

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of

Video Device Competition

Implementation of Section 304 of the
Telecommunications Act of 1996

Commercial Availability of Navigation Devices

Compatibility Between Cable Systems and
Consumer Electronics Equipment

MB Docket No. 10-91

CS Docket No. 97-80

PP Docket No. 00-67

Economic Analysis of the Regulation of MVPD Navigation Devices

Michael G. Baumann

and

John M. Gale

July 19, 2010

Economic Analysis of the Regulation of MVPD Navigation Devices

Executive Summary

The Commission's Notice seeks comment on the economics of the navigation device marketplace. Low demand for retail set-top boxes is a product of rational consumer preferences, not a sign of market failure. There are many economic reasons why consumers prefer to lease rather than purchase set-top boxes: leasing allows consumers to avoid sunk costs when upgrading equipment, leasing provides service and support from the same source as the content, leasing permits easier switching among MVPDs, and leasing reduces the upfront costs to a consumer.

Certain parties mistakenly point to the small size of the retail set-top box market as a sign of market failure. Market failure is the inability of a system of private markets to provide certain goods either at all or at the most desirable or "optimal" level due to improper pricing of either the inputs or the output. That is not the case here. Moreover, there is no monopoly power in the leasing of equipment by MVPDs because in markets not subject to effective competition cable operators must offer set-top boxes at or below cost plus a prescribed rate for return on capital, and in markets that are subject to effective competition that competition from other MVPDs (e.g., satellite and telco) limits a cable operator's ability to charge an above-competitive lease rate.

The Commission has proposed an AllVid concept, under which MVPDs would provide an adapter connecting proprietary MVPD networks to new televisions, DVRs, and other video devices via a standard interface. The Commission asserts that such a model will help promote competitive alternatives in the video device marketplace and encourage broadband adoption and use.

There are inherent risks with the Commission's AllVid approach. While government decision makers may possess the *ability* to establish a standard before a *de facto* or voluntary standard appears naturally in the marketplace, they generally lack adequate *information* to do so wisely when complex and emerging technologies are involved. This has been termed the "blind giant" problem in the economics literature. At this stage, it is too early to know which technologies and business models for delivering video content over the Internet and via home networks will prove most efficient.

The Commission doesn't know and cannot foresee all required functions that may be developed. As MVPDs continue to incorporate new functionalities into their services, the AllVid adapter would need to be replaced with newer models that can accommodate such innovations. However, while a redesigned AllVid adapter may pass new functionalities through to the "smart device," the smart device may not know how to implement such functionalities. Consequently, it

is not clear that an AllVid standard would eliminate the need for a consumer to replace her smart video device in order to take advantage of any innovations in an MVPD's service.

Markets should be allowed to work free from regulation absent clear evidence of market failure or abuse of market power, neither of which is present in the evolving and competitive market for providing video content. Pursuing a single standardized approach at this time may stifle innovation, competition, and consumer choice.

Indeed, marketplace forces are already providing numerous "smart device" alternatives to consumers. Most significantly, the market for supplying online video content, and the market for devices to access that content and deliver it to the television, is rapidly evolving. Many different business models are in use, and consumers can access content through a wide range of different platforms, technologies, and equipment. Furthermore, MVPDs are developing or deploying new solutions that enable the networking of MVPD content to IP-enabled consumer electronics devices in the home.

Any Commission approach to regulating MVPD navigation devices should allow market opportunities to respond (and keep responding) to consumer demand. The Commission can work with industry participants to ensure that MVPD services are available on third-party devices, but the Commission should not dictate design standards. If any regulation is developed by the Commission it should be performance-based and not specification-based. By defining performance targets, market participants remain free to offer different methods, services, and features so that consumers can choose the products that best serve their needs.

I. Introduction

In a recent Notice of Inquiry, the Federal Communications Commission seeks comment on its proposal that MVPDs provide an adapter that would connect to an MVPD's proprietary MVPD network and also include a standard interface for connections to new televisions, DVRs and other smart video devices.¹ The National Cable & Telecommunications Association ("NCTA") has asked us to analyze from an economic perspective the Commission's AllVid proposal.

The impetus behind the Commission's proposal is to try, yet again, to establish what the Commission views as a more competitive retail market for MVPD navigation devices and to encourage wider broadband use and adoption.²

The Commission seems to believe that the retail market for navigation devices is not competitive because of the limited volume of commerce. Section II discusses reasons why many consumers may prefer leasing set-top boxes from MVPDs rather than purchasing them at retail. While government intervention may be warranted in some situations where there is market failure, as discussed in Section III, there is no market failure, as that term is used by economists, in the retail sale of set-top boxes. Section IV discusses why the AllVid standard may share some of the same characteristics that have limited the sales of CableCARD devices.

Section V discusses the problems that can arise when the government mandates standards in a market where technology is changing rapidly. It discusses what is sometimes referred to in the economics literature as the "blind giant" problem, whereby at the time government decision makers possess the power to establish a standard before a *de facto* or voluntary standard appears in the marketplace, they lack the information needed to do so wisely. It also discusses how premature standardization can result in a loss of innovation and variety, and examines the increased difficulty in changing a government-mandated standard relative to a voluntary standard. Finally, it discusses why, in the cases where government does step in, performance standards are preferable to design standards.

Section VI looks at the current developments in new services and equipment to deliver Internet video content to consumers' television sets and the various business models that are being employed. These developments include television sets that can be directly connected to the Internet, set-top devices that connect televisions to the Internet, multifunction devices (such as game consoles and Blu-ray players) that can also receive video from the Internet and show it on a television, and devices that use a home computer to bring Internet content to the television.

¹ *In the Matter of Video Device Competition, Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment*, Notice of Inquiry, MB Docket No. 10-91, CS Docket No. 97-80, PP Docket No. 00-67 (April 21, 2010) ("NOI").

² NOI ¶ 1.

Section VII discusses why an AllVid standard may not increase broadband penetration.

Section VIII concludes by outlining a possible role for the Commission in helping to develop market-based solutions that allow consumers' retail devices to interact with an MVPD's network.

II. Lack of consumer demand for retail CableCARD devices is due to rational behavior by consumers

The NOI indicates that an impetus behind the Commission's proposal is a belief that an AllVid standard will establish what the Commission views as a more competitive retail market for MVPD navigation devices. The NOI points out that the Commission has previously adopted regulations to ensure competition in the navigation device market, but believes a fully competitive retail marketplace has yet to develop despite the entry of some firms.³ The Commission does not make clear what criteria it employs in determining what constitutes a fully competitive marketplace or, as it is referred to elsewhere, a robustly competitive marketplace.⁴

The Commission seems to believe that the retail market for navigation devices is not competitive because of the limited volume of commerce. A major reason why demand for the purchase of retail market navigation devices is low appears to be an affirmative consumer preference for leasing. There are many reasons why most consumers prefer to lease.

A. Leasing allows consumers to avoid sunk costs when upgrading equipment

One reason that MVPD customers may not be clamoring to buy set-top boxes at retail is that they value innovative services available through upgraded equipment and want to avoid being saddled with sunk costs. As the Commission notes, delivery platforms are evolving at a rapid pace.⁵ Consumers may need to upgrade or replace their devices to maintain compatibility with those delivery platforms. It is impractical to expect consumers to spend hundreds of dollars to accommodate each delivery innovation. A subscriber can avoid that risk by renting a set-top box from a cable operator. Additionally, cable operators use software upgrades to extend the life of a set-top box. There is no assurance that a purchased box would be software "upgradable," or would indeed be upgraded by a consumer electronics ("CE") manufacturer or retailer, as the operator deploys new features.

Rational consumers will compare the cost of purchasing a device at retail to the cost of leasing from an MVPD. For example, if it cost \$4 per month to lease a phone from AT&T and \$25 to

³ NOI ¶ 6.

⁴ NOI ¶ 10.

⁵ NOI ¶ 13.

purchase a phone, the payback period would be about 6 months.⁶ But the consumer payback calculation result is quite different in video devices today. Consider that an HD set-top box costs \$300 or more at wholesale and is leased to subscribers at about \$8.22 per month.⁷ Ignoring interest, if the consumer could purchase at the wholesale price, the payback period would be slightly more than three years. Given that the retail price will be higher than the wholesale price, the payback period will be even longer. For example, a 50 percent retail markup would increase the payback period to over four and one-half years and a 100 percent retail markup would extend the payback period to over six years. In a market with rapid technological innovation, it is very likely that the purchased device will become obsolete during that period.

Some commentators attempt to show that device purchases are less costly than leasing from an MVPD by comparing the purchase price of a TiVo HD DVR at \$300 to the RCN lease rate for a HD DVR of \$14.95 per month. They claim that the TiVo HD DVR was “one third the price of renting a similar box for five years.”⁸ What commentators do not account for is that the TiVo HD DVR requires a service subscription fee of \$12.95 per month in addition to the nominal upfront retail price which results in a higher actual price to the consumer.⁹ When total costs of ownership are compared in this example, the RCN lease rate of \$14.95 per month compares favorably to the total TiVo price of \$17.95 (using the commentators assumption that the TiVo purchase price is amortized over sixty months.) In addition the RCN device can be returned or upgraded while the TiVo device is assumed to be used for five years.¹⁰

According to the NOI, technology and innovation bypassing the CableCARD standard is partially responsible for its failure. When one-way “plug and play” devices were contemplated in 2002, it was considered a good first step to cover existing devices and services. But, by the time rules were adopted and products were brought to market by CE manufacturers, one-way

⁶ See “Was Breaking Up AT&T a Good Idea?” *Fortune*, January 2, 1989, http://money.cnn.com/magazines/fortune/fortune_archive/1989/01/02/71446/index.htm.

⁷ See Evolution Broadband, LLC’s Petition for Waiver of 47 C.F.R. § 76.1204(a)(1), CSR-____, Petition for Waiver, at 8 (July 31, 2009) (noting that an HD CableCARD set-top box costs approximately \$300 or more); see also Orange Broadband Operating Company, LLC and Carolina Broadband, LLC Request for Waiver of 47 C.F.R. § 76.1204(a)(1), CSR-7111-Z, First Amended Request for Waiver, at 3 (June 24, 2009) (noting that a new CableCARD HD/DVR costs more than \$450). According to the NOI, a subscriber can rent an HD set-top box from a cable operator for an average cost of \$8.22 per month. See NOI ¶ 13.

⁸ Comments of Public Knowledge, Media Access Project, and New America Foundation, PP Docket No. 00-67, at 10-11 n. 9 (June 14, 2010). Commentators assume that the TiVo device is used for five years for an amortized cost of \$5 per month.

⁹ The subscription cost can drop to \$8.31 per month if a consumer makes a three year up-front purchase for \$299 or to \$6.65 per month if a customer buys a lifetime plan for \$399. <http://www.tivo.com/abouttivo/policies/tivoservicepaymentplanstermsandconditions.html>.

¹⁰ Five years is also much longer than the standard one-year warranty period, though an extended warranty is available. See <http://www.tivo.com/buytivo/dvrlimitedwarranty.html>

devices were not popular with consumers as two-way services were introduced and valued by consumers.¹¹ Going down the AllVid standards path runs the same risks.

