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

In the Matter of	)	
	)	
Motorola, Inc.	)	
Request for Waiver of the IEEE-1394	)	CSR-8251-Z
Output Requirement	)	
	)	
TiVo Inc.	)	
Request for Waiver of the IEEE-1394	)	CSR-8252-Z
Output Requirement	)	
	)	
Implementation of Section 304 of the	)	
Telecommunications Act of 1996;	)	CS Docket No. 97-80
Commercial Availability of Navigation Devices	)	

TEXAS INSTRUMENTS OPPOSITION TO MOTOROLA AND TIVO WAIVER REQUESTS

Texas Instruments Incorporated ("Texas Instruments") opposes the requests by Motorola, Inc. ("Motorola") and TiVo Inc. ("TiVo") for waivers of the Commission's IEEE-1394 interface requirement.[1] The Commission is examining how to encourage video device innovation as part of its inquiries into how to drive broadband adoption and utilization.[2] Motorola and TiVo are asking the Commission to preempt and prejudge those proceedings. Broadband, and the role video devices may play in broadband adoption and utilization, are so important that the Commission should continue to consider video device equipment standards and output port requirements comprehensively. That approach is consistent with the Commission's longstanding

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1 Motorola, Inc. Request for Waiver of 47 C.F.R. § 76.640(b)(4) ("Motorola Petition"); Petition of TiVo Inc. for Clarification or Waiver of 47 C.F.R. § 76.640(b)(4) ("TiVo Petition").

2 *See A National Broadband Plan for Our Future*, Notice of Inquiry, 24 FCC Rcd. 4342 (2009); Public Notice, *Comment Sought on Video Device Innovation, NBP Public Notice #27*, DA 09-2519 (Dec. 3, 2009).

practice of denying waivers where a petitioner cannot show unique circumstances and the issues are better addressed through notice and comment rulemaking.

IEEE-1394 is a low-cost networking solution that is widely deployed in the consumer and personal computer markets. To date more than 1 billion IEEE-1394 ports have been shipped worldwide (with more than 25 million set-top boxes shipped with IEEE-1394 ports). The IEEE-1394 network interface was designed for, and is ideal for, video streaming. IEEE-1394 operates at 400 Mbps (four times faster than present Ethernet speeds), requires much less CPU overhead, makes more efficient use of network bandwidth, and is commercially available at a price of less than $1.00. The low-cost 400 Mbps version of IEEE-1394 supports five or more simultaneous HD-quality video streams on the same network with very low CPU utilization, significantly outperforming the low-cost version of Ethernet.[3] In short, IEEE-1394 is a sophisticated and inexpensive technology.

The IEEE-1394 bus is designed to provide a two-way interface. However, cable multiple system operators ("MSOs"), who write the specifications for set-top boxes, currently use software to only enable content to move in one direction – out of the set-top box. The software on the set-top box disables the capability of the IEEE-1394 port from sending content into the set-top box, which limits how the port interacts with the set-top box. These limitations on the IEEE-1394 port are not due to its capability or that of the set-top box hardware, but rather to the MSO software disabling the inherent capability of the port. This effectively prevents consumer electronics set-top box manufacturers from using the IEEE-1394 interface to provide value-

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[3] Although the newer version of the Ethernet standard (1000 Mbps Ethernet, or Gigabit Ethernet) is faster than the 400 Mbps version of IEEE-1394, Gigabit Ethernet is also more expensive. In addition, newer versions of the IEEE-1394 protocol provide 800 Mbps at commercially available prices of less than $2.50, with next-generation versions that will operate at 1600 and 3200 Mbps.

added services such as hard disk drive-based recording, burning of content onto DVD/Blu-Ray disks, Internet access, or any other technology innovation available in the market. Ethernet and wireless IP ports would not solve this problem and would be subject to the same limits imposed by the MSOs. Instead of granting the waiver requests by Motorola and TiVo and fragmenting the market, the Commission should, for the same reasons it is considering network neutrality, require cable MSOs to provide full bi-directional software support for their set-top boxes via the IEEE-1394 port. That would lead to many new innovative services and a richer consumer experience. Without bi-directional capabilities, any claims by Motorola or TiVo that a waiver will lead to enhanced set-top box functionality ring hollow.

The waiver requests by Motorola and TiVo should also be denied because Motorola and TiVo will obtain an unfair advantage over other manufacturers that have invested in IEEE-1394 in order to satisfy the Commission's rules. It is simply untrue that including IEEE-1394 ports in set-top boxes is not commercially viable and therefore a cost burden on consumers. The marketplace has shown that IEEE-1394 is easily integrated into a wide range of consumer products, from TVs to Blu-Ray recorders to high-definition set-top boxes. Grant of the waiver would unfairly distort the competitive landscape, disadvantaging those consumer electronics manufacturers that have invested to integrate the IEEE-1394 port into their products at low cost in order to comply with FCC requirements while advantaging Motorola and TiVo. In short, there is no hardship for Motorola and TiVo to comply with the Commission's rules and to include an IEEE-1394 bus on set-top boxes supplied to cable operators.

