
**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)
)
Implementation of Section 304 of the) CS Docket No. 97-80
Telecommunications Act of 1996)
)
Commercial Availability of Navigation)
Devices)
)
Compatibility Between Cable Systems and) PP Docket No. 00-67
Consumer Electronics Equipment)

COMMENTS OF CISCO SYSTEMS, INC.

Jeffrey A. Campbell
Senior Director, Technology and
Trade Policy
CISCO SYSTEMS, INC.
1300 Pennsylvania Avenue, N.W.
Suite 250
Washington, D.C. 20004
202.354.2920

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SUMMARY

Cisco Systems, Inc. submits these comments in response to the Commission's various proposals to modify the existing CableCARD regime. Several of the proposed changes to the rules will benefit the public interest and should be adopted by the Commission. First, expanding the IEEE 1394 requirement to permit additional interfaces will reduce costs while promoting innovative home networking devices. Today, several other connector standards are better suited than IEEE 1394 to serve the "home networking" purpose. For example, because of the benefits of Ethernet connectivity, Cisco already includes Ethernet connectors in its current set-top box models, and plans to include Ethernet connectors in its future models. The IEEE 1394 output is therefore redundant on Cisco boxes, and only adds unnecessary expense and consumes excess energy and space. Permitting cable operators to use either Ethernet, Wi-Fi, or USB 3.0 in lieu of IEEE 1394 will improve set-top box functionality, decrease costs, and create other technical benefits that will ultimately benefit consumers.

Second, waiving the integration ban with respect to all cable systems for low-cost, one-way boxes without recording capability (i.e., digital transport adapters, or "DTAs") will promote the cable digital transition, resulting in faster Internet service and more high-definition ("HD") programming and other digital services. Without DTAs, cable operators would have to supply all subscribers in all-digital systems with expensive, sophisticated CableCARD set-top boxes that provide services some subscribers may not wish to pay for or access. The blanket DTA waiver should include HD DTAs, now that HD is commonplace and can no longer be considered an "advanced" service for the purposes of the Commission's set-top box waiver policies. Given the more than 20 million CableCARD-enabled leased set-top boxes that already have been deployed, this proposal will not impede any development of a competitive retail market for navigation devices or undermine the goal of "common reliance."

The Commission should not adopt all proposals discussed in the *FNPRM*, however. Rather than requiring cable operators to make available an out-of-band communications link over the public Internet for one-way devices operating on Switched Digital Video (“SDV”) cable systems, the Commission should find that the existing tuner adapter solution is effective and widely available. Cisco and other cable equipment manufacturers were active members in the development of the tuning adapter specification and participated with TiVo and CableLabs in testing and bringing this solution to market. Since 2008, Cisco alone has shipped more than 42,000 such adapters to its cable operator customers and anticipates shipping approximately 35,000 adapters per year over the next several years.

Not only is a satisfactory solution already in use, but the proposed out-of-band system would require establishing new standards and protocols for many complex and difficult technical issues (e.g., location discovery, authorization, publishing available services, and client/gateway/back office communications) across at least twelve different possible SDV system architectures. Implementing a signaling backchannel over the public Internet also raises security and privacy concerns that would need to be addressed, including denial-of-service, cracking, and spoofing. In the best of circumstances, full implementation could take 30 months from promulgation of a rule, making the proposal particularly ill-suited as an interim “fix” to sustain the CableCARD regime while the FCC considers its successor technology. The Commission should not entangle itself in a complicated and unnecessary “repair” to a CableCARD ship which it is in the process of abandoning.

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COMMENTS OF CISCO SYSTEMS, INC.

I. INTRODUCTION

Cisco Systems, Inc. (“Cisco”)¹ submits these comments in response to the Commission’s most recent *Further Notice of Proposed Rulemaking* (“*FNPRM*”) in these dockets, which seeks comment on various proposals to modify the existing CableCARD regime.² As discussed below, several of the proposed changes to the rules will benefit the public interest. Specifically, expanding the IEEE 1394 requirement to permit additional interfaces will reduce costs while promoting innovative home-networking devices, and waiving the integration ban for low-cost, one-way boxes without recording capability will promote the cable digital transition. The

¹ Cisco is the worldwide leader in networking that transforms how people connect, communicate, and collaborate (see www.cisco.com). Cisco customer premises solutions provide powerful home-networking and content-sharing options that allow subscribers to live the “Connected Life” with simple, affordable tools to enjoy and interact with content in new ways. These solutions draw on Cisco’s rich experience in providing more than 40 million set-top boxes worldwide.

² Implementation of Section 304 of the Telecommunications Act of 1996, *Fourth Further Notice of Proposed Rulemaking*, 25 FCC Rcd 4303 (2010) (“*FNPRM*”).

Commission should adopt these proposals. However, the Commission should reject a proposal to mandate that cable operators make available an out-of-band communications link over the public Internet for Unidirectional Digital Cable Product (“UDCP”) devices operating on Switched Digital Video (“SDV”) cable systems. A satisfactory solution for such devices is already in use, and additional regulations are unnecessary. Also, the proposed system would require establishing new standards for many complex and difficult technical issues; this lengthy and unnecessary process is inappropriate as an interim fix to the CableCARD regime, which the Commission actively is seeking to replace.