B. Leasing permits easier switching to competing MVPDs

Lack of portability of devices across MVPDs is likely another reason that consumers rent rather than purchase set-top boxes and hence why the CableCARD standard may not have resulted in greater retail sales. Consumers are concerned about being stranded with equipment that would not be transferable to a different MVPD. By leasing, consumers can more easily switch among competing MVPDs.

Consumers view satellite and telephone MVPDs as competitors to cable MVPDs, and satellite and telephone MVPDs currently serve more than 40% of the market. Regulation solely of cable navigation devices does not allow for portability across all MVPDs. While nominally the navigation device rules apply to all MVPDs, in practice, DBS operators are not subject to the rules, AT&T does not provide CableCARD devices, and Verizon only supports CableCARD to a limited extent.¹²

Just as consumers may rent to avoid the sunk costs associated with upgrading equipment, they may rent to avoid the sunk costs associated with switching MVPD providers. Competition to provide services can induce MVPDs to lower consumer switching costs by providing low-cost entry in order to attract new subscribers. In addition, leasing may be better than purchasing for consumers who may only be temporarily with any MVPD, such as college students or military personnel. Even if set-top devices were portable across different MVPDs, consumers might still have strong incentives to lease devices for the reasons discussed in sections II.A and II.C.

C. Leasing provides equipment service and support from the same source as content

Consumers may prefer to lease from the MVPD rather than purchase from a third party to simplify service and support. Multiple suppliers in the delivery chain can cause consumer confusion regarding where to turn if a problem arises. MVPDs need to provide high quality and reliable service in order to compete. A consumer who loses service is likely to complain to the MVPD, even if some system components have been purchased at retail. Yet, the MVPD may explain that the problem is not in the transmission but in the retail set-top device and the device manufacturer may put the blame on the MVPD. A retail device may not support all advanced services as MVPDs continue to introduce new services and features. Some models of retail devices may not be able to access these new services which could cause consumer confusion.

¹¹ NOI ¶ 8.

¹² NOI ¶ 9.

In a similar manner, during the introduction of AM stereo broadcast services, purchasers of GM cars with AM stereo radios that were incompatible with some AM stereo broadcasts blamed broadcasters for not being able to receive the upgraded signal, not the car or radio manufacturer.¹³ Similarly, if a consumer's equipment purchased at retail does not support all of the services offered by the consumer's MVPD, the consumer could easily blame the service provider rather than the device manufacturer. Consumers may prefer one point of contact in case of a problem rather than having to deal with multiple customer support points of contact.¹⁴ As was argued in the Kodak case, "... modularity may come at the cost of finger-pointing when something goes wrong..."¹⁵ Going down the AllVid standards path runs these same risks.

D. Non-cable MVPDs have adopted a leased equipment model

Consumers' preference for leasing is also exhibited by the equipment marketing practices of non-cable MVPDs. While DirecTV subscribers used to have to purchase their equipment, now DirecTV has largely migrated to an all-lease model.¹⁶ DirecTV's explanation for this policy is that equipment costs, particularly for advanced products such as HD and/or DVR receivers, can be sizable and that leasing provides their customers a better and more affordable alternative. If a customer would rather purchase a DirecTV System from a third party instead of leasing directly from DirecTV, the subscriber may be able to do so but the immediate cost will be greater than leasing and most customers find that leasing is a more affordable alternative. DirecTV's FAQ notes that as technology becomes more advanced, leasing allows DirecTV to provide the latest equipment with minimal upfront cost to the customer.¹⁷ For some equipment the subscriber pays an upfront fee in addition to the monthly lease fee but this does not represent a purchase price or mean that the subscriber owns the equipment.¹⁸

¹³ "Compatibility Standards, Competition, and Innovation in the Broadcasting Industry," Stanley Besen and Leland Johnson, Rand, Prepared for the National Science Foundation, November 1986, pp. 49-50.

¹⁴ As another example, consider the competitive strategy of Apple computers. Apple targets consumers who prefer to buy computer components (CPU, monitor, DVD drive, software, etc.) from the same source under the assumption that they will all work together with little or no effort. Other manufactures choose to make individual components so that consumers can mix and match pieces from different manufacturers.

¹⁵ "Should Competition Policy Favor Compatibility?" Joseph Farrell, Chapter 12 in *Standards and Public Policy*, edited by Victor Stango, Cambridge University Press, 2007, p. 380.

¹⁶ "Can I purchase DIRECTV equipment instead of leasing?"
http://support.directv.com/app/answers/detail/a_id/750/p/447/r_id/104513.

¹⁷ "Why lease the DIRECTV equipment?"
http://support.directv.com/app/answers/detail/a_id/1865/related/1/session/L2F2LzEvc2lkL01zNmdWSzRr/p/447/r_id/104513.

¹⁸ "I am charged a lease fee. I paid for my equipment upfront, so don't I own it?"
http://support.directv.com/app/answers/detail/a_id/1876/related/1/p/447/r_id/104513.

Similarly, rental is the only option for Verizon FiOS TV set-top boxes. According to Verizon, “we ensure you have the latest technology without having to spend hundreds of dollars for each box up-front.”¹⁹

III. CableCARD device sales are not a sign of “market failure”

The Commission has not established that there is a market failure, as that term is typically used by economists, in the retail sale of set-top boxes. The Commission has simply noted that it is a market with a small volume of commerce. CableCARD devices may have failed to generate a large volume of retail sales, but that is not what is meant by economic market failure. Market failure is the inability of a system of private markets to provide certain goods either at all or at the most desirable or “optimal” level.²⁰ In general, market failure arises because of non-excludability (the inability to prevent individuals who have not paid for a good from enjoying its benefits) and/or non-rival consumption (where consumption of a good by one individual does not preclude its enjoyment by anyone else). These conditions lead to inefficiencies in production due to improper pricing of either the inputs or the output. Neither of those conditions is present in the case of set-top boxes.

Moreover, the Commission has not established that there is any monopoly power in the leasing of equipment by MVPDs. Monopoly power is the ability of a firm to make a profit if it sets its price optimally above marginal cost.²¹ On the one hand, cable operators that are subject to rate regulation must offer set-top boxes at or below cost plus a prescribed rate of return on capital. On the other hand, for cable operators subject to effective competition, that competition from other MVPDs (e.g., satellite and telco) limits the cable operator’s ability to charge an above-competitive lease rate.

Furthermore, because of the complementary relationship between set-top equipment and content services, MVPDs have an incentive to ensure that customer equipment is supplied in the most efficient manner possible in order to sell their content. This is why it is economically rational for an MVPD to pay high costs up front for set-top boxes and then lease them to consumers at low monthly rates, without any guarantee of receiving lease payments that exceed costs before the device breaks, is lost, or becomes obsolete. This is an example of the common observation about complementary goods that consumers need to have both goods in order to consume the product, so each provider wants the complementary good to be as cheap as possible. “[T]he firm will

¹⁹ “Equipment Answers,” http://www22.verizon.com/residential/fiostv/faq/faq.html#two_four (“Can I purchase the equipment instead of renting it for a monthly fee? At this time, rental is the only option for Verizon FiOS TV receiver. The equipment we provide is state-of-the-art, and we ensure you have the latest technology without having to spend hundreds of dollars for each box upfront.”).

²⁰ See *The Dictionary of Modern Economics*, The MIT Press (1981) and *Modern Industrial Organization*, D. Carlton and J. Perloff, Pearson (2005), p. 82.

²¹ *Modern Industrial Organization*, D. Carlton and J. Perloff, Pearson (2005), p. 93.

have an incentive to lower the price of hardware to create a larger network and thus a [content market] that is more favorable to consumers.”²²

Certain commentators have claimed that MVPDs have an incentive to subsidize customer equipment and that this has negatively affected the retail market for customer equipment.²³ Based on this claim, cable systems are providing customer equipment at such a *low* price that competitors cannot enter the market. In direct contradiction of this claim, these same commentators have also claimed that cable systems are charging too *high* a price for customer equipment and lowering consumer welfare.²⁴ Based on this second claim that prices are too high, entry of competitors in a retail market for customer equipment will drive prices lower. Their claims are self-contradictory: MVPDs are charging high equipment prices and competition will drive down prices, yet competition cannot develop because MVPDs are charging low equipment prices.

The lack of production of retail CableCARD devices reflects rational manufacturer response to actual market demands. The MVPDs have complied with the regulations, but simply establishing interfaces and standards for CableCARD devices does not ensure that consumers want to buy those devices. As was noted regarding the slow penetration following the adoption of the standard for color television, “adoption of a formal standard may not guarantee rapid diffusion where demand is weak.”²⁵ Similarly, FM radio adoption was long delayed despite the existence of a standard because, in part, of the lack of sufficient unique programming to induce purchases of receivers.²⁶

In order to stimulate consumer demand for a new product, the product must offer attractive attributes and pricing relative to existing products, and must be marketed and promoted to consumers. Where a new product does not offer consumers new services, new content, or substantially lower pricing, or is not promoted by the manufacturer and retailers, it will draw only limited consumer interest. AM stereo provides a case in point. “First, a serviceable

²² “Systems Competition and Network Effects,” Michael Katz and Carl Shapiro, *Journal of Economic Perspectives*, Vol. 8, No. 2, Spring 1994, p. 99.

²³ In recently filed comments Public Knowledge, et al., argue that cable systems should be precluded from subsidizing any customer premises equipment costs with service revenues. Comments of Public Knowledge, Media Access Project, and New America Foundation, PP Docket No. 00-67, at 10-11 (June 14, 2010) (stating that “long-standing cross-subsidization and pricing issues that have kept CableCARD devices from achieving a fuller measure of success in the marketplace”).

²⁴ See *id.* at 11; see also Public Knowledge, et al., Petition for Rulemaking, CS Docket 97-80, at 12-14 & n. 37 (December 18, 2009) (“consumers eventually can pay more money to lease a device from an MVPD than it would cost them to buy a video device outright”).

²⁵ “Compatibility Standards, Competition, and Innovation in the Broadcasting Industry,” Stanley Besen and Leland Johnson, Rand, Prepared for the National Science Foundation, November 1986, p. ix.

²⁶ See generally Stanley Besen, “AM versus FM: The Battle of the Bands,” *Industrial and Corporate Change*, Vol. 1, No. 2, 1992, and Stanley Besen and Joseph Farrell, “Choosing How to Compete: Strategies and Tactics in Standardization,” *Journal of Economic Perspectives*, vol. 8, no. 2, Spring 1994, p. 123.

technology (monophonic AM radio) is available to all buyers (broadcast stations and listeners). Therefore, buyers are under little or no immediate pressure to adopt a new technology. A number of AM stereo technologies are compatible with the old technology but not with each other. At best, only modest differences exist among the various new technologies in terms of their economic benefits and costs, but there is no unanimity about which technology is best.”²⁷

Similarly, set-top boxes supplied by the MVPDs provide a serviceable option, and while the retail boxes may offer different technologies than the MVPD boxes, consumers may not view these different functionalities as sufficiently valuable to forgo the lease option.

There are many examples of products that failed to generate significant demand, and hence were later discontinued. The inability of these products to develop a durable “robust” market was not due to market failure. Notable examples include: Apple Newton, Segway, 8-track tapes, DAT, Quadraphonic sound, minidisks, laserdiscs, Iridium satellite phones, smokeless cigarettes, Betamax, HD DVD, and CB radio.

