the Xfinity application. See Werner Declaration, para 6; "Comcast Launches Xfinity TV Partner Program; Samsung First TV Partner to Join," Comcast Press Release April 20, 2016.

⁴² See, for example, IETF RFC 6763: DNS-Based Service Discovery (DNS SD) at <https://tools.ietf.org/html/rfc6763>.

The NPRM itself does not ask any questions regarding the cost of implementing the Information Flow solution. Strangely, the NPRM does ask about the costs that might arise to build a single device that will support one or multiple device specific apps, even though the NPRM does not propose to adopt this approach.⁴³

On this topic NCTA notes that the NPRM proposal ignores costs, and provides a list of over 20 different line item costs in system design and implementation as well as lost opportunity costs that will occur as a result of the NPRM.⁴⁴ While these costs are not quantified, NCTA does estimate the additional energy costs resulting from new in-home devices alone will be \$1.6 billion per year.⁴⁵ AT&T expects the cost impact of the NPRM proposal will be very large, though the proposal lacks sufficient detail to estimate the overall cost impact.⁴⁶ AT&T raises further cost concerns associated with new equipment certification programs that will be needed, the support costs of the parity requirements and increased operations costs related to supporting a wide variety of equipment in homes.⁴⁷ Comcast states the cost of implementing the NPRM proposal will be “substantial, complex, and very costly,” providing examples of implementation costs associated with new entitlement servers, providing additional network bandwidth to support the new technical interfaces and the development of new in-home gateway devices.⁴⁸

The CVCC technical appendix did not comment about the cost of its proposed implementation.

My analysis of these comments, or lack of technical commentary in the NPRM and CVCC Technical Appendix, on the cost issue raises three key observations.

First, in my experience, the MVPDs comments provide reasonable examples to support the position that the cost of implementation will be significant. The lack of definition behind the NPRM proposal precludes the ability to develop even a first cut estimate of the total implementation costs. Nevertheless, the labor and capital that will be necessary to develop and ratify the NPRM standard, develop and

⁴³ NPRM, para 48 and 49.

⁴⁴ See Appendix B: A Technical Analysis of the FCC’s Navigation Device Proposal, Sidney Skjei, NCTA Comments p. 49-50.

⁴⁵ *Op. cit.* p. 54. See also the Natural Resources Defense Council (NRDC) in a subsequent Expert Blog estimated the NPRM proposal “may disrupt the industry’s ongoing efforts to reduce customer electricity costs by more than \$1 billion per year.” Natural Resources Defense Council, Expert Blog: FCC Proposal Could Undermine Efforts to Bring Down National Set-Top Box Energy Use, May 4, 2016 at <https://www.nrdc.org/experts/noah-horowitz/fcc-proposal-could-undermine-efforts-bring-down-national-set-top-box-energy>.

⁴⁶ See Dulac Declaration, AT&T Comments, para 8.

⁴⁷ See Dulac Declaration, AT&T Comments, para 25, 34, and 39.

⁴⁸ See Werner Declaration, Comcast Comments, para 8.

participate in a certification program, and then design, test and implement a new system architecture to support the Information Flows, not to mention the purchase of new service and in-home gateway devices, will undoubtedly be significant. The lack of definition behind the NPRM proposal does play into the hands of those who advocate its adoption, since any large imposition of costs that could be identified from a detailed technical description would present serious obstacles to adoption of the proposal.

My experience in estimating the cost of standards development and technology deployment over MVPD networks is that the two most significant costs incurred by the NPRM proposal are likely to be associated with the deployment of new in-home devices and the resulting costs arising from the delays associated with the standardization process. The in-home device cost is a dedicated cost per household, the most expensive type of cost to incur since it cannot be reduced through cost sharing across other subscribers. The costs of delay to standardization are difficult to quantify, but nevertheless can be very large. They are most significant when they result in subscriber churn representing the loss of subscribers who move to other more innovative, agile platforms that offer new or lower-priced features or services.