II. THE EXISTING SOLUTION FOR CONNECTING ONE-WAY DEVICES TO SDV SYSTEMS IS EFFECTIVE, PRO-CONSUMER, AND GENERALLY AVAILABLE

SDV is a valuable technique through which cable operators can more efficiently use the bandwidth in their systems, freeing capacity for deployment of additional content and services, including more high definition (“HD”) services and broadband Internet access. However, because SDV relies on upstream requests from a subscriber’s set-top box in order to provide the desired programming, the technology presents a technical challenge for UDCP devices which inherently are one-way and thus typically are not capable of transmitting such requests. The cable industry, as represented by the National Cable & Telecommunications Association (“NCTA”) and CableLabs, and UDCP manufacturer TiVo, Inc. (“TiVo”), working together, established a CableLabs specification and deployed a solution that enables UDCP devices to properly receive all channels on a SDV system. Cisco and other cable equipment manufacturers were active members in the development of this specification and participated with TiVo and CableLabs in testing and bringing this solution to market. This solution, using a tuning adapter, not only works, it is widely available and enables subscribers to enjoy the benefits of a SDV system without negatively impacting UDCP functionality. Given that the problem has already

been solved and is being implemented successfully, Commission action in this area is unnecessary and risks diverting resources from more critical problems.

A. Tuning Adapters Have Been (And Continue to Be) Deployed Effectively

In November of 2007, the cable industry and TiVo announced the creation of an external adapter to permit UDCPs to access switched digital cable channels.³ Cable operators began to offer such adapters to TiVo customers in the second quarter of 2008. Since then, Cisco alone has shipped more than 42,000 such adapters to its cable operator customers and anticipates shipping approximately 35,000 adapters per year over the next several years.⁴ In the six years since CableCARD devices entered the marketplace, the ten largest cable companies have distributed more than 456,000 CableCARDs for use in UDCPs – approximately 76,000 per year.⁵ Cisco therefore anticipates delivering one tuning adapter for approximately every two CableCARD-enabled UDCPs. Statistically speaking, fewer than one in three CableCARD-enabled UDCPs should require a tuning adapter, given that less than one-third of U.S. households are in SDV cable systems.⁶ Thus the supply of tuning adapters is and will be more than adequate to supply customers who purchase UDCPs for use within a SDV system.

³ NCTA Media Release, *NCTA and TiVo Announce Switched Digital Solution for HD DVRs*, Nov. 26, 2007, available at <http://www.ncta.com/ReleaseType/MediaRelease/4439.aspx>.

⁴ Motorola Inc. also manufactures tuning adapters.

⁵ Letter from Neal M. Goldberg, NCTA, to Marlene H. Dortch, Secretary, Federal Communications Commission, CS Docket No. 97-80 (Dec. 22, 2009).

⁶ Ian Olgeirson, Report, “IPTV looms, but cable plant outlook maintains evolutionary course,” SNL Kagan, December 18, 2009 (concluding that, based a compilation of company statements and SNL Kagan estimates, “less than one-third of the digital cable subscribers in the U.S. will be served by a system equipped with or in the process of launching SDV by the end of 2009.”).

Additional evidence indicates the number of households in operating SDV cable systems may be
(continued on next page)

B. The Commission Should Not Substitute a Regulatory Mandate for a Successful Market-Based Solution

The Commission should not entangle itself in a complicated and unnecessary “repair” to a CableCARD ship which the Commission is in the process of abandoning. The cable industry successfully worked together with UDCP manufacturers to develop the tuning adapter solution, and that solution is deployed in tens of thousands of homes today. TiVo – which now supports a complex new solution – was instrumental in developing the tuning adapter solution and strongly endorsed the solution as recently as last summer:

“TiVo believes that the provision of a Tuning Adapter at *no additional cost* is a reasonable, practical solution to ensure that existing unaffiliated retail navigation devices that are capable of receiving streamed programming can continue to receive such programming delivered via SDV in compliance with FCC rules.”⁷

The tuning adapter solution is already in place and working, and to the extent that additional issues arise, the parties involved have demonstrated a clear desire and ability to solve such issues. In contrast, the TiVo proposal is still theoretical, and the large number of serious technical and security concerns described below raise doubts that the proposal can be implemented on a timely basis, if at all. Given the FCC’s clear intention to replace the CableCARD regime, it would hardly make sense for the FCC or industry participants to invest time, effort, and money into an unnecessary fix to an already addressed problem.

closer to one-fourth of U.S. households. SNL Kagan, “US Cable Industry: Historical and 10 Year Projections,” Oct. 1, 2009.

⁷ Petition for Reconsideration or Clarification of TiVo Inc., File Nos. EB-07-SE-351, EB-07-SE-352, at 17-18 (July 27, 2009) (“*TiVo Petition for Recon.*”).

III. CONTRARY TO CLAIMS OF EASE AND SIMPLICITY, AN OUT-OF-BAND SOLUTION FOR SDV PRESENTS NUMEROUS DIFFICULT CHALLENGES

TiVo proposes that the Commission require cable operators to allow CableCARD devices to receive out-of-band communications from the cable head-end and transmit out-of-band communications to the cable head-end over Internet Protocol (“IP”).⁸ According to the Commission, TiVo states that this would allow subscribers with compatible UDCPs to access all linear content without the need for any equipment beyond a CableCARD.⁹ TiVo claims that this proposal is straightforward and easily implemented.¹⁰

TiVo is incorrect. Implementing a signaling backchannel over the public Internet raises many technical, security, and privacy concerns that would need to be addressed before such a system could begin to be implemented. Given the complexity of TiVo’s proposal, full implementation could require years, making the proposal particularly ill-suited as a part of a “quick fix” to sustain the CableCARD regime while the Commission prepares a replacement.