IV. The AllVid standard may suffer some of the same problems as CableCARD

The requirements imposed by the FCC in the implementation of Section 629 have not correctly predicted innovations in MVPD markets or market demands and competition. In imposing its CableCARD and 1394 regulations, the FCC has significantly lagged behind the market forces driving MVPD competition and, more importantly, consumer demand for new services and technology. While the FCC has recognized innovations that were taking place in the market, the regulatory process has been unable to keep pace with market forces.

A. The AllVid approach may not eliminate the need to upgrade other equipment

There is an inherent risk of obsolescence with retail devices. Consider a universal remote control that operates a consumer’s television, set-top box, and AV receiver. If she were to upgrade the AV receiver with a newer version that provides more functions even though the interface between the receiver and the universal remote has not changed, the remote may not be able to access all of the added functionality of the receiver.

There may be similar risks with a smart device. MVPDs do not just compete on innovations in delivery technology. They also compete on services and functionality provided to their subscribers. What is important for the smart device is not just how the data stream is delivered, it is the ability of the device to interpret that data and provide services and functionality to the subscriber. The AllVid adapter must be able to output new innovations and the smart device must understand how to interpret and implement the information related to these innovations.

²⁷ “Compatibility Standards, Competition, and Innovation in the Broadcasting Industry,” Stanley Besen and Leland Johnson, Rand, Prepared for the National Science Foundation, November 1986, p. 57.

Without the ability on the part of the Commission or smart device manufacturers to foresee these innovations, the smart devices as well as the AllVid adapter may need to be replaced as innovations occur. As a result, consumers may still prefer to rent smart devices from their MVPD rather than purchase one at retail in order to ensure continued compatibility with their MVPD's product innovations.

New interactive TV applications provide a concrete example of this risk. Programmers are launching interactive applications that rely upon CableLabs' Enhanced TV Binary Interchange Format ("EBIF") platforms. Softel has designed an interactive application for use on Showtime networks using EBIF or tru2way,²⁸ and Clearleap and Fourthwall have partnered to create a video-centric, EBIF interactive weather application featuring content from The Weather Channel.²⁹ Canoe Ventures has just debuted interactive request-for-information ads across several Comcast and Time Warner markets, relying upon EBIF.³⁰

It is not clear how the AllVid standard would be able to incorporate these types of technological improvements that require coordination across content suppliers, MVPDs, and set-top box manufacturers. Indeed, the need to redesign standards and get a variety of device manufacturers on-board may delay the introduction of new content innovations. While MVPDs have an incentive to supply updated equipment to provide new, innovative MVPD services to their subscribers, other manufacturers will likely not be interested in incorporating these updates until market demand has been proven. If such updated complementary equipment cannot be deployed, the entry of new services and technologies may be delayed or even foreclosed.

B. The Commission does not know, and cannot foresee, what future design specifications, such as for functionality and codecs, will be required

The importance of functionality is recognized in the NOI, as the Commission seeks comments on any other functions for which standards would be necessary to develop an AllVid adapter.³¹ The functions specifically mentioned in the NOI are: physical connection, communications protocol, authentication, service discovery, and content encoding. The important point is that the

²⁸ "Softel's Mediasphere Powering Showtime's New HD EBIF Interactive TV Application," *InteractiveTV Today*, March 24, 2010, <http://www.itvt.com/story/6531/softels-mediasphere-powering-showtimes-new-hd-ebif-interactive-tv-application>.

²⁹ "Clearleap, Fourthwall Media Create EBIF-BASED, Video-Centric Interactive TV Weather App," *InteractiveTV Today*, February 3, 2010, <http://www.itvt.com/story/6457/clearleap-fourthwall-media-create-ebif-based-video-centric-interactive-tv-weather-app>.

³⁰ "Canoe Launches Clickable 30-Second Ads With Comcast, TWC," *Multichannel News*, June 25, 2010, http://www.multichannel.com/article/454208-Canoe_Launches_Clickable_30_Second_Ads_With_Comcast_TWC.php.

³¹ NOI ¶ 24.

Commission doesn't know and cannot foresee all required functions for the adapter. A similar issue arises with respect to the smart video device. The NOI asks whether the Commission needs to specify audio-visual formats for the smart devices to which the AllVid adapter will connect, and seeks comments on which audio-visual codecs the Commission should require smart video devices to handle.³² Just as the Commission cannot foresee future functionalities, it cannot foresee future codecs. Problems with incorporating new innovations are likely to arise because of the time required to adopt a new set of standards and therefore future product improvements may be hindered relative to market-based solutions.

Indeed, some of the Commission's proposals may already be outdated. In discussing the physical connection, the Commission suggests that 100-BASE-TX could be used to connect the AllVid with smart devices. But 100-BASE-TX is already an outdated standard among personal computers and home-networking equipment. Gigabit ("Gb") network interface cards (1000BASE-T) are included in almost all new personal computers and home networking equipment. Faster 10 GB Ethernet standards have become available as the IEEE ratified a fiber-based standard in 2002 and a twisted pair standard in 2006. As of 2009, 10 GB Ethernet is replacing 1 GB as the backbone network and has just begun to migrate down to high-end server systems. This may likely migrate to households. And perhaps by the time the AllVid standard is implemented, some new physical connection standard, such as HDBaseT, will be the norm for digital media distribution.³³

Additionally, many households no longer rely on physical wired connections but use Wi-Fi to connect. Wi-Fi allows the deployment of local area networks without wires for client devices, typically reducing the costs of network deployment and expansion. While past wireless devices have operated using the 802.11b or 802.11g standard, 802.11n is the latest multi-streaming modulation technique.

C. Time to develop the AllVid standard

The NOI envisions that MVPDs would have to make proposed AllVid devices available to new customers by December 31, 2012.³⁴ This is less than 2½ years from now. Yet the time required to implement the Commission's prior regulations concerning navigation devices took much longer. For example, in 1998 the Commission required MVPDs to make available a conditional

³² NOI ¶ 31.

³³ "HDMI is Dead. Introducing HDBaseT Networking," *Audiopholics*, July 1, 2010, <http://www.audiopholics.com/news/industry-news/hdmi-dead-hdbaset>.

³⁴ NOI ¶ 37.

access element separate from the basic navigation device. Five years later, in 2003, the Commission adopted standards for CableCARD compatibility.³⁵

AllVid would require the development of standards or protocols in at least the five specific areas identified in the NOI: physical connection, communications protocol, authentication, service discovery, and content encoding. Recall that initially the CableCARD primarily dealt with just one element: security. Proposed standards would need to be commented on by both MVPDs and CE manufacturers. Once the standards are established, new products must be developed by both the MVPDs and the CE manufacturers to implement the AllVid proposal. In addition to development, there would have to be testing and trials and deployment. As NCTA has previously noted, “Standardization ... is an extremely time consuming process. Even where parties agree on a solution, such as bringing Emergency Alert Service into joint CEA and SCTE standards, the process of comment resolution ... and adoption took *two and one-half years*. When parties (sic) interests diverge, standards processes take even longer.”³⁶

Cisco Systems noted in recent comments that very few Commission-driven technology mandates have been developed and implemented in 30 months or less.³⁷ Cisco notes that not even a three year planning period was sufficient to establish and implement the necessary framework for CMRS service provider number portability, which ultimately took more than six years. Cisco also points to the excess time taken to implement the location accuracy requirements for the provision of E911 services by wireless carriers, even though the initial rules provided a five year time frame.

Likewise, standards for broadcast HDTV were ten years in making. Continual improvements in the technology required numerous revisions of a proposed standard. After lengthy negotiations among developers of different technologies, “sponsors of competing high definition television (HDTV) systems ... agreed to merge their technologies and split licensing fees. This was attributed both to a desire to avoid the costs of subsequent testing before the FCC...and to a fear that the FCC’s choice might be challenged in the courts, delaying the introduction of the technology.”³⁸ Also, a standard for color TV broadcasts went through a lengthy decision process and when finally set, had to be subsequently changed in the face of marketplace developments.

³⁵ NOI ¶ 7.

³⁶ Comments of the National Cable & Telecommunications Association, *In the Matter of Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment*, Notice of Inquiry, CS Docket No. 97-80, PP Docket No. 00-67, August 24, 2007, p. 40 (emphasis in original).

³⁷ Comments of Cisco Systems, Inc., *In the Matter of Implementation of Section 304 of the Telecommunications Act of 1996, Commercial Availability of Navigation Devices, Compatibility Between Cable Systems and Consumer Electronics Equipment*, Notice of Inquiry, CS Docket No. 97-80, PP Docket No. 00-67, June 14, 2010, p. 11.

³⁸ Stanley Besen and Joseph Farrell, “Choosing How to Compete: Strategies and Tactics in Standardization,” *Journal of Economic Perspectives*, Vol. 8, No. 2, Spring 1994, pp. 125-126.

While the initial CBS sponsored color standard was being finalized, continuing research had improved the RCA sponsored standard to the point where it was clearly viewed by market participants as the better alternative.³⁹

In the current proposal for an AllVid standard, the standard will have to be developed while the markets for interactive services from both MVPDs and Internet providers along with the smart devices used to access those services are rapidly changing and improving. As discussed below, there are numerous players who are each attempting to find the service and technology that will appeal to consumers and drive adoption of their devices. Manufacturers of televisions, Blu-ray players, DVRs, set-top boxes, game systems, computers, and other devices are all striving to be the gateway to digital content for consumers. They will, most likely, continue to innovate and compete while proposed standards are negotiated with the Commission.

There are two points to be made here. First, the actual time required to complete this proceeding and subsequent rulemaking and then develop and implement the proposed AllVid standards may be substantially longer than the 2 years that are contemplated in the NOI. Second, with the marketplace rapidly changing, the AllVid standard runs the risk of being obsolete prior to implementation and/or hindering some innovation while companies await the outcome of the standards-setting process. Even if the Commission were very lucky and picked exactly the right answer based on 2010 technology, by the time the standard could actually be implemented in 2013 (or more likely later), it would more than likely be out of date due to continuing innovation. This arguably is what happened with CableCARD. The Commission chose a separable security approach in 1998 but CableCARD standards were not substantially implemented until the mid-2000s, by which time innovation in services and supporting technology had already bypassed the mandated standard.

V. Mandating standards can freeze or delay innovation of devices and services in the currently dynamic smart device market.

Broadly speaking, there are three principal means of achieving standardization: (1) *de facto* standards, which are set through market competition often where a single firm introduces a standard and others follow; (2) voluntary standards, determined through negotiations between firms or through standard-setting organizations and where participants can choose to comply either by employing an open standard or through licensing; and (3) *de jure* or mandatory standards established by the government where use of the standard interface is required in order to participate in a market. There are examples of all three methods being employed in U.S. telecommunications markets. For example, the choice between Blu-ray and DVD-HD was

³⁹ Through the 1940s CBS was advocating the adoption of its mechanical color system, which was not compatible with black and white broadcasts, and the FCC adopted the CBS system in 1950. By 1952 a consensus of support had formed for the RCA system which was backwards compatible with black and white sets and the FCC reversed its decision in December 1953. See Carl Shapiro and Hal Varian, "The Art of Standards Wars," *California Management Review*, Vol. 41, No. 2, Winter 1999, pp. 11-13.

made through market forces while the broadcast HDTV standard was set by government mandate. Historically, mandatory government standards have been established in cases where strong negative externalities (uncompensated actions that harm someone) were deemed likely, as in the case of broadcast radio and television and the setting of non-interference standards (to prevent one person's usage from harming another person's usage).