Second, the lack of attention in the NPRM to any issues associated with the cost of implementation to the proposed solution is troubling. In an ideal world, policy makers have a deep, quantitative understanding of the costs and benefits of their policy proposals and the alternatives. The application of cost-benefit analysis based upon this knowledge can be used to formulate efficient regulatory frameworks that best meet policy objectives in a complex technical, economic and policy landscape. Oftentimes this is not possible due to substantial complexity, uncertainty or the presence of difficult-to-quantify costs and benefits. The NPRM should have asked for more detail regarding the possible costs and benefits of all of the proposed solutions in DSTAC, but it did not. A clear grasp of the costs and benefits of all the proposals, preferably in quantitative form whenever reasonably possible, is critical for the FCC to be able to conduct informed decision-making regarding the merits of the NPRM proposal, and to rationally select the best alternative.

Third, the lack of interest in the cost of in-home equipment to support the NPRM proposal is noteworthy given that such devices are a particularly important cost component of the FCC's proposal. Reducing the cost to consumers of leasing MVPD equipment was a high-profile policy objective of the FCC press reports announcing the NPRM, yet the NPRM itself does not ask the question of what the impact of the NPRM proposal will be on set-top box costs to MVPD subscribers! As noted above, I believe the proposal will result in a new gateway device to provide MVPDs needed protection in network reliability, network security and innovation. The NPRM does not seem to seriously consider this possibility and ask how much the cost of set-top devices might have to increase in order to implement the Information Flow technical interfaces.

In summary, despite this lack of attention to important cost information in the NPRM, the submitted comments from MVPDs now offer some additional detail to the implementation costs, even though this is understandably incomplete due to a lack of definition provided in the NPRM proposal. This commentary warns of significant new costs to implement the NPRM. Given my analysis of the available cost information, I believe the lack of a clear understanding of the specific reasons and magnitudes for new costs associated with the proposal is reason alone to not proceed forward with the NPRM proposal at this time.

Summary

This declaration has reviewed the technical commentary provided in submitted comments to the Navigation Device NPRM. The review and analysis of this information leads to the following findings on key issues of technical disagreement in this regulatory proceeding:

1. The MVPDs will need to redesign their network architecture to support the Information Flows defined in the NPRM. To meet requirements in network reliability, network security and ability to innovate, the NPRM will result in new gateway devices in consumers' homes. The new devices could actually increase the amount paid by MVPD subscribers for their in-home leased equipment.
2. The two-year implementation deadline is not enough time to create a standard in an Open Standards Body and implement the standard on MVPD networks due to the complexity of the mandated solution, the lack of clarity about what requirements need to be developed to meet the NPRM solution and the need to modify existing technologies.
3. NPRM costs are likely to be significant and to occur in unexpected places such as for new in-home equipment. A cost-benefit analysis of the NPRM proposal and the alternatives has not been conducted sufficiently to justify moving forward.

Having reviewed this material I cannot help but observe that this is precisely the type of policy debate and approach that the FCC should try to avoid. For the reasons and findings noted above, I think the best approach for the FCC would be to not adopt the proposal as described in the NPRM. There are too many uncertainties and the regulatory framework mandates too many technical details for which the NPRM has not performed the necessary cost-benefit analysis to insure this is the right direction to pursue. There is simply too much risk associated with rushing to adopt an approach that has yet to be described in sufficient detail to be able to seriously conclude that benefits will outweigh the costs of adoption.

Specifically, the NPRM needs to conduct a much more serious evaluation of the apps-based approach. This is a technical solution that does permit MVPDs to meet their reliability, security and innovation requirements, and for consumers to receive

the MVPDs services without the need to lease a set-top box. Even better, these retail devices will support video apps from a large number of competitive service providers including the MVPDs. This market-based approach removes the FCC from the uncomfortable and ill-suited role of having to mandate technical interfaces that require additional in-home devices.

I believe it is likely that by the time any standards would be developed and deployed as a result of the NPRM, this technical solution will be obsolete and unnecessary, and a robust app-based video economy will be in full swing. Within two years I anticipate that video customers will have far more options for how they watch video.⁴⁹

These developments will make the difficult struggles of the FCC in trying to decide between treating the MVPD network as a dumb pipe,⁵⁰ or treating existing navigation devices as dumb terminals,⁵¹ an irrelevant exercise. Besen's description of government agencies acting like "blind giants" is worth repeating, as the circumstances appear particularly relevant to this current proceeding:

"government actions to mandate technologies are especially inappropriate when technologies are changing rapidly and there is considerable uncertainty about the costs and benefits of the alternatives"⁵²

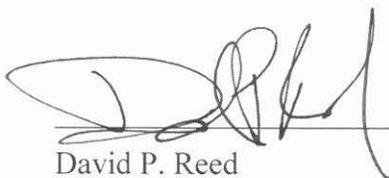
⁴⁹ Of course, this is well underway already. See Los Angeles Times, "Hulu Is Developing a Cable-like Package of Channels," *Latimes.com*, accessed May 2, 2016, <http://www.latimes.com/entertainment/envelope/cotown/la-et-ct-hulu-tv-service-20160501-story.html>.