⁸ See *FNPRM*, 25 FCC Rcd at 4308-09 ¶ 14; Letter from Matt Zinn, Sr. Vice President, General Counsel, Secretary, and Chief Privacy Officer, TiVo Inc., to Marlene H. Dortch, Secretary, FCC, CS Docket No. 97-80, at 3 (Feb. 17, 2010) (“*TiVo Ex Parte*”).

⁹ *FNPRM*, 25 FCC Rcd at 4308-09 ¶ 14 (citing *TiVo Ex Parte* at 3).

¹⁰ *TiVo Petition for Recon.* at 6-7 (citation omitted) (“Indeed, the Commission has recognized that TiVo and certain other UDCPs have Internet capability that allows upstream signaling. Such signaling is all that is necessary for a TiVo device to request and locate the streamed programming.”); *TiVo Ex Parte* at 3 (“Where a cable operator has been open to working with TiVo on [an out-of-band] approach, it has been accomplished without any such extraordinary reconfiguration of headend equipment.”).

A. Technical and Operational Challenges Involve Multiple Network Elements, Complex Interactions Between Operator Networks and Retail Devices, and Development of New Standards-Based Protocols

Cisco engineers have given serious thought to how the TiVo proposal could be implemented. While the *FNPRM* describes the TiVo proposal in a single sentence, actual implementation of this proposal would require lengthy specification of the interactions between multiple components of cable operators' networks and retail devices through the development of new standards and protocols.

1. TiVo's out-of-band proposal would require time-consuming development of new standards and protocols

TiVo's proposal would require the establishment of a number of new standards and protocols. Industry-wide standard protocols would need to be established for many key functions including location discovery, authorization, publishing of available services, communication between the UDCP client and the cable system gateway, and communication between the gateway and the SDV server.¹¹

Location Discovery. Each subscriber resides within a relatively small local cluster of cable devices served by a distribution hub which may change behind the scenes as cable operators update their networks. Because of this, UDCP devices would need to be aware of their location within the cable operator's network in order to appropriately request and receive content. Specifically, the device would need to know what distribution hub within the cable

¹¹ TiVo references the "TV Everywhere" initiative as an example of the ease of implementing its proposal. *TiVo Ex Parte* at 3. However, the TV Everywhere model service is orthogonal to the SDV service. TV Everywhere is a web-based delivery of on-demand content that has been authorized through a cable operator. SDV is a QAM-based service that requires real time network re-allocation at the local level. SDV therefore requires distributed switching that is highly location based. The two services are not comparable.

system should be instructed to enable a channel for that device. There is not currently an industry-wide standard for establishing device location within a cable system.

Authorization. In order to maintain necessary control over content, devices requesting content must be authorized as belonging to a cable subscriber who has access to the content requested (by virtue of the subscriber's cable subscription). There is no established standardized way to complete such authentication across all cable systems; one would have to be developed.

Publishing Available Services. In order to properly request a service provided through SDV, the UDCP device must know what SDV services are available, as well as the necessary tuning information. Providing this information is complicated by the fact that available services can and do change based on the user's subscription status, business decisions, and other factors. There is no established standard way to publish such information; an industry-wide standard would be required.

Client/Gateway/Back Office Communications. The communications protocols between a UDCP client device and the cable system gateway would need to be standardized across the cable industry. In addition, the communications protocols between a gateway and a cable operator's back office computers would need to be developed by each cable operator.

Establishing each of these groups of standards/protocols will require detailed negotiations between cable operators, third-party CableCARD device manufacturers, and cable equipment vendors. After the standards are established, they will need to be implemented and tested, and a certification or similar process will need to be set in place to assure compliance.

2. Technological differences in cable systems could hamper creation of universal standards

An additional hurdle to establishing standards for the TiVo proposal is the difference between the underlying network technologies and architectures used by various cable operators

to implement SDV. SDV system architectures differ based on the chosen combination of three different types of components to form a specific deployment architecture. The first component, the channel change protocol, is the protocol between the SDV server and the client's set-top box which is used to request and maintain switched services. There are two different SDV channel change protocols deployed by U.S. cable operators.¹²

The second component is the carousel protocol, which is used to provide configuration and discovery information to the client devices, and to deliver the list of active switched programs with corresponding tuning information. There are two primary carousel protocols used in SDV systems today.¹³

The third and final component which varies across SDV systems is the discovery method or protocol, which is the process by which a consumer device discovers its service group (location) and the corresponding service group ID. A device must identify the service group ID when requesting a switched service. There are three different discovery methods deployed in the United States.¹⁴

Therefore there are at least twelve different possible SDV system architectures. Each of these possible architectures would need to be addressed in the creation of universal standards as required by TiVo's proposal, which would complicate the process significantly.

¹² Channel Change Message Interface Specification or Next Generation On Demand ("NGOD") Channel Change Protocol.

¹³ MCMIS, or NGOD delivered as either a DAVIC out-of-band data or as an OCAP object carousel.

¹⁴ Discovery is done either based on service group map files, based on embedding the service group ID in an in-band carousel, or using a server-assisted technique based upon client requests.