I. IEEE-1394 SET-TOP BOX FUNCTIONALITY BENEFITS CONSUMERS.

IEEE-1394 is robust, powerful, low-cost, and the best network interface for multimedia innovation and Internet broadband access.

A. The IEEE-1394 Port is a Technologically Superior Solution.

IEEE-1394 features many advantages and inherent capabilities:

IEEE-1394 is fast. In today's set-top boxes, IEEE-1394 operates at 400 Mbps. IEEE-1394 ports operating at 800 Mbps and 1600 Mbps are already on the market.

IEEE-1394 is a true peer-to-peer network. IEEE-1394 is a true peer-to-peer network, supporting up to 63 devices. IEEE-1394 permits mixed cable topologies using twisted/shielded pair cable, CAT5 cable, coaxial cable, and/or optical fiber. These devices can be hot-plugged in a daisy chain or star topology without the need for a central processor to manage the functions. Ethernet on the other hand requires a single device acting as a "host" for managing the network which is processor-intensive, inefficient, and costly.

IEEE-1394 has an efficient architecture. IEEE-1394 does not uncompress or change MPEG-compressed data (such as video-over-IP); the port either streams the data between devices in its native MPEG-compressed form or sends it directly to the set-top box, where it is uncompressed by the decoder in the set-top box and passed on via the HDMI interface to the digital television for display. The significance of this architecture is that the need for costly memory buffers and central processing units are minimized for the transmission of content.

IEEE-1394 provides guaranteed quality-of-service. IEEE-1394 can support five (or more) simultaneous high-definition video streams at 400 Mbps, which makes IEEE-1394 ideal for simultaneous display and recording. Because IEEE-1394 was designed from the ground up with true isochronous streaming services and the concept of an "isochronous resource manager" for moving video content, it can provide a guaranteed quality of service not available in an Ethernet system. IEEE-1394 is able to assign speeds to devices based on their capabilities.

Because of its low overhead, IEEE-1394 makes available 87% of bandwidth for use (which is significantly better than Ethernet).

IEEE-1394 protects content. IEEE-1394's DTCP encryption protocol respects the rights of content owners, multichannel video service providers, and broadcasters and has been approved by the Motion Picture Association of America, CableLabs, and the DVD Copy Control Association. IEEE-1394's DTCP encryption is a proven technology that requires very little CPU processing because the technology is embedded in the device.

IEEE-1394 is widely used. By April 2008 more than one billion IEEE-1394 ports had shipped worldwide. IEEE-1394 network interfaces are found in set-top boxes, in personal and notebook computers, in DVD recorders, in camcorders, and in many other consumer and computer devices.

IEEE-1394 is upgradeable. IEEE-1394 is software upgradeable, so that deployed units can be updated in the future with new services and features.

B. The IEEE-1394 Port is Inexpensive.

Motorola and TiVo argue that selling their respective set-top boxes to cable operators with an IEEE-1394 port will be too expensive. But this ignores the declining cost of IEEE-1394 that has resulted from the Commission's requirement that cable operators provide HDMI/DVI and IEEE-1394. Some customers of Texas Instruments add IEEE-1394 capabilities to their HD set-top boxes for less than $1.00 per set-top box. In other implementations, additional capabilities and encryption have been offloaded from the CPU/SOC chipsets into the IEEE-1394 interface at a cost of less than $3.00 per set-top box – while enabling the set-top box CPU/SOC chip to use slower, cheaper CPU subsystems because of the offloaded functionality. The cost of IEEE-1394 continues to decline because of competition and innovation resulting from the

Commission's HDMI/DVI and IEEE-1394 requirements. Grant of a waiver to Motorola and TiVo is likely to fragment the market and reduce innovation and competition, ultimately harming the consumer and increasing costs.

In addition, the cost to the consumer is not solely in the set-top box, but also in the peripheral devices which connect to the set-top box. IEEE-1394's true peer-to-peer network capability enables smaller, cheaper CPU/processor devices when moving data between devices. Indeed, IEEE-1394 can totally eliminate the need for a CPU/processor in some peripheral devices in certain implementations. For Ethernet, both the set-top box and the peripheral device require expensive CPU/processor devices. Also, IEEE-1394 topology enables a daisy-chaining architecture, which allows multiple peripheral devices to connect into the network by simply connecting Device A to Device B, Device B to Device C, Device C to Device D, and so on. Ethernet topology uses a separate router/splitter to connect multiple devices. In the case of three or more devices connected into the topology, a separate Ethernet router/splitter would need to be added, or integrated into the set-top box, adding cost and complexity to the Ethernet network solution. In short, IEEE-1394 is a low-cost networking solution.