Although achieving standardization may provide benefits to manufacturers and consumers, when a standard is imposed prematurely, and in particular when a mandatory standard is imposed prematurely by government, it becomes difficult, if not impossible, for superior technologies to displace those that are embodied in the standard. When technology is changing rapidly, the danger of a mandatory standard locking in an inefficient alternative that forecloses innovation in technology and services is substantial and especially likely.

A. The blind giant

While government decision makers may possess the power to establish a standard before a *de facto* or voluntary standard appears, they often lack the information needed to do so wisely. The history of regulatory efforts, especially in telecommunications, includes examples of efforts that foreclosed innovation, selected “incorrect” standards, or favored particular incumbent industries. A major reason widely pointed out in the economics literature is that the time when regulators may be best able to influence the future of a technology (before a *de facto* or voluntary standard is in place) is also when they have very little information to make a choice (the technology is still changing rapidly). This has been termed the “blind giant” problem.

“The second is a dilemma posed by the realization that governmental agencies are likely to have greatest power to influence the future trajectories of network technologies, just when a suitable informational basis on which to make socially optimal choices among alternatives is most lacking. The actors in question, then, resemble ‘blind giants’ – whose vision we would wish to improve before their power dissipates.”⁴⁰

The difficulty faced by regulators in choosing the “right” technology has been pointed out in the cases of color television and HDTV in Europe.

“[E]ven if policy-makers try to maximize total surplus, they may lack the information needed to do so. In the case of choosing a standard at the start of the product's life, it may be very difficult to determine which standard is the ‘correct’ one. Moreover, the government may have a significant informational disadvantage relative to private parties when emerging technologies are involved.

⁴⁰ Paul A. David, “Some New Standards for the Economics of Standardization in the Information Age,” in *Economic Policy and Technological Performance*, edited by Partha Dasgupta and Paul Stoneman, Cambridge University Press, 1987, p. 210.

Many commentators feel that the FCC made a poor choice for color television in the 1950s, and that the European Community is making a losing choice in HDTV today.”⁴¹

Standard setting is not only difficult early in a new technology, innovation in competing technologies will not wait for the standard setting process.

*“Formal standard setting, either by government or by private parties, should be avoided during the time that the technologies in question are rapidly changing. A salient example is color television where the FCC’s decision in favor of the CBS technology as the mandatory standard was quickly seen as a mistake. A key difficulty was that even during the FCC’s deliberations the competing technologies were being modified and perfected, making objective evaluations very difficult.”*⁴²

The case of the introduction of color television is instructive. The FCC originally selected a color television standard that was developed by CBS that was partly mechanical, with a disc made of red, blue, and green filters spinning inside the television camera and a similar disc spinning in synchronization in front of the cathode ray tube inside the receiver set. Despite adopting the CBS standard, this version of color television was a commercial failure because of the lack of color receivers necessary to watch the programs, the incompatibility of the new standard with existing black-and-white television sets, and the refusal of television manufacturers to create adapter mechanisms for their existing black and white sets.⁴³ Eventually, the FCC replaced this standard with the NTSC color standard, which was cooperatively developed by several companies (including RCA and Philco).

B. Prematurely locking in a government designed standard may lock out dynamic innovation of devices, distribution models, applications, and services.

Setting a government defined standard is not an unalloyed benefit to consumers. Premature standardization may prevent the experimentation that would lead to improved information about the advantages of various technological alternatives and the services that those alternatives will allow. The process of regulatory standard setting can also delay innovation and entry in addition to possibly locking in sub-optimal technology. The mere presence of the regulatory process may discourage market-based and voluntary attempts at improving services and technology. The

⁴¹ Michael Katz and Carl Shapiro, “Systems Competition and Network Effects,” *Journal of Economic Perspectives*, Vol. 8, No. 2, Spring 1994, p. 113.

⁴² Stanley Besen and Leland Johnson, “Compatibility Standards, Competition, and Innovation in the Broadcasting Industry,” Rand, Prepared for the National Science Foundation, November 1986, p. ix. [Emphasis in original.]

⁴³ http://en.wikipedia.org/wiki/Color_television, <http://en.wikipedia.org/wiki/NTSC>.

dynamic process of innovation taking place now in the video marketplace along with convergence of computer and television services could easily be suspended or skewed by a preemptory interface standard.⁴⁴

As an example, the FCC process for developing broadcast HDTV standards may well have discouraged the development of HDTV via alternative non-broadcast delivery methods. “The FCC stated that it ‘would not retard’ the development of HDTV via non-terrestrial media, but by actively developing a terrestrial HDTV standard, it made it hard for cable operators or a DBS entrant to chose a different standard. ...such a move would fail if set manufacturers and consumers preferred to wait...to see what would happen at the FCC. The FCC’s entry into the process greatly affected people’s expectations of whether broadcasters would introduce an HDTV technology; with network externalities such expectations can matter a lot.”⁴⁵

The loss of innovation and variety that can be the result of standardization, especially premature standardization, is well supported in the economics literature.

“...public authorities may hope to foster network integration, and so to promote competition among suppliers of network components, by promulgating uniform interface standards for systems purchased by government agencies, or by mandatory imposition of standards in regulated industries. That losses of potential efficiency may result from the legislative or administrative setting of technology standards, and also from governmental efforts to induce cooperation among firms in the voluntary setting of standards, is generally regarded as the central dilemma facing public policy-makers in this arena.”⁴⁶

“Although compatibility has obvious benefits, obtaining and maintaining compatibility often involves a sacrifice in terms of product variety or restraints on innovation.”⁴⁷

“[P]remature reductions of gateway costs may exact unforeseen economic penalties by discouraging investment in R&D programmes aimed at establishing the technological dominance of one system over its rivals.”⁴⁸

⁴⁴ Slowing innovation is one potential effect of imposing the proposed standards. Public Knowledge states that “It is important that the universal gateway not provide *unnecessary* capabilities or restrictions...” [emphasis added] It is not clear what innovations are unnecessary and which are desired by consumers. Petition for Rulemaking of Public Knowledge, *et. al.*, CS Docket 97-80, December 18, 2009, p. 36.

⁴⁵ Joseph Farrell and Carl Shapiro, “Standard Setting in High-Definition Television,” *Brookings Papers on Economic Activity: Microeconomics*, 1992, p. 17.

⁴⁶ Paul A. David, “Some New Standards for the Economics of Standardization in the Information Age,” in *Economic Policy and Technological Performance*, edited by Partha Dasgupta and Paul Stoneman, Cambridge University Press, 1987, p. 219.

⁴⁷ Michael Katz and Carl Shapiro, “Systems Competition and Network Effects,” *Journal of Economic Perspectives*, Vol. 8, No. 2, Spring 1994, p. 95.

“The need to adhere to a standard imposes limits on firms’ product design choices. Unlike the first two effects of standardization, this effect is a cost. Limits on design choices can lead to static losses from the reduction in variety. And they can lead to dynamic losses as firms are foreclosed from certain paths of R&D that could result in innovative new products that could not comply with the standards. Note that these limits impose costs both at the time a new product is created, and later when it is possible to introduce a new generation offering greatly enhanced performance.”⁴⁹

“But standardization has its costs. First, it may retard innovation. Second, the process of standardization may itself be costly...Third – the problem addressed in this paper – since standardization typically constrains product design, it may limit product variety.”⁵⁰

“One way to ensure compatibility is to require firms to produce products that conform to set standards. This is, however, a potentially costly requirement. Standards limit flexibility to offer products with specialized characteristics (standards limit product variety) and may constrain technological progress by limiting firms to suboptimal designs.”⁵¹

C. Government standards are likely more difficult to change and may be inferior to voluntary standards

Establishing standards through a mandatory or *de jure* process can have more a permanent effect than a voluntary or *de facto* standard setting. Because government-imposed standards have the force of law, conformity by all parties is ensured; as a result, individuals cannot deviate from them. Even where some experimentation continues and superior technology is identified after a standard is chosen, changing a government standard is likely to be far more difficult than changing a *de facto* standard.⁵² This is partly due to the fact that firms who develop new services

⁴⁸ Paul A. David, “Some New Standards for the Economics of Standardization in the Information Age,” in *Economic Policy and Technological Performance*, edited by Partha Dasgupta and Paul Stoneman, Cambridge University Press, 1987, p. 234.

⁴⁹ Carl Shapiro, “Setting Compatibility Standards: Cooperation or Collusion?” in *Expanding the Boundaries of Intellectual Property*, edited by Rochelle Dreyfuss, Diane Zimmerman, and Harry First, Oxford University Press, 2001, p. 88.

⁵⁰ Joseph Farrell and Garth Saloner, “Converters, Compatibility, and the Control of Interfaces,” *The Journal of Industrial Economics*, vol. 40, no. 1, March 1992, pp. 9-10.

⁵¹ Richard Gilbert, “Symposium on Compatibility: Incentives and Market Structure,” *The Journal of Industrial Economics*, Vol. 40, No. 1, March 1992, p. 2.

⁵² The difficulty in moving to a more efficient and socially beneficial outcome is present even if firms can agree on the preferred outcome. “In this article we have analyzed the problem of coordinating innovation or a change of standard in an industry in which products not compatible with others are at a substantial disadvantage. We have shown that there can be inefficient inertia, or inefficient innovation, and that *these problems cannot be entirely*

and devices that do not conform to a current standard can, under a voluntary standard, compete through price and innovation to displace the standard. Under a government-mandated standard, firms with innovative new devices must, instead, argue before government regulators for a formal decision to change the standard.

“When inefficient rules are imposed by private SDOs [Standards Development Organizations], there are a number of safety valves available; for example, businesses can choose not to participate in standard setting or can form competing SDOs or otherwise contract around the problem. When an unsound rule is proposed by a government enforcer, however, there is often no way to contract around it, and worse, there may be no way to conduct a natural experiment without the rule that can prove it should be abandoned. As we consider the challenges and proposed solutions within standard setting, we should rigorously focus on the efficiency implications of each practice and keep in mind the benefits of licensing freedom and power of markets to self-correct.”⁵³

It is also true that government standard setting can be inferior to cooperative efforts by firms in the market, even if private cooperative standard setting may be viewed as overly lengthy. In addition a government standard setting process may not adequately weigh the future benefits on innovation and entry from private standard-setting activities.⁵⁴

“However difficult it may be to achieve confined cooperation in a timely fashion, voluntary standard-setting is nevertheless viewed by many as the appropriate public policy course because it represents the lesser of two evils. The greater evil, in this case, is regarded to be the potential efficiency losses arising from governmental imposition of ‘wrong’ standards. It is pointed out frequently that public authorities do not generally possess the technical expertise required to

resolved by communication between firms.” Joseph Farrell and Garth Saloner, “Standardization, Compatibility, and Innovation,” *Rand Journal*, Vol. 16, No. 1, Spring 1985, p. 81. [emphasis added]

⁵³ “Efficiency in Analysis of Antitrust, Standard Setting, and Intellectual Property,” Gerald Masoudi [Deputy Assistant Attorney General, Antitrust Division, U.S. Department of Justice], High-Level Workshop on Standardization, IP Licensing, and Antitrust, Tilburg Law & Economic Center, Tilburg University, January 18, 2007, p. 16, available at <http://www.justice.gov/atr/public/speeches/220972.htm>.