B. Given the Substantial Timeframe Required for Implementation, the Proposal is Ill-Suited as an “Interim Fix”

The purpose of the proposed rulemaking is “to improve the operation of the CableCARD ... until a successor solution becomes effective.”¹⁵ The National Broadband Plan calls for a successor solution to be in place by December 31, 2012 – approximately thirty months from the date of these comments.¹⁶ Past experience shows that controversial changes which (like TiVo’s) require significant standards work and expensive rollouts are long-term endeavors that take years to specify and implement. Imposing such changes as an “interim” fix makes little business or policy sense. The parties and the Commission would be far better served to focus on consensual interim changes to the CableCARD regime that can be implemented quickly, and focus most of their energies on developing and implementing a satisfactory successor solution.

1. In the best of circumstances, development and deployment of TiVo’s proposal could take 30 months from the promulgation of Commission rules

If all stakeholders (cable operators, cable systems suppliers and consumer equipment manufacturers) worked efficiently and cooperatively, the best case timeframe to achieve a deployable, full-vetted solution meeting the broad outlines of TiVo’s proposal ranges between 30 and 42 months. The following table breaks down the estimate into its component parts.

¹⁵ *FNPRM*, 25 FCC Rcd at 4303 ¶ 1. See also Video Device Competition, *Notice of Inquiry*, 25 FCC Rcd 4275, 4276 ¶ 3 (2010) (“*AllVid NOI*”) (proposing an ‘AllVid’ adapter to spur competition in the retail market for smart video devices).

¹⁶ See FCC, *Connecting America: The National Broadband Plan*, at 51-52 (Mar. 16, 2010) (“National Broadband Plan”).

Activity	Estimated Timeframe
Standards Definition and Ratification by Parties	6-12 months
Product Development	12 months
Systems Verification Testing	3-6 months
MSO Back-office Integration (necessary to verify consumer is permitted to access content)	3-6 months (may be longer, since multiple billing system providers are involved, sometimes within the same MSO)
Nationwide Deployment by Cable Operators	6 months (assuming a very aggressive schedule)
Total	30-42 months

As noted in Section III(A) above, at least five groups of standards or protocols are required, three of which clearly require industry-wide agreement. Protocols for Services Discovery, Client/Gateway Communications, and Authorization all require joint collaboration and agreement among the cable operators, their digital video network systems suppliers (Cisco and Motorola), and the consumer electronics industry. The most appropriate standards forum for this effort probably would be either SCTE or CableLabs. Proposed standards would need to be ratified by both the cable operators and the consumer electronics industry membership. The protocols for Gateway/SDV Server communications and communications with Back Office systems are proprietary and would likely differ for each MSO. Cumulatively, twelve months is a realistic estimate of the timeframe for the development of these five critical and complex components of TiVo's proposal.

Once standards are established, there are at least four products that must be either developed from scratch or modified in order to implement the TiVo proposal. Even considering only the two completely new products – the Services Gateway which would communicate with the UDCP equipment, and the Authentication Server – Cisco estimates 54 weeks of development before the system would be ready for testing. System testing, back office integration, and deployment would add, in the best case, another 12 months.

It should be noted that this estimate does not account for manufacture of compliant retail devices, nor for establishment and compliance with any required certification process. Nor does the timeline contemplate procedural delays that might occur from any parties seeking waivers. In short, 30 months to implement the TiVo proposal is an optimistic best-case scenario; real world experience suggests the timetable could be significantly longer.

2. Very few Commission-driven technology mandates have been developed and implemented in 30 months or less

Even for proposals arguably less complex than TiVo's proposal, industry has rarely been able to implement a Commission technology mandate in less time than the above estimated time to implement the TiVo proposal. For example, in 1996 the Commission required all Commercial Mobile Radio System ("CMRS") wireless handset providers in the top 100 markets to implement service provider number portability by June 30, 1999.¹⁷ In that report, the Commission concluded that "none of these [CMRS-specific] difficulties are insurmountable," but noted that the CMRS industry was "only beginning to address the additional standards and protocols specific to the provision of portability by CMRS carriers."¹⁸ Therefore, to allow industry additional time to develop standards and protocols, the Commission implemented a staggered schedule of milestones over *three years* building up to the June 30, 1999 deadline.¹⁹ Yet even that period was insufficient for industry to establish and implement the necessary framework; the

¹⁷ Telephone Number Portability, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 8352, 8432-8437 ¶¶ 154-160 (1996).

¹⁸ *Id.* at 8439 ¶ 164.

¹⁹ *Id.* at 8440 ¶ 166.