⁵⁰ See Besen Declaration, Comcast Comments, para 40.

⁵¹ See DSTAC Report, p. 193.

⁵² See Besen Declaration, Comcast Comments, para 30 & note 40, also describing how Paul David has characterized government agencies as "blind giants" because "at the time when [they] can have the most influence, they also have the least amount of information about what action would be most appropriate." P.A. David and S. Greenstein, "The Economics of Compatibility Standards: An Introduction to Recent Research," 1 *Economics of Innovation and New Technology* 3, 1990, p. 30.

I, David P. Reed, declare under penalty of perjury that the foregoing declaration is true and correct to the best of my knowledge, information, and belief.



David P. Reed

Executed on May 22, 2016

Attachment A: Curriculum Vitae for David P. Reed

Profile

- Accomplished Researcher and Business Executive experienced with leading and conducting strategic planning and research and development (R&D) efforts in industry laboratories and universities.
- Extensive experience setting strategic direction and building R&D organizations.
- Experience leading and making contributions to large R&D projects covering a wide range of technologies relevant to the telecom industry such as software application platforms, broadband delivery systems, and wireless networks.
- Principal author of interdisciplinary analyses that played key role in defining U.S. policy debates on PCS spectrum allocation and local access competition.
- Effective communicator of technology, business, and policy concepts to engineers, academics, policy makers, and Board members through presentations, written documents, and technology demos.

Research Interest

Telecommunications technology, policy, and economics: Applying interdisciplinary research methods to examine the evolution of telecommunications infrastructure to advanced wireless and broadband platforms and the resulting implications on business strategy or public policy objectives.

Current research interests include competition in the local loop, economics of local access networks, growth of broadband network capacity, unlicensed band spectrum management issues, broadband roadmaps for emerging countries, and trends in emerging broadband applications such as video streaming.

Education

Carnegie Mellon University

Doctorate of Philosophy in Engineering and Public Policy (1991)

Dissertation: Engineering, Economic, and Public Policy Analysis of Residential Fiber Networks

Masters of Science in Electrical Engineering (1988)

Colorado State University

Bachelor of Science in Electrical Engineering (1985)

Teaching Experience

- Principles of Telecommunications Policy, (TLEN 5210) Spring 2013 – 2015, Univ. of Colorado Boulder
- Future of Video: Technology, Policy, and Economics, (TLEN 5380) Fall 2013 – 2015 Univ. of Colorado Boulder
- Research Methods, (TLEN 5700) Fall 2013 – 2015, Univ. of Colorado Boulder
- Capstone Projects, (TLEN 5710) Spring 2013-2016, Univ. of Colorado Boulder
- Interdisciplinary Telecom Analysis (TLEN 7001) Fall 2013, 2015, Univ. of Colorado Boulder

Publications

BOOKS

1. David P. Reed. *Residential Fiber Optic Networks: An Engineering and Public Policy Analysis*, Artech House, Boston 1991.

ARTICLES in REFEREED JOURNALS

2. David P. Reed, Jennifer Haroon, and Patrick S. Ryan, "Technologies and Policies to Connect the Next 5 Billion" (January 13, 2014). *Berkeley Technology Law Journal*, Vol. 29, 2014.

3. David P. Reed and Jim Lansford, "Wi-Fi as a Commercial Service: New Technology and Policy Implications". *Telecommunications Policy*, September 2014.

4. David P Reed, "Critiquing the Layered Regulatory Model," *Journal on Telecommunications & High Technology Law*, pp. 281 – 297, Volume 4, Issue 2, 2005.

5. David P. Reed, "The Cost Structure of Personal Communications Services," *IEEE Communications Magazine*, p. 102-108, April 1993.

6. Leland Johnson and David P. Reed, "Telephone Company Entry Into Cable Television: A Reply," *Telecommunications Policy*, April 1993.