⁵⁴ “Second, there is the question of whether the government would have incentives to improve matters. One plausible hypothesis is that the government will act to serve the current generation of producers and users, while acting to block or impose inefficiently high costs on an emerging technology. Some believe this happened when the Federal Communications Commission (FCC) required that high-definition television signals fit into the 6 MHz bandwidth that traditionally has been used for broadcast television.” Michael Katz and Carl Shapiro, “Systems Competition and Network Effects,” *Journal of Economic Perspectives*, Vol. 8, No. 2, Spring 1994, pp. 112-113.

write technical standards, and so must in any event rely upon information obtained from sources closest to the technology in the private sector.”⁵⁵

In addition, bypassing industry expertise and experience and relying on internal evaluations can make it more likely that an incorrect standard is chosen.

“Perhaps the most important rule for government action is that it should depend heavily on industry evaluations and agreements rather than on in-house evaluations. The difficulties of relying on internal evaluations are well illustrated in the color television case, where the FCC initially picked the wrong technology, and in AM stereo, where its recommendation in favor of Magnavox was rejected by industry.”⁵⁶

Finally, there is the danger that a government-mandated selection process will not adequately weigh the cost implications of a particular standard. An example where mandated compatibility likely cost consumers more than the projected benefits is when Congress mandated the inclusion of UHF tuners in all television receivers. As explained by Douglas Webbink, the benefits projected⁵⁷ at the time of the decisions were, in fact, substantially smaller than the costs imposed on consumers⁵⁸ especially considering that the limited accomplishments of the mandate could have been produced much more efficiently through alternative means.⁵⁹ Similarly, the Council on Wage and Price Stability found that UHF broadcast quality improvements could have been accomplished more cheaply by increasing transmission power at each station as compared to the

⁵⁵ Paul A. David, “Some New Standards for the Economics of Standardization in the Information Age,” in *Economic Policy and Technological Performance*, edited by Partha Dasgupta and Paul Stoneman, Cambridge University Press, 1987, pp. 219-220.

⁵⁶ Stanley Besen and Leland Johnson, Rand, “Compatibility Standards, Competition, and Innovation in the Broadcasting Industry,” Prepared for the National Science Foundation, November 1986, pp. 134-135.

⁵⁷ “It was suggested that there were six major goals of the law...subsidizing the growth of new commercial and educational UHF stations, increasing the profits of existing UHF stations, increasing the number and diversity of commercial and educational programs on the air, and fostering more specifically local programming.” “The Impact of UHF Promotion: The All-Channel Television Receiver Law,” Douglas Webbink, *Law and Contemporary Problems*, Vol. 34, No. 3, Summer 1969, p. 560.

⁵⁸ “In addition, we found that the law was considerably more expensive for the public than the FCC has maintained, and it has become even more obsolete in light of the new technological and economic developments..” Douglas Webbink, *Law and Contemporary Problems*, Vol. 34, No. 3, Summer 1969, p. 560.

⁵⁹ “...the law raised the retail price by \$10 or more per set on ninety per cent of all receivers sold after 1964...an additional cost ranging from \$85 million to \$110 million per year...the number of UHF stations on the air only increased by ninety-one...during which time consumers had paid at least \$550 million dollars for legally required UHF tuners....This indicates that consumers have been paying on the average about \$6 million for each new UHF television station which went on the air. That appears to be a rather expensive subsidy to UHF television, considering that...a full-color station could be built for between \$1 million and \$2 million and have annual operating expenses of perhaps \$.5 million to \$1 million.” Douglas Webbink, *Law and Contemporary Problems*, Vol. 34, No. 3, Summer 1969, pp. 552-553.

proposed improvements in tuner sensitivity for all new receivers that were sold.⁶⁰ These consumer costs only increased when, in an attempt to further benefit UHF broadcasters, the FCC mandated that UHF tuning be identical to VHF tuning which further increased the costs to consumers.

As another example, when the FCC mandated the inclusion of 1394 connections on all set-top boxes, the standard was already being displaced by new technologies.⁶¹ Consumers continue to pay for an extra connector that is rarely employed.

D. Performance standards are preferred to design standards

If any regulations are established by the Commission they should be based on performance not on specific designs or technologies.

“Ideally, the standards that are established should be performance rather than design standards – a basic conclusion that appears throughout the standards literature. This approach is advantageous because it permits firms wide latitude in complying with a standard, perhaps with the new designs and technologies that were not even envisioned by the framers of the standard. An example was the FCC decision not to adopt as mandatory the Zenith/dbx system for TV stereo, but simply to protect the pilot tone from radio frequency interference. This approach leaves open the possibility of new and better technologies subject only to the performance constraint of proper protection.”⁶²

“Standards should not restrict or define the product more than necessary. ... [T]his can often be accomplished by setting a technical goal that must be met and allowing more than one method of achieving the goal. In particular, a prudent course is for a standard setting entity to adopt a ‘performance’ standard rather than a specification standard (which specifies a particular design or material). Many economic studies have shown that performance standards are superior in encouraging innovation.”⁶³

⁶⁰ “Comments in the Federal Communications Commission proceeding on UHF Television Noise Figures,” Council on Wage and Price Stability, Docket No. 21010, RM-2577, March 16, 1977.

⁶¹ See generally Motorola, Inc.’s Request for Waiver of 47 C.F.R. § 76.640(b)(4), CS Docket No. 97-80 (November 25, 2009).

⁶² Stanley Besen and Leland Johnson, “Compatibility Standards, Competition, and Innovation in the Broadcasting Industry,” Rand, Prepared for the National Science Foundation, November 1986, p. 135.

⁶³ “Standard Setting in a Network Economy,” David Balto [Assistant Director, Office of Policy and Evaluation, Bureau of Competition, Federal Trade Commission], Cutting Edge Antitrust Law Seminars International, February 17, 2000, available at <http://www.ftc.gov/speeches/other/standardsetting.shtm>.

“[S]tandard-setting bodies [should] promulgate performance rather than specification standards whenever possible; performance standards represent the least restrictive alternative. Based on empirical studies of performance standards imposed by regulatory agencies, several studies have shown that performance standards not only do not inhibit innovation but encourage it: firms will seek out the best means of achieving the product standard goal. Specification standards, on the other hand, lock in a specific design and leave no room for design innovation by increasing market risk.”⁶⁴

Clearly, any standards developed by the Commission should be performance based and not design specification standards. By defining performance targets, market participants remain free to offer different methods, services, and features so that consumers can choose the products that best serve their needs.

E. Any standards must account for varied business models

As described in more detail below, many different technologies are currently being used, and others are being developed, to deliver Internet content to televisions. In addition to working with different technologies competitors are also working with substantially different business models. Some device manufacturers limit Internet access to manufacturer-developed sites or networks, others allow for access to some non-affiliated sites but do not allow fully open browsing, while still others allow for fully functional Internet browsing. In combination with some level of Internet access, some devices also allow users to route personal content such as home video and photographs to their televisions, while others allow integration of MVPD provided linear content.

Competitors believe that each of these combinations of technology and services will be favored by some set of consumers. Competition currently playing out in the market will determine who is correct, what combinations are favored by consumers, what combinations generate only limited demand, and what combinations fail. Any development of an AllVid interface standard would not only have to account for the different products that are already on the market and predict what new products might be coming, but at the same time not foreclose or favor any of the alternative business models being tried or proposed. Any restrictions on devices or interfaces will have effects on the level of integration and services offered, and their subsequent success or failure, in the market. These likely business model effects must be taken into consideration.

⁶⁴ Sean P. Gates, “Standards, Innovation, and Antitrust: Integrating Innovation Concerns into the Analysis of Collaborative Standard Setting,” 47 *Emory L.J.* 583, 651 (1998).

VI. Market success in bringing Internet video and other innovations to the television and other CE devices in the home is occurring without government intervention

The NOI indicates that a second impetus behind the Commission’s proposal is a belief that establishing an AllVid will encourage wider broadband use and adoption.⁶⁵ One view is that there has been a lack of innovation in set-top boxes that may be inhibiting business models that would drive adoption and utilization of broadband, such as models that integrate traditional television and the Internet.⁶⁶ However, a survey of the video marketplace indicates that currently there is dynamic development of new services and equipment to deliver Internet video content to consumers via a wide variety of devices – all occurring without government intervention.⁶⁷

Online distribution is a new means of supplying video content to consumers. Online video is also referred to as “over the top” (“OTT”) video because it utilizes the high-speed Internet connection, rather than the cable connection, to deliver video to the CE device. While online video was originally viewed exclusively on personal computers it can now be delivered to a personal computer, to a mobile device, to a set-top box, to a game console, to a DVR, to a Blu-Ray player, or to a suitably-equipped television set. As consumers grow more accustomed to viewing video with these different devices, MVPDs have strong market incentives to make their content available to these same devices.

Online video has emerged as a dynamic new distribution method because of the increased household penetration of broadband service and because of growing consumer demand for video displayed on mobile devices. Approximately 95 percent of the U.S. population has access to broadband services at greater than 4 Mbps, and approximately two-thirds of American adults have adopted broadband at home.⁶⁸ Indeed, as of November 2009, broadband penetration among active Internet users in U.S. homes grew to 94.45 percent.⁶⁹ Additionally, the U.S. ranks near the top in Internet usage, measured as gigabytes/month/user.⁷⁰ There are many business models to deliver video content over the Internet—most of them experimental, transitional or promotional.⁷¹ It is too early to know which business model or models will prove successful in this new business.

⁶⁵ NOI ¶ 1.

⁶⁶ *Connecting America: The National Broadband Plan*, p. 18.

⁶⁷ The list of products and services included here is certainly not exhaustive. It is only meant to be illustrative of the development and implementation of products that are currently in the market, or soon will be.

⁶⁸ *Connecting America: The National Broadband Plan*, pp. 20 and 23.

⁶⁹ “Americans Lead World in Broadband Use,” <http://www.websiteoptimization.com/bw/0912/>.

⁷⁰ “Americans Lead World in Broadband Use,” <http://www.websiteoptimization.com/bw/0912/>.

⁷¹ For example, as discussed below, the Hulu service is free but Hulu recently announced Hulu Plus, a \$9.99 subscription service that offers expanded content.

A. Over the top services

There are dozens of Internet video services provided on either an advertising-supported basis, an a la carte basis, or a subscription basis, as suppliers continue to experiment with pricing models, trying to find what is most attractive to consumers and what works from a business perspective. Internet video is “non-linear” – *i.e.*, it is generally delivered “on demand,” not as a broadcast channel. This is in contrast to the “linear” delivery approach of broadcast and cable television networks.