Commission repeatedly extended the deadline, ultimately setting it at November 24, 2003.²⁰ This final deadline was more than six years after the Commission issued its initial regulation and more than twice the Commission's initial three-year estimate for standard-setting and implementation.²¹

The Commission's Wireless Emergency 9-1-1 ("E911") location accuracy rules are another example of a lengthy timeframe for specification and implementation of a Commission technical requirement. In 1996, the Commission first adopted "Phase II" location accuracy requirements for the provision of E911 services by wireless carriers.²² These rules provided *five years* from the effective date for covered wireless carriers to identify latitude and longitude of a mobile phone making a 911 call, within a radius of no more than 125 meters in 67 percent of all cases.²³ This standard was adopted in part as a result of an early consensus agreement between wireless carriers and public safety organizations.²⁴ In 1999, however, the Commission modified its rules to accommodate handset-based location accuracy technologies, and modified the

²⁰ Verizon Wireless's Petition for Partial Forbearance from the Commercial Mobile Radio Services Number Portability Obligation, *Memorandum Opinion and Order*, 17 FCC Rcd 14972, 14972 ¶ 1 (2002) ("2002 Extension Order"); Cellular Telecommunication and Industry Association's Petition for Forbearance from Commercial Mobile Radio Services Number Portability Obligations and Telephone Number Portability, *Memorandum Opinion and Order*, 14 FCC Rcd 3092, 3093 ¶ 1 (1999); Telephone Number Portability; Petition for Extension of Implementation Deadlines of the Cellular Telecommunications Industry Association, *Memorandum Opinion and Order*, 13 FCC Rcd 16315, 16317 ¶ 7 (1998).

²¹ *2002 Extension Order*, 17 FCC Rcd at 14972 ¶ 1.

²² Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 FCC Rcd 18676, 18712 ¶ 71 (1996).

²³ *Id.* at 18683-84 ¶ 10.

²⁴ *Id.* at 18688-89 ¶¶ 22-23.

deployment schedule accordingly.²⁵ The deployment schedule was modified again in 2000,²⁶ and yet again in 2001 and 2002 for nationwide and smaller carriers, respectively.²⁷ Yet even today there is still uncertainty regarding the geographic area over which compliance with the standards is to be measured.²⁸ In November 2007 the Commission attempted to resolve this issue, but the U.S. Court of Appeals for the D.C. Circuit stayed and vacated the result.²⁹ Late last year the Commission sought to refresh the record on this proceeding, which remains unresolved.³⁰

These are particularly strong examples of the timing challenges the Commission has had in creating complex technical standards, and the difficulties industry has had in implementing such standards. Furthermore, these examples demonstrate that Cisco's thirty-month estimate is likely optimistic. Specifying and implementing TiVo's complex proposal would almost certainly

²⁵ Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Third Report and Order*, 14 FCC Rcd 17388 (1999).

²⁶ Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Fourth Memorandum Opinion and Order*, 15 FCC Rcd 17442 (2000).

²⁷ See, e.g., Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Order*, 16 FCC Rcd 18364 (2001); Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, *Order to Stay*, 17 FCC Rcd 14841 (2002).

²⁸ See Association of Public-Safety Communications Officials-International, Inc. (APCO) Request for Declaratory Ruling, CC Docket No. 94-102 (filed Oct. 5, 2004).

²⁹ See Wireless E911 Location Accuracy Requirements, *Report and Order*, 22 FCC Rcd 20105, 20105-06 ¶ 1 (2007), *voluntarily vacated* by Motion of FCC for Voluntary Remand and Vacatur, *Rural Cellular Ass'n v. FCC*, No. 08-1069 (D.C. Cir. July 31, 2008), Order Granting Mot. Rem. (Sept. 17, 2008).

³⁰ See Public Safety and Homeland Security Bureau Seeks to Refresh the Record Regarding Service Rules for Wireless Enhanced 911 Phase II Location Accuracy and Reliability, PS Docket No. 07-114, Public Notice (rel. Nov. 6, 2009).

involve a timeframe longer than appropriate for an interim solution intended to expire on December 31, 2012.

3. Implementing the TiVo proposal would be an expensive, unnecessary distraction from the goals of Section 629 and the National Broadband Plan

Implementing TiVo's proposal would be an inappropriately massive and unnecessary burden on industry and the Commission, even if it were intended as a permanent objective. Costs for implementing this multi-year project would be thousands of hours and millions of dollars spent by the cable and consumer electronics industry. Spending so much money and effort on an interim patch for a system which the Commission is planning to replace is not in the public interest. Implementing the TiVo proposal would only serve to distract the Commission and the cable and consumer electronics industries from the true goal of the National Broadband Plan video device recommendations: to establish an adequate replacement to the CableCARD regime.

C. TiVo's Proposal Would Unnecessarily Risk the Security and Reliability of Cable Systems

Even if the necessary standards could be successfully developed, implementing TiVo's proposal to connect cable systems to the public Internet would introduce whole new categories of security and reliability issues to cable systems that are not a concern today.

TiVo's proposal would require cable operators to connect a "gateway" computer server or servers to the public Internet which would listen for requests from UDCP devices such as TiVo's. Like all servers available to public access on the Internet, these servers would be vulnerable to denial-of-service ("DoS") attacks similar to those used to shut down some major

websites in the past.³¹ In this case, however, such attacks would disrupt the subscriber's television experience without warning or explanation. Other threats include direct "cracking" attempts by malicious individuals seeking to gain access to corporate networks and "spoofing" attacks where an individual would impersonate either a cable subscriber or the cable operator in order to access confidential or proprietary data (including theft of service). Because, for the most part, cable video delivery systems today do not connect navigation devices to the cable network via the public Internet, these types of attacks are simply not possible. But implementing the TiVo proposal would make such attacks possible, thereby increasing the vulnerability of cable systems and raising the likelihood that consumers would suffer insecure and unreliable service.