7. Leland Johnson and David P. Reed, "Telephone Company Entry Into Cable Television: An Evaluation," *Telecommunications Policy*, pp. 122-134, March 1992.

8. David P. Reed, "Economic Comparisons of Alternative Fiber-Based Local Access Architectures Using ATM Components," *International Journal of Digital and Analog Cabled Systems*, March 1990.

9. David P. Reed and Marvin Sirbu, "An Optimal Investment Strategy Model for Fiber to the Home," *Journal of Lightwave Technology*, **2**, pp. 1868-1875, November 1989. Also in *Proceedings of the 1988 ISSLS*, IEEE, September 1988.

10. David P. Reed, Marvin Sirbu, and Frank Ferrante, "An Engineering and Policy Analysis of Fiber Introduction into the Residential Subscriber Loop," *Journal of Lightwave Technology*, **2**, pp. 1876-1884, November 1989.

ARTICLES in REFEREED Magazines

11. David P. Reed, "The Cost Structure of Personal Communications Services," *IEEE Communications Magazine*, p. 102-108, April 1993.

ARTICLES in REFEREED CONFERENCE PROCEEDINGS

12. Reed, David P. and Warbritton, Donny and Sicker, Douglas, Current Trends

and Controversies in Internet Peering and Transit: Implications for the Future Evolution of the Internet (August 20, 2014). 2014 TPRC Conference Paper

13. David P. Reed and Jim Lansford, "Wi-Fi as a Commercial Service: New Technology and Policy Implications". *TPRC 41: The 41st Research Conference on Communication, Information and Internet Policy*. September 2013.

14. David P. Reed and Jerry Bennington, "Developments in the Cable Industry", *26th Annual Telecommunications Policy Research Conference*, 1998.

15. David P. Reed, "The Transition to Digital Television Distribution Systems," *23rd Annual Telecommunications Policy Research Conference*, 1995.

16. David P. Reed, "Cable Networks – Evolution to New Services" *13th Annual Conference on European Fibre Optic Communications and Networks*, pp. 15-18, Brighton, England, 1995.

17. David P. Reed, "The Prospects for Competition in the Subscriber Loop: The Fiber-to-the-Neighborhood Approach," *21st Annual Telecommunications Policy Research Conference*, 1993.

18. Leland Johnson and David P. Reed, "Integrated Broadband Networks: The Role of the Telephone Companies," *17th Annual Telecommunications Policy Research Conference*, Airlie, Virginia, 1989.

19. David P. Reed and Marvin Sirbu, "Integrated Broadband Networks: The Role of the Cable Companies," *17th Annual Telecommunications Policy Research Conference*, Airlie, Virginia, 1989.

20. David P. Reed and Marvin Sirbu, "An Optimal Investment Strategy Model for Fiber to the Home," *Proceedings of the 1988 ISSLS*, IEEE, September 1988.

BOOK CHAPTERS

21. David P. Reed. "The Transition to Digital Television Distribution Systems: A Technological View of Expected Interoperability," *The Internet and Telecommunications Policy*, Lawrence Erlbaum Associates, New Jersey 1996.

22. David P. Reed, "Taking It All Apart: Principles of Network Modularity," *Private Networks, Public Objectives*, Elsevier, New York, 1996.

23. David P. Reed and Marvin Sirbu, "An Engineering, Economic, and Policy Analysis of Integrated Broadband Networks," *Telephone Company and Cable Television Competition*, Artech House, Boston 1991.

24. David P. Reed and Marvin Sirbu, "An Engineering Cost and Policy Analysis of Proposed Fiber Optic Telephone Networks in the Subscriber Loop," *Integrated Broadband Networks: The Policy Issues*, North Holland, New York 1990.

TECHNICAL REPORTS

25. David P. Reed. *Taking It All Apart: The Cost Structure of Personal Communications Services*, OPP Working Paper Series, No. 28, Office of Plans and Policy, Federal Communications Commission, November 1992.

26. Leland Johnson and David P. Reed. *Residential Broadband Services by Telephone Companies? Technology, Economics, and Public Policy*, RAND Corporation, R-3906-MF/RL, June 1990.

OTHER ARTICLES and REVIEWS

27. David P. Reed and Marvin Sirbu, Peer Review of the Connect America Phase II Cost Model at the request of Julie A Veach, Chief, Wireline Competition Bureau, Federal Communications Commission.