The following are just some of the more well-known of these OTT services:

- Netflix. Netflix began streaming movies and television programs to personal computers in January 2007.⁷² Subscribers to Netflix’s DVD subscription mail order rental service can stream as much video content as they want at no extra charge.⁷³ Netflix has entered bilateral agreements with manufacturers of televisions, Blu-ray players, DVRs, game consoles, and other boxes to permit its service to be delivered on as many platforms as possible.⁷⁴
- Amazon. Amazon began offering video downloads through its Unbox software in September 2006.⁷⁵ Users can still download video content, but Amazon introduced its Video On Demand (“VOD”) streaming service in September 2008 and appears to emphasize this distribution method.⁷⁶ Amazon offers television shows and films for rental and purchase.⁷⁷
- Apple. Apple’s efforts to obtain video and other online content distribution rights have accelerated in connection with the release of its iPad device.⁷⁸ Apple offers online video

⁷² Netflix Announces Multiple Partners to Instantly Stream Movies and TV Episodes from Netflix to the TV, Jan. 7, 2010, <http://netflix.mediaroom.com/index.php?s=43&item=343>.

⁷³ Netflix Announces Multiple Partners to Instantly Stream Movies and TV Episodes from Netflix to the TV, Jan. 7, 2010, <http://netflix.mediaroom.com/index.php?s=43&item=343>.

⁷⁴ Netflix Announces Multiple Partners to Instantly Stream Movies and TV Episodes from Netflix to the TV, Jan. 7, 2010, <http://netflix.mediaroom.com/index.php?s=43&item=343>.

⁷⁵ “Amazon Unbox on TiVo” Now Available, Offering Over 1.5 Million Broadband-Ready TiVo Subscribers Access to Thousands of Movies and TV Shows, Amazon.com Press Release, March 7, 2007, <http://phx.corporate-ir.net/phoenix.zhtml?c=97664&p=irol-newsArticle&ID=971365&highlight=>.

⁷⁶ Danny King, “Amazon Turns on VOD,” *Video Business*, September 4, 2008, <http://www.highbeam.com/doc/1G1-184606271.html>.

⁷⁷ Sources: *Amazon.com/videoondemand*, <http://newteevee.com/2009/12/09/buy-a-dvd-on-amazon-start-watching-the-movie-in-minutes/>, <http://www.amazon.com/gp/help/customer/display.html?nodeId=200026970>.

⁷⁸ Apple Scrambles to Secure iPad Deals, *Wall Street Journal* online March 18, 2010 <http://online.wsj.com/article/SB10001424052748703523204575129862264704190.html>.

through its iTunes Store where users can purchase or rent individual videos.⁷⁹ Videos can be downloaded from iTunes and watched on a personal computer, iPhone, iPod, iPad, or on television via Apple TV or the new Apple Mac mini which includes HDMI out.⁸⁰ Apple is reportedly now interested in offering television broadcast and cable programming on a subscription basis (in addition to its a la carte payment method). Some programming suppliers have reportedly shown interest, whereas others are said to have shown little interest or opposed the proposal.⁸¹

- Google/YouTube. YouTube started as a video file-sharing site and was purchased by Google in 2006.⁸² YouTube added “classic” television shows in February 2007.⁸³ In November 2008, YouTube began offering full-length films and television episodes on the site.⁸⁴ YouTube can be accessed via widgets on certain MVPD services (e.g., FiOS) and on certain TVs, Blu-ray disc players, set-top boxes and other devices.
- Hulu. Initiated by a group of movie studios, Hulu launched for public access in the United States on March 12, 2008. In addition to NBC, ABC and FOX programs and movies, Hulu carries shows from numerous cable networks and online sources. Consumers can watch Hulu on their TVs by downloading MediaMall Technologies’ PlayOn software which works with a networked Wii, Xbox 360, or DLNA-compatible device connected to a TV, or by simply connecting a computer with a streaming capable video card to the TV via HDMI or an RCA connector. Hulu’s business model has been a free service, with advertising, but in June 2010 Hulu announced Hulu Plus as a subscription service that provides access to more content.⁸⁵ Hulu Plus will be accessible from select Internet-connected TVs, Blu-ray players, game consoles, and Apple’s iPad, iPhone and iPod Touch.

⁷⁹ Apple Unveils the New iPod, October 12, 2005, <http://www.apple.com/pr/library/2005/oct/12ipod.html>.

⁸⁰ Movies downloaded directly via Apple TV, in contrast, can only be played on Apple TV.

⁸¹ Sam Schechner and Yukari Watani Kane, “Apple TV-Service Proposal Gets Some Nibbles: CBS, Disney Examine Apple’s TV-Subscription Service,” December 22, 2009, *Wall Street Journal* online, <http://online.wsj.com/article/SB10001424052748703344704574610491399388448.html>; Peter Kafka, “Apple’s iTunes pitch: TV for \$30 a month,” CNET, November 2, 2009, http://news.cnet.com/8301-13579_3-10388552-37.html; “Apple TV intriguing as cable alternative,” *MarketWatch*, Dec. 22, 2009, <http://www.marketwatch.com/story/apple-tv-intriguing-as-cable-alternative-analysts-2009-12-22?siteid=rss&rss=1>.

⁸² Greg Sandoval, “YouTube signs Sony, preps site for studio content,” CNET, April 16, 2009, http://news.cnet.com/8301-1023_3-10221459-93.html.

⁸³ “YouTube to post classic TV shows,” *Marketwatch*, February 12, 2007, <http://www.marketwatch.com/story/youtube-to-post-classic-tv-shows>.

⁸⁴ Brad Stone and Brooks Barnes, “MGM to Post Full Films on YouTube,” *New York Times*, November 9, 2008, http://www.nytimes.com/2008/11/10/business/media/10mgm.html?_r=3&ref=technology.

⁸⁵ “Hulu’s Subscription Plan Spans Three Screens,” *Multichannel News*, June 29, 2010.

The list of services offering online video continues to grow. Announcements of new online video services appear almost daily, and OTT business models are evolving rapidly to compete with traditional MVPD services.

B. Delivering Internet video to the television and other CE devices

There has been a lot of investment by many players to bring Internet video to consumers and, in particular, to consumers' televisions, all with no FCC intervention. Various devices are available to enable consumers to watch online video on their home television sets, where the picture is likely to be larger than on a computer screen.

In light of this opportunity, more than 30 technology companies are bringing Web Services to consumer electronics. Among them are companies that are working to build applications and web services directly into the TV itself.⁸⁶ Other companies are working to provide the services through devices that attach to the TV. Other companies are developing solutions that deliver interactive services via the MVPD network. Still other companies believe that the PC in the home is capable of serving as an intermediary between the Internet and the television. In short, there are many alternative approaches and no clear "right solution."

These solutions might be divided into four categories.

1. Television sets that can be connected directly to the Internet

Many manufacturers are currently selling Internet-enabled TVs. While household penetration is limited to date, built-in Web connectivity will soon be standard in most televisions.⁸⁷ The following are some examples of recent developments:

- **Sony.** Sony's models feature an Ethernet connection allowing them to directly access Sony BRAVIA Internet Video content using a consumer's broadband connection. Sony claims that the platform offers a large selection of free and premium movies, TV shows, sports, music and other content from partners such as Amazon VOD and YouTube. In addition, Sony provides widgets which allow for adding on-screen applications that provide such information as weather reports, stock information, financial news, Twitter, and additional content.⁸⁸ Recently, Sony has joined Intel and Logitech in helping to develop Google TV.
- **Samsung.** Samsung claims that its Internet-ready TVs can access Internet content from Yahoo!, Flickr, Blockbuster, Amazon VOD, and other sites using TV widgets.

⁸⁶ "Google TV – Searching for Success," Kurt Scherf, Parks Associates, June 2010, p. 2.

⁸⁷ "Google TV – Searching for Success," Kurt Scherf, Parks Associates, June 2010, p. 1.

⁸⁸ "Sony Adds Super Slim Edge-lit LED Models to Bravia HDTV Line," Sept. 9, 2009, http://www.sony.ca/view/press_832.htm.

Additional applications allow consumers to stream video, play games, view pictures, and provide additional services.⁸⁹

- Toshiba. Select new Toshiba televisions access Internet content through, what Toshiba terms, NET TV™ capabilities. Net TV includes applications that allow access to Internet content such as Vudu, Facebook, Twitter, Flickr, and YouTube. NET TV also streams audio applications such as Pandora and allows consumers to create a “Ticker” at the bottom of the screen to display news, weather, or stock information.⁹⁰
- Panasonic. Panasonic’s Viera TVs offer what they refer to as Viera Cast, which allows viewers to access Internet video from Netflix, Amazon and YouTube and access to services such as Twitter, Pandora, Picasso, and Skype.⁹¹

2. Set-top boxes with the primary or sole function of receiving video from the Internet and showing it on a television.

In addition to new televisions with built-in Internet access, many manufacturers are selling devices which allow consumers to connect the Internet to their existing televisions. The following are some examples:

- Vudu. Vudu’s devices and service allow consumers to stream Internet content including on-demand movies, television shows and other content. The service requires a Vudu-compatible TV or a Vudu set-top box. Vudu claims that its service offers access to over 3,000 HD movies on demand. There is no subscription fee but users pay to rent or own individual movies and TV series. In addition Vudu offers 120 channels of free on-demand television shows along with access to YouTube.⁹²
- Boxee. Boxee states that it “integrates personal locally stored media with Internet streaming media along with social networking features. Its social networking component allows users to share information about what they are watching or listening to with other Boxee users or friends on social networks like Twitter, Facebook, etc.” Boxee offers software which will allow users to watch Internet video. Boxee will begin offering later in 2010 a “Boxee Box by D-Link.” The Boxee box will be a streaming media player that transmits online web content to the TV.⁹³

⁸⁹ <http://www.samsung.com/us/consumer/tv-video/televisions/index.idx?pagetype=type>.

⁹⁰ “Toshiba Introduces the New UX600 Series LED TV, Blending High Picture Quality with Internet Capability That is Fun and Easy,” March 22, 2010, <http://www.regzalcdtv.com/>.

⁹¹ <http://www2.panasonic.com/consumer-electronics/learn/Televisions/vieracast>.

⁹² http://www.vudu.com/product_overview.html.

⁹³ <http://www.boxee.tv/>.

- Roku. Roku offers a device that directly connects Internet provided services to a consumer's television. Roku states that "With Roku, you get instant access to thousands of movies, shows, sports, and more — with more choices added all the time. Use your existing subscriptions, or choose from an amazing selection of free and on-demand entertainment. Includes Netflix, Amazon Video on Demand, Major League Baseball and classic movies."⁹⁴
- Clearleap. Clearleap (IP-based distribution platform) and Roku (a device manufacturer) have announced a partnership to provide broadband delivered content similar to that provided by MVPDs. The partnership aims to enable MVPDs to deliver premium content, including their own VOD libraries, plus supplemental online video, to their customers via Roku boxes. Currently, Clearleap's Universal Video Platform for content management and service delivery has been integrated into 6 of the top 10 U.S. cable operators' headends, with content delivered from the cloud to existing set-top boxes. The Clearleap/Roku partners hope to enable premium content delivery through its customers' broadband infrastructure to a connected IP device. "Clearleap's CEO noted that several of Clearleap's cable operator customers have acknowledged the expanding role of online video viewership (e.g. Netflix, YouTube, Amazon, MLB, etc.) via connected devices and are growing concerned. The partnership underscores what he said are cable operators' search for more flexible and capital-efficient set-top box approaches. An important nuance to the deal is that it effectively provides cable operators an IP-based alternative to their existing VOD infrastructure. Clearleap can process transactions incurred through the Roku box and have them added to the subscriber's cable bill. It can also detect a subscriber's service tier and authorize access to premium VOD like HBO or Starz."⁹⁵
- Popbox. Popbox is a device that aggregates a consumer's content from local storage devices on the consumer's home-network along with a variety of Internet connected services available for streaming as applications. Popbox differentiates its device from others, such as the Roku player, by integrating Internet content with content from a home network. Boxee's software product is similar to Popbox, but is enabled on a consumer's home computer, while Popbox sells its own device.⁹⁶
- DivX TV. DivX TV sells an Internet TV platform that is embedded in licensed TVs, Blu-ray players and home theater systems. Their product does not require a separate set-top box and streams Internet content and services directly to a consumer's TV, Blu-ray player, or mobile phone. The DivX TV interface gives the consumer access to Internet

⁹⁴ <http://www.roku.com/>.