TiVo's proposal would also create a new point of failure for cable service, one potentially outside of the cable operator's control. Requiring certain cable television programming requests to pass over the subscriber's home broadband Internet connection means that if a subscriber's broadband connection fails or is disconnected, their video service may be interrupted. Since in many cases the subscriber's broadband connection would not be managed by the cable operator,

³¹ In a denial of services attack, thousands or millions of fake requests are sent to a server, slowing or crashing the server while crowding out legitimate requests. CERT, *Denial of Service Attacks*, http://www.cert.org/tech_tips/denial_of_service.html (last visited June 8, 2010). Thousands of such attacks occur every day. See ATLAS, *Summary Report: Global Denial of Service*, <http://atlas.arbor.net/summary/dos> (reporting more than 1500 DoS attacks in the past 24 hours at 11:59PM on June 8, 2010) (last visited on June 8, 2010). Major government and commercial websites have suffered significant outages from such attacks. See, e.g., Choe Sang-Hun and John Markoff, *Cyberattacks Jam Government and Commercial Web Sites in U.S. and South Korea*, NY Times, July 9, 2009, at A4 (documenting attacks on whitehouse.gov and other major U.S. government websites, as well as the websites of the NY Stock Exchange, Nasdaq, and the Washington Post).

there would be little or nothing the cable operator could do to restore the subscriber's service. This would likely lead to increased customer support costs and decreased customer satisfaction.

D. The Out-of-Band Proposal May Conflict with Commission Policies and Rules

1. TiVo's proposal conflicts with the Commission's desire to maintain cable operators' freedom to innovate and protect their networks

The Commission has expressed its intention that the replacement to the CableCARD regime “allow unfettered innovation in MVPD delivery platforms,”³² “encourage MVPDs to develop and introduce innovative services without being inhibited by the need to consult with navigation device manufacturers,”³³ and “maintain MVPDs' freedom to innovate and protect their networks.”³⁴ TiVo's proposal appears to be inconsistent with these intentions; it would impose standards that would fetter cable operators to a particular delivery platform architecture. As a result, a cable operator which wishes to develop a delivery mechanism outside of the agreed-upon standards would by necessity be required to consult with and persuade navigation device manufacturers in order to accomplish the change. Not only would this limit cable operators' ability to innovate, but as discussed above, it could even weaken cable operators' ability to protect their networks from attack or theft of service. Adopting TiVo's proposal would therefore be a step backward from the Commission's goals for video networks.

³² *AllVid NOI*, 25 FCC Rcd at 4275, 4282 ¶¶ 1, 17.

³³ *Id.* at 4283 ¶ 23.

³⁴ *Id.*

2. TiVo’s proposal may expose cable operators and subscribers to the types of network harm and theft of service that the navigation device rules are intended to prevent

TiVo’s proposal also appears to be inconsistent with the Commission’s policy goals because the signaling backchannel could expose cable operators to network harm and/or theft of service. Sections 76.1201 and 76.1203 protect MVPDs by permitting them to restrict the attachment or use of devices “where electronic or physical harm would be caused by the attachment or operation of such devices or such devices may be used to assist ... in the unauthorized receipt of service.”³⁵ As discussed above, connecting cable operators’ networks to the public Internet increases vulnerability to security breaches, theft of service, and service outages.³⁶ Accordingly, a UDCP connected to a cable network via an IP backchannel may exceed the scope of permissible competitive devices under Section 629 and the Commission’s rules.

IV. THE COMMISSION SHOULD ADOPT THE *FNPRM* PROPOSAL TO RELAX THE INTERFACE REQUIREMENT AND INCLUDE ALTERNATIVE CONNECTORS

The *FNPRM* proposes to relax the requirement of 76.640(b)(4)(ii), which currently mandates that “all high definition set-top boxes acquired by a cable operator for distribution to customers” must include an IEEE 1394 interface.³⁷ The proposal would permit the use of either IEEE 1394, Ethernet, Wi-Fi, or USB 3.0. The Commission should adopt this proposal as in the public interest.

³⁵ 47 C.F.R. §§ 76.1201, 76.1203.

³⁶ U.S. Computer Emergency Readiness Team, *Home Network Security*, http://www.us-cert.gov/reading_room/home-network-security/ (last visited June 11, 2010) (describing, in consumer-oriented language, the various threats to computers on the public Internet).

³⁷ 47 C.F.R. § 76.640(b)(4)(ii).

A. Allowing Cable Operators a Choice of Interfaces Under Section 76.640(b)(4)(ii) Will Serve the Goal of the 1394 Requirement

The IEEE 1394 requirement was adopted by the Commission in 2003 and was intended to enable connectivity with consumer home devices. However, today several other connector standards are better suited to serving the “home networking” purpose IEEE 1394 was intended to serve. Permitting cable operators to use these other standards will improve set-top box functionality, decrease costs, and create other technical benefits that will ultimately benefit consumers.

IEEE 1394 was the only appropriate technology at the time the rule was adopted, primarily because it was the only standard which featured content protection at that time.³⁸ However, IEEE 1394 has since been supplanted by other technologies. Most home networking today is done using IP over Ethernet or Wi-Fi, both of which are now as capable of protecting content as IEEE 1394. The Commission recognized in the *FNPRM* that recent waiver requests have made a “compelling argument” that IP connectivity such as Ethernet, Wi-Fi, or USB 3.0 “will provide consumers with the functionality that the IEEE 1394 interface requirement was intended to provide, such as home networking.”³⁹ Indeed, today thousands of models of consumer electronics goods use Ethernet, Wi-Fi, or USB 3.0 to connect to consumers’ home networks, while IEEE 1394 use is limited to some camcorders and other high-end video equipment. In part this may be because IEEE 1394 is more expensive, costing between one and

³⁸ See Memorandum of Understanding Among Cable MSOs and Consumer Electronics Manufacturers (Dec. 12, 2002), *attached to* Letter from Charter Communications, Inc., et al. to Hon. Michael Powell, Chairman, FCC, CS Docket No. 97-80, at 6 (filed Dec. 19, 2002) (requiring use of IEEE 1394 with copy protection).