<http://www.fcc.gov/document/cacm-peer-review-reed-sirbu-0>, 2013.

28. David P. Reed, "Standardization Issues in Local Competition," Conference on the Future of Local Communications, Columbia Institute of Tele-Information, New York, 1993.

29. David P. Reed and Robert Pepper, "Opening the Local Loop: Technologies for Competition," *24th Annual Williamsburg Conference*, The Institute of Public Utilities, Williamsburg, Virginia, 1992.

30. David P. Reed, "A Question of Network Evolution," *Telephone Engineer & Management Magazine*, September 1, 1992.

31. David P. Reed and Marvin Sirbu, "A Cost Analysis of a Fiber Upgrade for a Coaxial Cable Network to Support On-Demand Video," *SPIE OE/Fibers 89 Symposium on Optoelectronic and Fiber Optic Devices and Applications*, 1989.

Other Professional Boards and Activities

- Chair, Preliminary Examinations Committee of the Interdisciplinary Telecom Program at CU-Boulder
- Senior Fellow, Member of Advisory Board and Member of Executive Committee Silicon Flatirons Center for Law, Technology, and Entrepreneurship at the University of Colorado Law School:
- Member of Mentoring Board of the Technology Law and Policy Clinic at the CU Law School
- U.S. Patents Issued
 - No. 8,060,648–Method and System of Allocating Data for Subsequent Retrieval (with T. Shaw)
 - No. 8,566,888–System for Updating Channel Lineup for Broadcasting and Switched Digital Broadcasting Services (with J. Gong)
 - No. 8,332,902–Method and System of Providing Switch Broadcast Television (with J. Gong and J. Cary)
- Dean’s Advisory Board for Colorado State University College of Engineering (2006-2012)
- Served on Technical Paper Selection Committee of NCTA Convention (2007-2012)
- Served on Committee on Intellectual Property Rights and the Emerging Information Infrastructure to produce *Digital Dilemma: Intellectual Property in the Information Age*, Computer Science and Telecommunications Board, National Research Council, Washington, D.C., 2000
- Technical Advisory Boards of VocalPoint (startup), QBeo (startup), and ITU Ventures
- Served on Organizing Committee of TPRC (1991-1993)
- Member of IEEE, IEEE Communications Society, IEEE Committee on Communications and Information Policy, SCTE, and CTAM professional societies

Selected presentations (starting 2014)

1. "Trends in Cable Network Economics", 2016 NCTA INTX Academic Workshop, May, 2016.

2. “Broadband 101”, Mountain Connect Broadband Development Conference, Colorado, 2015, 2016.
3. Telecom Exchange West, CEO Roundtable – Net Neutrality: Uncharted Territory, March 6, 2014
4. “Wi-Fi as a Commercial Service: New Technology and Policy Implications”, workshop sponsored by CAIDA on Active Internet Measurements, March 27, 2014
5. Moderated joint Silicon Flatirons and NCTA workshop at 2014 Cable Show, April 29-30, 2014, presented “Wi-Fi as a Commercial Service”.
6. “Prospects for Gigabit Broadband” at the Workshop on the Future of Broadband Regulation co-sponsored by Institute for Information Policy (IIP) of Pennsylvania State University and Federal Communications Commission, May 30, 2014
7. Discussant on “Policies Enabling Access, Growth and Development on the Internet” main focus session at Internet Governance Forum 2014, Istanbul, Turkey, September 3, 2014.
8. Moderator of “Technologies & Policies to Connect the Next Five Billion” workshop at Internet Governance Forum 2014, Istanbul, Turkey, September 3, 2014.

Academic Honors

- First Prize, Graduate Student Paper Contest of the TPRC, 1991
- Prize for MITRE Best Papers Award Program, 1989 (David P. Reed, Marvin Sirbu, and Frank Ferrante, *An Engineering and Policy Analysis of Fiber Introduction into the Residential Subscriber Loop*)
- Silver Medal Award 1985. Outstanding senior at the College of Engineering, Colorado State University, awarded by the Colorado Council of Engineers
- 1985 IEEE Outstanding Service Award – Colorado State University
- Phi Kappa Phi, Tau Beta Pi, Eta Kappa Nu, President Colorado State Student Chapter of IEEE