⁹⁵ Clearleap and Roku Partner, Blurring Traditional Video Distribution Boundaries, June 24, 2010, <http://www.videonuze.com/blogs/?2010-06-24%2008:14:58/Exclusive-Clearleap-and-Roku-Partner-Blurring-Traditional-Video-Distribution-Boundaries/&id=2615>.

⁹⁶ <http://www.popbox.com/support.php>.

media along with social networking services and the consumer's personal collection of movies, music and photos.⁹⁷

- Sezmi. Sezmi describes itself as the all-in-one personal TV service.⁹⁸ It is a hybrid service that uses transmissions from television stations, makes its own transmissions over the same spectrum, and also delivers some content through the Internet. Sezmi provides content directly to a television set and aims to be a direct competitor to existing MVPDs. It provides a subscription to broadcast channels and over a dozen cable networks. Subscribers are able to purchase movies and television episodes a la carte. Subscribers must either rent or purchase an antenna and a specialized DVR.⁹⁹ Sezmi states that it “aims to provide a more personalized, Net-savvy, inexpensive alternative to cable and satellite—complete with the real broadcast and cable channels you can’t get from Apple TV, Roku, or Vudu.”¹⁰⁰ Sezmi is currently available in Boston, Detroit, Ft. Lauderdale, Houston, Kansas City (MO), Los Angeles, Miami, Orlando, Phoenix, Portland (OR), and San Francisco. Nationwide expansion is coming later this year.¹⁰¹
- Apple. Apple TV allows consumers to connect Internet content with their televisions via a standalone device and provides access to a large selection of on-demand HD movies.¹⁰² In addition, Apple recently released a new Mac mini which can direct content to a television through a built-in HDMI port. Apple allows easy access to content from iTunes and other sources on the Internet. The Mac mini also allows consumers to directly play their iTunes collection through their home entertainment center.
- AMD. AMD’s ATI TV Wonder Digital Cable Tuner enables digital cable content on a media PC. The tuner provides the ability to watch digital cable television, including high definition programming, using a CableCARD. The tuner also supports standard analog cable and unencrypted digital TV over cable. The user can view and record premium HD digital cable from digital cable channels such as HBO, ESPN, Cinemax, and many others.

⁹⁷ <http://www.divx.com/en/electronics/divx-tv>.

⁹⁸ <http://www.sezmi.com/>.

⁹⁹ See Harry McCracken, “Hello, Sezmi—Goodbye, Cable,” *PC World*, Nov. 16, 2009, http://www.pcworld.com/article/182300/hello_sezmi_goodbye_cable.html; see also Cecilia Kang, “NAB showcases Sezmi, a hybrid broadcast-broadband television service, in debate over spectrum,” *Washington Post’s Post Tech* blog, January 11, 2010, http://voices.washingtonpost.com/posttech/2010/01/nab_showcases_sezmi_a_hybrid_b.html.

¹⁰⁰ Harry McCracken, “Hello, Sezmi—Goodbye, Cable,” Nov. 16, 2009, http://www.pcworld.com/article/182300/hello_sezmi_goodbye_cable.html.

¹⁰¹ Jared Newman, “Sezmi’s Promising Cable TV Alternative,” *Business Week*, June 29, 2010, <http://www.businessweek.com/idg/2010-06-29/sezmi-s-promising-cable-tv-alternative.html>.

¹⁰² Apple TV permits viewing of iTunes content. Apple, Inc. Form 10-K for the fiscal year ended September 26, 2009, p. 6.

This is the first CableLabs Certified OpenCable Receiver (OCUR) designed to enable OpenCable content on a media PC.¹⁰³

- Ceton. Ceton's InfiniTV 4 is another CableLabs-certified OCUR that has four HD tuners and was featured in Microsoft CEO Steve Ballmer's 2010 CES keynote address. Ceton explains that its device "enables Media Center PCs to play or record up to four live channels of HDTV at once, and stream live HD channels or recordings to multiple HDTVs throughout the home, all from a single cable connection and a single CableCARD." Users can replace set-top boxes with a single personal computer.¹⁰⁴

3. Multifunction devices that can receive video from the Internet and show it on a television but also have gaming, recording, and other capabilities

Consumers do not need to buy a dedicated device (such as those discussed above) to connect their television to Internet sources. Many devices with different primary uses also allow Internet access and are now in the market and already in many homes. In the U.S., penetration of Internet-connected game consoles jumped 38% between 2008 and 2009. Over 61 million Xbox, PS3, and Wii consoles have been sold in the United States,¹⁰⁵ and usage of the console as a set-top box is prevalent, with more than one-third of Microsoft Xbox 360 users watching video on at least a monthly basis.¹⁰⁶ Video-on-Demand services such as Netflix are available through the Xbox, PS3 and Wii and certain Blu-ray players. These Blu-ray players come equipped with many of the same Internet connectivity and content services built into the new high-definition televisions discussed above.

For example:

- Sony. Besides playing Blu-ray Discs and DVDs, Sony's Blu-ray player can stream all of the same content available to new Sony television buyers from the BRAVIA™ Internet Video platform, which Sony claims includes thousands of movies, TV programs, and music from YouTube, Slacker, and Netflix.¹⁰⁷

¹⁰³ "ATI TV Wonder™ Digital Cable Tuner: Features & Benefits," <http://www.amd.com/us/products/pctv/tv-wonder-tuners/Pages/digital-cable-tuner.aspx>.

¹⁰⁴ <http://cetoncorp.com/products.php>.

¹⁰⁵ "Game Consoles to Challenge Pay TV," Nate Worden, *Wall Street Journal*, May 26, 2010, p. B4.

¹⁰⁶ "Google TV – Searching for Success," Kurt Scherf, Parks Associates, June 2010, p. 1.

¹⁰⁷ "New Sony Blu-ray Player Integrates Streaming Internet Video for Ultimate Home Entertainment Experience," Sept. 9, 2009, http://news.sel.sony.com/en/press_room/consumer/home_video/blu-ray_disc/release/41828.html.

- Samsung. Samsung Blu-ray players allow consumers to choose applications that allow a TV to display streaming video, play games, view pictures, access Facebook, Twitter, YouTube and sports and news services, and access video from Blockbuster and Netflix.
- Panasonic. Panasonic's Viera Blu-Ray players also have Viera Cast and the same functionality as their Viera TVs discussed above.
- Game consoles. Both Microsoft's Xbox 360 and Sony's Playstation 3 allow consumers to instantly watch movies and TV episodes streamed from Netflix. And as of spring 2010, Nintendo's Wii offers access to Netflix's streaming catalog.

4. Devices that rely on a computer connected to the Internet and transmit signals to the television set through a wireless connection

Linksys and D-Link sell devices that allow users to wirelessly connect their personal computers to their televisions. The following are some examples:

- Linksys. The Linksys Media Center Extender enables any TV to receive and display video and audio content from a Windows Media Center PC wirelessly.¹⁰⁸
- D-Link. The D-Link Share center allows the user to stream saved videos to their computers and TVs.¹⁰⁹ D-Link also will be shipping the Boxee Box later this year which will allow the user to access content from the Internet and the home network on a TV.¹¹⁰
- Netgear. Netgear's Digital Entertainer Live allows the user to access YouTube, online videos, and streaming live Internet TV without a computer, as well as movies, video, music and photos stored on USB drives and home computers.¹¹¹

These different approaches exemplify the different business models being pursued today in the marketplace. Some of these devices allow access to the entire Internet; others only allow access to partner sites. Some of these devices can deliver video content from all or virtually all sources on the Internet, but others are more restricted in range. For instance, an Apple TV or Vudu device cannot (currently) be used to watch videos streamed from Netflix or Amazon. In addition, some devices allow consumers to add in home-networks and the consumer's own content (home movies and photographs). Many of these products are already in people's homes while others are still in development or in their very early days. Obviously many of these services and devices are new to consumers and will continue to change as the market evolves.

¹⁰⁸ <http://www.linksysbycisco.com/CA/en/products/DMA2100>.

¹⁰⁹ http://sharecenter.dlink.com/solutions_share.aspx.

¹¹⁰ Dong Ngo, "D-Link's Boxee Box to ship in November," CNET, June 11, 2010, http://news.cnet.com/8301-17938_105-20007496-1.html.

¹¹¹ <http://www.netgear.com/Products/Entertainment/DigitalMediaPlayers/EVA2000.aspx>.

C. Devices that integrate Internet access and MVPD service already are being developed and some exist in the market

While the devices and services just discussed allow consumers to view on their televisions content sourced from a broadband connection to the Internet, manufacturers are also offering devices that integrate Internet content with content and services provided by MVPDs.

- **TiVo.** TiVo Premiere claims its device can bring all of a user’s online entertainment together in one easy-to-use device and that it enables consumers to search, explore, browse, and discover content from the Internet and an MVPD. The TiVo box connects to Internet VOD providers (Netflix, Amazon, and Blockbuster) and provides access to streaming YouTube videos and other web videos, movies and TV shows. It also allows consumers to connect to their own home computer. Options are available that allow users to schedule recordings using a laptop or mobile phone.
- **Moxi.** Moxi offers a line of HD Digital Video Recorders designed for use with cable television providers and supports multi-stream CableCARDs as well as channel scanning for unencrypted channels. Multi-room viewing is supported. Moxi’s Media Link application uses DLNA-compliant servers on a consumer’s home computer to stream music, photos, and videos to a TV. Any DLNA server will work with the Moxi HD DVR, and, in particular, PlayOn software provides the ability to access users’ Hulu and Netflix accounts, as well as YouTube videos. Moxi also allows access to Flickr, Rhapsody, and Finetune accounts. Moxi has an application, SuperTicker, that provides one-touch access to weather, sports scores, news, and other information.¹¹²
- **Google.** Google TV is being promoted as the TV experience that users have always wanted but never had before. Google TV is supposed to integrate programming from the MVPD and the Internet, so that consumers can search all sources (Internet, MVPD and personal computers) at one time from the same TV interface and navigate to that content. The user interface also allows downloading applications and connecting to social networks.¹¹³ Google plans to open source the Google TV platform with the goal “to collaborate with the entire developer community to help drive entertainment in the living room forward and to introduce the next generation of TV-watching experience.”¹¹⁴

¹¹² <http://www.moxi.com/us/home.html>.

¹¹³ <http://www.intel.com/inside/smartTV/>.