³⁹ *FNPRM*, 25 FCC Rcd at 4311 ¶ 19.

five dollars per box, while Ethernet costs only pennies per output.⁴⁰ IEEE 1394 is also less energy efficient than some other options.

Because of the benefits of Ethernet connectivity, Cisco already includes Ethernet connectors in its current set-top box models, and plans to include Ethernet connectors in its future models as well. The IEEE 1394 output is therefore redundant on Cisco boxes, and only adds unnecessary expense and consumes excess energy and space. Increased flexibility would allow Cisco to produce set-top boxes with a full range of home networking features at a lower cost than it can today. For similar reasons there is widespread industry support for increased flexibility in the IEEE 1394 requirement.⁴¹ The Commission should embrace the consensus and adopt the proposal to increase flexibility in the output interface cable operators may employ under Section 76.640(b)(4)(ii) of its rules.⁴²

⁴⁰ Petition of Intel Corporation For Waiver of 47 C.F.R. § 76.640(b)(4), CSR-8229-Z, CS Docket No. 97-80, at 5 (filed Oct. 7, 2009) (“Intel Petition”) (detailing expensive nature of 1394 technology from Intel’s perspective).

⁴¹ See, e.g., Petition of TiVo Inc. for Clarification or Waiver of 47 C.F.R. § 76.640(b)(4), CS Docket No. 97-80 (filed Nov. 6, 2009) (seeking clarification that the 1394 requirement does not apply to retail devices, and waiver for any cable operator which distributes TiVo high-definition DVR models); Comments of the Consumer Electronics Association, CSR-8229-Z, (filed Dec. 10, 2009); Comments of National Cable & Telecommunications Association on NBP Public Notice #27, CS Docket No. 97-80 *et al.*, at 36 (filed Dec. 22, 2009), *attached to* Letter from Neal M. Goldberg, NCTA, to Marlene H. Dortch, Secretary, FCC, CS Docket No. 97-80 *et al.* (filed Dec. 22, 2009). Only Texas Instruments, which receives license fees from devices using IEEE 1394, and the 1394 Trade Association have opposed waiver of the 1394 requirement. See Texas Instruments Opposition to Motorola and TiVo Waiver Requests, CSR-8251-Z, CSR-8252-Z, CS Docket No. 97-80 (filed Feb. 22, 2010); Letter from David Thompson, Secretary, 1394 Trade Association, to Marlene H. Dortch, Secretary, FCC, CS Docket No. 97-80, CSR-8229-Z (filed Dec. 9, 2009) (opposing Intel Corporation’s waiver request).

⁴² Cisco does not oppose requiring set-top boxes to use “any industry standard” protocol for video transmission through the 76.640(b)(4)(ii) interface. See *FNPRM*, 25 FCC Rcd at 4311 ¶ 21. However, vendors should be allowed to choose which specific industry standard protocol to support, as appears to be the Commission’s intention.

B. As Directed by the Commission in the *FNPRM*, the Media Bureau Should Continue to Act on Requests to Waive the 1394 Requirement

Cisco has filed a request for waiver of the 1394 requirement for any cable operator that wishes to deploy any current or future model Cisco HD set-top box that supports IP connections such as Ethernet.⁴³ In the *FNPRM* the Commission addresses such pending waivers, directing the Media Bureau to “act on ... requests for waiver of the existing rule as part of its normal course of business.”⁴⁴ The Media Bureau should comply with this directive, and should adopt the Commission’s opinion that other outputs are today better suited to fulfilling the “home networking” purpose the IEEE 1394 requirement was intended to serve. The Media Bureau should therefore grant Cisco’s request for waiver of the IEEE 1394 requirement as in the public interest, and should do so independent from this proceeding, as the *FNPRM* directs.

V. THE COMMISSION SHOULD ADOPT THE *FNPRM* PROPOSAL TO PERMIT CABLE OPERATORS TO DEPLOY LIMITED CAPABILITY HD SET-TOP BOXES WITH INTEGRATED CONDITIONAL ACCESS

The *FNPRM* proposes to permit cable operators to place into service new, one-way navigation devices (including devices with HD capability) which perform conditional access and other functions in a single integrated device, but do not have recording functionality.⁴⁵ The Commission should adopt this proposal for all cable operators, because doing so will facilitate the transition to all-digital cable networks, resulting in faster Internet and more HD programming

⁴³ See Cisco Systems, Inc. Petition for Waiver of Section 76.640(b)(4); Implementation of Section 304 of the Telecommunications Act of 1996: Commercial Availability of Navigation Devices, CSR- _____, CS Docket No. 97-80, Petition for Waiver (submitted June 14, 2010).

⁴⁴ *FNPRM*, 25 FCC Rcd at 4311 ¶ 20 n.50.

⁴⁵ *Id.* at 4311 ¶ 22.

and other digital services without substantially affecting the retail market for CableCARD devices or the Commission's policy goals in this area.