¹¹⁴ “Industry Leaders Announce Open Platform to Bring Web to TV,” May 20, 2010, <http://www.intel.com/pressroom/archive/releases/20100520corp.htm>.

D. OEM boxes from MVPDs have delivered innovation

The MVPD marketplace is robustly competitive today. Nearly all consumers have access at least to a cable operator and two DBS providers, and many consumers benefit from additional telco and other competitors, especially in large markets. In order to differentiate their product and better compete against each other, MVPDs have been continually adding new and improved services. As those services have been offered, to the benefit of consumers, MVPDs have improved customer premises equipment. In their marketing materials, MVPDs compare their products to their competitors' based on the number of hours of programming that can be recorded on their DVRs, multi-room DVR functionality (the ability to record on one DVR and watch on other set-top boxes throughout the house), games, news and information tickers, interactive digital programming, instant polling/voting, interactive advertising, parental controls, cross-platform interactive services such as Caller ID on TV, and ability to access Internet content via the box. This constant improvement in equipment results from MVPD competition against each other in terms of the services and features offered by their set-top boxes.

Recent innovation in MVPD services and technology had been driven by increasing competition in MVPD markets. One of the effects of this increasing competition has been the development of new services and features by MVPDs in order to differentiate their product and attract consumers. As pointed out by the U.S. Department of Justice, "the advent of DBS competition, which introduced digital delivery systems, has spurred cable companies to upgrade their facilities to include more channels, video-on-demand, HD programming, and personal video recorders."¹¹⁵ In order to provide the new services, cable companies have often had to deploy new set-top boxes. The ability to coordinate the introduction of new services with new set-top boxes is critical to continuing competition among MVPDs. To some extent this competition in innovation may have been hampered by restrictions on cable provided set-top boxes that do not apply to DBS and telephone providers. Clearly, in order to not skew future market results any regulation placed on cable system set-top boxes should apply equally to equipment used by competing MVPDs. However, even more importantly, any regulation that hampers the ability of all MVPDs to innovate and differentiate themselves from each other will harm competition.

E. Progress in home networking techniques

As consumers begin to expect video content to be available through any device—*e.g.*, television, personal computer, iPad, smart phone—cable operators have strong competitive incentives to ensure the availability of their content on diverse devices. When consumers can enjoy content in more places and on more devices, that content is more valuable. Cable operators also are currently developing approaches to residential gateways that can consolidate multiple set-top box functionalities and provide signals to a wide variety of home receiving devices. Other approaches taken by cable operators would move gateway functionality further back into the

¹¹⁵ *Ex Parte* Submission of the United States Department of Justice, GN Docket No. 09-51, January 4, 2010.

network, or even into the “cloud.” In addition, cable operators are experimenting with ways to make their content available to subscribers through broadband connections. Some of the industry efforts being pursued to advance home networking include the following:

- Digital Living Network Alliance (DLNA). The DLNA is a collaborative trade organization working to develop standards to make it easier for consumers to use their digital photos, music and video programming content throughout their home networks using approved content protection technology.¹¹⁶ For example, a DLNA compliant TV will interoperate with a DLNA compliant device to securely transfer MVPD content, as well as to play music, photos or videos.
- Digital Entertainment Content Ecosystem (DECE). The DECE is a consortium working to develop a set of standards for the digital distribution of content. The goal is to enable consumers to share purchased digital content across a domain of registered consumer electronics devices.¹¹⁷ This will enable consumers to purchase content from multiple sources and have it delivered over diverse distribution platforms to DECE devices for viewing, even if the devices use different resolutions and security technologies.
- Multimedia over Coax Alliance (MoCA). MoCA is an industry group which develops specifications for the transport of digital entertainment and information content over residential coaxial cable, which is commonly used to carry video signals from cable television, satellite, and other sources to television sets and set-top boxes.¹¹⁸ MVPDs already provide some home networking services such as multi-room DVRs and wireless routers, and Verizon delivers FiOS over MoCA.

F. Internet video business models

The above broadly describes different technologies which are currently being used to deliver Internet content to televisions including: televisions with broadband inputs, set-top boxes with broadband inputs and video outputs, multifunction devices such as Blu-ray players and game consoles, and computers with broadband inputs and video outputs. Some technologies also provide different levels of integration of Internet, personal, MVPD, and other digital content. In addition to the large number of different technologies already introduced and those in development, competitors are also working with substantially different business models. Besides

¹¹⁶ DLNA promotes home networking specifications through agreements among consumer electronics manufacturers, computer and mobile device manufacturers, component and software developers, content providers, cable, telephone and satellite distributors, and retailers.

¹¹⁷ DECE includes consumer electronics, computer and mobile device manufacturers, component and software developers, content providers, cable distributors, and retailers.

¹¹⁸ MoCA includes consumer electronics manufacturers, cable, telephone, and satellite distributors, and retailers.

the decision of whether to integrate digital content from different sources, there is also significant variation in what Internet content to integrate.

Some device manufacturers limit Internet access to manufacturer-developed sites or networks. For example, Sony provides access to its BRAVIA Internet Video network, which provides VOD and other content from partners. In some cases the limited access may be driven by technological limitations, for example, lack of a keyboard may make open-ended browsing too awkward. In other cases the limited access can be purely a business decision, for example, when a device manufacturer wants to drive demand to its own content sources. Other devices allow for access to non-affiliated sites, such as YouTube or Twitter, but still do not allow fully open browsing. These device manufacturers may, or may not, have specific business agreements with the different content providers in order to allow for billing and access verification. Finally, some devices allow for fully functional Internet browsing from a television, especially fully functional computers with HDMI video outputs such as the Mac Mini.

In combination with some level of Internet access, different devices allow for different levels of integration with other digital content. Some devices allow users to route personal content such as home video and photographs to their televisions while many do not. Some devices allow integration of MVPD provided linear content where program information is either integrated in a manufacturer's electronic program guide ("EPG") or users are routed to the MVPD provided EPG. Still other devices allow access to all MVPD provided services, including interactive services such as VOD and PPV.

Competitors believe that each of these combinations of technology and services will be favored by some set of consumers and be successful. Competition currently playing out in the market will determine who is correct so that their devices are favored by consumers, and who is incorrect so that their devices fail. At this point, it is not possible to forecast with any accuracy what type of device, or group of devices, will satisfy consumer demand. All are currently being offered to consumers and more are being developed every week. The favored level of compatibility and integration with MVPD-provided services is also being tested in the market.

Any development of an AllVid interface standard will have to account for these different products that are already on the market and predict what new products might be coming. But at the same time, any standard that attempts to accommodate all the possible levels of integration that are currently being tested in the market likely will impose unnecessary costs on those consumers that only want limited compatibility. These consumers would be forced to pay for a device which provides for services and integration which they may not want. They will join the millions of consumers who have paid for UHF tuners and 1394 connectors and never used them. The standard would force consumers looking for the most limited services to subsidize those looking for the most complex and extensive services, rather than allowing the market to serve their differing demands in the most efficient manner.

VII. There is no evidence that the AllVid standard will drive consumer demand for broadband access

Manufacturers are already marketing equipment that allows consumers to display content sourced from the Internet on their television receivers. As discussed above, many new television receivers allow for a broadband connection to be directly input and use on-screen widgets to navigate the web. Other firms are developing innovative ways to bring the Web experience to the television. Consumers who have broadband connections are beginning to explore the benefits of this “over-the-top” technology.

What some proponents of the AllVid standard seem to believe is that integrating a broadband connection with MVPD programming will induce those consumers who subscribe to MVPD services but not broadband to add a broadband service.¹¹⁹ We have seen no evidence that it is a perceived inability to integrate web and MVPD sources that accounts for a consumer’s lack of interest in securing a broadband connection. It is also unlikely that the use of an MVPD supplied set-top box is somehow deterring consumers from purchasing a broadband connection. It is much more likely that the 76% of U.S. households that already have personal computers are aware of on-line content and may wish to view that content on their television receiver while those households without a computer do not yet value the service enough to incur the cost.¹²⁰

In addition, a disproportionate share of households without internet access also has no set-top box.¹²¹ So it is unclear how an AllVid standard will spur them to adopt broadband when they do not now even have a set-top. In fact, it is often a lack of availability of broadband service in certain markets, the cost of the broadband service and equipment, a lack of digital skills to use broadband, the perceived relevance of broadband, and accessibility for individuals with disabilities that is limiting broadband adoption.¹²²

There is nothing in the proposed AllVid standard that allows MVPD subscribers to access internet content on their televisions. Consumers will still need a broadband connection and some

¹¹⁹ The FCC chairman has said “can the presence of TVs in everyone’s home help...people who don’t have broadband for those who don’t have computers?” See Cecilia Kang, *FCC Takes on Cable, Satellite on Television Set-Top Boxes*, *Washington Post*’s Post Tech blog, November 18, 2009, (quoting FCC Chairman Julius Genachowski) available at http://voices.washingtonpost.com/posttech/2009/11/fcc_takes_on_cable_satellite_o.html.

¹²⁰ The FCC Public Notice, *Comment Sought on Video Device Innovation (NBP Public Notice #27)*, GN Docket Nos. 09-47, 09-51m 09-137, CS Docket No. 97-80 (rel. Dec. 3, 2009) states that while 99 percent of U.S. households have television sets, 76 percent have personal computers.

¹²¹ See “An Overview of Home Internet Access in the U.S.,” Nielsen, December 2008, <http://blog.nielsen.com/nielsenwire/wp-content/uploads/2009/03/overview-of-home-internet-access-in-the-us-jan-6.pdf>.

¹²² *Connecting America: The National Broadband Plan*, Federal Communications Commission, Chapters 8 and 9. Indeed, nowhere in Part II of the plan, Inclusion, which discusses availability, adoption and utilization, is there any mention of set-top boxes or an MVPD gateway device.

device that connects that broadband source to their televisions. Those devices are already available in the marketplace as detailed previously. Therefore, it is unclear how mandating an AllVid device will in-and-of-itself promote the adoption of broadband connections.¹²³ Even if the AllVid standard could facilitate the integration of MVPD and Internet digital content the vibrant competition and innovation that is currently occurring implies that firms will not wait for the FCC to finish its work. Solutions are already being worked out in the marketplace.

VIII. Conclusion

From an economic efficiency perspective, the best role for the government would not be to define the exact technology that video providers and consumers must use, but instead, would be to work with industry participants to develop market-based solutions that drive innovation. Given the potential problems with government-mandated standards, especially in an environment with rapid technological change, the Commission's approach to regulating MVPD navigation devices should allow the market opportunities to respond (and keep responding) to consumer demand. Governmental prescription of technical standards may prematurely lock out innovation. Rather than imposing technology mandates, the Commission could point toward solutions based on performance requirements. Then the Commission can let the market decide on the optimal design of services and devices rather than attempt to mandate a design.

¹²³ TiVo makes this point itself when it claims that the standard will “*encourage* them [consumers] to make fuller use of broadband services and content...” Comments of TiVo Inc. on NBP Public Notice #27, December 22, 2009, p. 12. [emphasis in original] TiVo also assumes that consumers require a gateway in order to have “the *ability* to access broadband content on their televisions.” [emphasis in original] *Ibid.* As is clearly demonstrated earlier in this paper, consumers already have this ability.