A. DTAs Have Many Benefits for Cable Operators and Ultimately for Consumers

Cisco currently produces low-cost, limited capability standard definition ("SD") set-top boxes known as "digital transport adapters" or "DTAs" which perform conditional access and other functions in a single integrated device. The Commission, under its streamlined *Evolution Broadband* waiver process, granted Cisco's request for a waiver permitting cable operators to deploy these devices.⁴⁶

As low-cost devices that give subscribers access to digital content, these DTAs are an important tool for cable operators that are transitioning to digital systems. By transitioning to more efficient digital signaling, cable operators can recover bandwidth for additional services, such as expanded selections of HD content and faster broadband services. DTAs enable cable operators to economically perform this transition without disrupting service to customers who may have previously relied entirely on analog content (i.e., did not previously have a set-top box of any kind). Without DTAs, cable operators would have to supply all subscribers with expensive, sophisticated CableCARD cable set-top boxes that provide services the subscribers may not wish to pay for or access. The additional expense would significantly and unnecessarily deter or delay cable operators' transition to digital systems. As such, DTAs promote the transition to all-digital cable systems, bringing more content and services to consumers over the same infrastructure.

⁴⁶ Motorola, Inc., *Memorandum Opinion and Order*, 24 FCC Rcd 10939 (MB 2009).

B. The Commission Should Permanently Exempt SD and HD DTAs from the Integration Ban

The availability of SD DTAs has served a valuable role in promoting the cable digital transition, and the Commission is correct in proposing to expand its *Evolution Broadband* waiver regime to permanently exempt such devices from the integration ban rule. For similar reasons, the Commission should exempt HD DTAs from the integration ban as well. As the Commission has recognized, HD is commonplace in the video marketplace, and can no longer be considered an “advanced” service for the purposes of the Commission’s set-top box waiver policies.⁴⁷ HD is now a standard feature on most television sets, and analysts indicate that 90% of households will have an HDTV within the next three years.⁴⁸ (63% of households today have an HDTV).⁴⁹ As HD becomes increasingly ubiquitous, the Commission should adopt its proposal to exempt HD DTAs from the integration ban rule in order to continue to promote the cable digital transition.

The Commission should implement these exemptions to benefit all cable subscribers, not just those within smaller cable systems. An SD DTA unnecessarily degrades the picture quality available to a subscriber, regardless of the size of their cable provider. Additionally, a broad DTA exemption would benefit all cable operators by reducing DTA prices across the board through increasing the economies of scale for DTA manufacturing.

⁴⁷ See Implementation of Section 304 of the Telecommunications Act of 1996; Cable One, Inc.’s Request for Waiver of Section 76.1204(a)(1) of the Commission’s Rules, *Memorandum Opinion and Order*, 24 FCC Rcd 7882, 7886 ¶ 12 (2009) (“*Cable One Order*”).

⁴⁸ See SNL Kagan, *Digital/HD TV Set Projection Model* (2010).

⁴⁹ *Id.*

C. Permanently Exempting HD DTAs from the Integration Ban Will Not Substantially Affect the Retail Market for CableCARD Devices

As the Commission has previously concluded, HD DTAs are “unlikely to present a significant impediment to the development of a competitive retail market for navigation devices.”⁵⁰ Retail CableCARD devices and DTAs are not substitutable products (in fact, there is not even a retail market for DTAs), and therefore introduction of HD DTAs will not affect the market for retail CableCARD devices. Even with HD capability, DTAs remain extremely limited, one-way devices. In contrast, the CableCARD devices available at retail include advanced features such as: DVR capabilities; access to Internet content (including Netflix, Amazon, Blockbuster, and other content sources); interactive applications; and sophisticated user interfaces. Subscribers looking for such advanced features are very unlikely to settle for a DTA, even one with HD capability. Additionally, HD DTAs will not undermine the “common reliance” goals of the Commission. According to NCTA, over 20 million CableCARD set-top boxes have been deployed by cable operators, ensuring that CableCARD technology is a readily available industry standard and helping to achieve the goals of portability and a level playing field for competitive devices.⁵¹

VI. CONCLUSION

Cisco applauds the Commission’s commitment to improving the CableCARD regime. To do so, the Commission should provide both equipment manufacturers and cable operators the flexibility to best serve their customers. Revising the IEEE 1394 requirement and permitting

⁵⁰ *Cable One Order*, 24 FCC Rcd at 7887 ¶ 13.

⁵¹ Letter from Neal M. Goldberg, Vice President and General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC, CS Docket No. 97-80, at 1 (filed Mar. 31, 2010).

low-cost, one-way DTA devices are both worthy proposals which will benefit consumers by bringing new services and devices into their homes.

Conversely, embracing TiVo's proposal for out-of-band communications over the public Internet would significantly hinder cable operators' abilities to manage and protect their networks. Cisco urges the Commission to recognize that the existing tuning adapter solution for connecting UDCP devices to SDV cable systems already works; adopting a new, complex standard would take years and produce little to no additional benefit beyond the existing solution.

Respectfully submitted,

CISCO SYSTEMS, INC.

By: /s/ Jeffrey A. Campbell

Jeffrey A. Campbell
Senior Director, Technology and Trade
Policy
1300 Pennsylvania Avenue, N.W.
Suite 250
Washington, D.C. 20004
202.354.2920

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