II. THE COMMISSION SHOULD CONTINUE TO COMPREHENSIVELY EVALUATE VIDEO DEVICE INNOVATION.

The Commission is examining video device innovation through its Notice of Inquiry on the National Broadband Plan. As part of that proceeding, the Commission has begun reviewing what technologies are used in, and what standards are appropriate for, set-top boxes. Motorola and TiVo are asking the Commission to prejudge and preempt that proceeding by granting waiver requests that are permanent and sweepingly broad – for Motorola to be excused from including an IEEE-1394 port for every set-top box it sells to cable operators that includes any kind of interface that supports IP, and for TiVo to be excused from including an IEEE-1394 port

for every set-top box it sells to cable operators that it also sells at retail. In other words, a waiver for every Motorola and TiVo set-box sold to cable operators. These waiver requests, if granted, would eviscerate the Commission's network output requirements just as the Commission's examination of set-top box technology and possibilities is hitting its stride.[4]

The waiver requests by Motorola and TiVo, as with the very similar waiver request made previously by Intel Corporation ("Intel"), are better addressed through notice-and-comment rulemaking than through the waiver process. The Commission has repeatedly observed that in the absence of unique circumstances, a waiver request is an inappropriate means of changing or rescinding a regulation duly adopted through notice and comment rulemaking.[5] Texas Instruments argued that Intel's waiver request failed to demonstrate unique circumstances; the waiver requests by Motorola and TiVo serve to highlight just how much all three of these waiver requests lack any unique circumstances.[6] The Commission should continue to examine video device innovation as part of the National Broadband Plan proceeding and any notice and

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[4] The Commission has declined to grant some rule waivers where the subject matter of the rule was under examination in an ongoing proceeding. *See, e.g., New ICO Satellite Services G.P.*, Order and Authorization, 24 FCC Rcd. 171, 183 (Int'l Bur. 2009).

[5] *See, e.g., Threshold Fair Distribution Analysis of 26 Groups of Mutually Exclusive Applications for Permits to Construct New or Modified Noncommercial Educational FM Stations Filed in October 2007 Window*, Memorandum Opinion & Order, 23 FCC Rcd. 17983, 17986-17987 (Media Bur. 2008) (denying waiver request where applicant failed to show unique circumstances and concluding that the "proposal would be better considered in the context of notice and comment rulemaking procedures"); *Rechannelization of the 17.7-19.7 GHz Frequency Band for Fixed Microwave Services under Part 101 of the Commission's Rules*, Notice of Proposed Rulemaking, 19 FCC Rcd. 7260, 7267 (2004) (denying waiver request where applicant failed to show unique circumstances and observing that the "proper mechanism" for a rule change "is through a notice and comment rulemaking proceeding and not through a decision to grant a blanket waiver"); *Schlumberger Technology Corp.*, Order, 14 FCC Rcd. 2988, 2990 (Wireless Bur. 1999) (concluding that "accommodation of . . . industry trends regarding use and needs . . is a matter more appropriately handled in the context of a rule making proceeding rather than by a waiver").

[6] *See* Texas Instruments Opposition to Intel's Waiver Request, CSR-8229-Z, filed Dec. 10, 2009.

comment rulemakings that arise from the NBP proceeding. The Commission should not preempt decisions about broadband development and deployment by granting these waiver requests.

III. GRANT OF THE WAIVERS WILL NOT RESULT IN ENHANCED SET-TOP BOX FUNCTIONALITY.

There is not going to be any real innovation or enhanced set-top box functionality unless and until the cable multiple system operators ("MSOs") enable bi-directional functionality. Today the IEEE-1394 bus, designed to provide a two-way interface, is in millions of homes. Yet cable MSOs currently use software to only enable content to move in one direction – out of the set-top box. The software on the set-top box disables the capability of the IEEE-1394 port, which prevents the consumer from controlling or sending content into the set-top box. These limitations on the IEEE-1394 port are not due to its capability or that of the set-top box hardware, but rather to the MSO software disabling the inherent capability of the port. This effectively prevents anyone other than the cable MSOs from providing value-added services.

The best thing for consumers would be an open set-top box platform. The intent of the FCC has been to standardize interfaces around HDMI/DVI and IEEE-1394, to allow networking with customer premises equipment purchased at retail so that viewers could control their viewing experience. Today, the hardware capability is in place in set-top boxes in millions of American homes with software upgradable IEEE-1394 ports. But until that bi-directional functionality is enabled, there cannot be real set-top box innovation. Granting waivers to Motorola and TiVo will result in less functionality, not more.

IV. THE WAIVER REQUESTS FAIL TO MEET THE HIGH THRESHOLD FOR GRANT OF A WAIVER.

The waiver requests made by Motorola and TiVo fail to meet the high burden required to obtain a waiver of the IEEE-1394 output standard set forth in Section 76.640(b)(4) of the Commission's rules.[7]

Motorola seeks a waiver pursuant to Section 629(c) of the Communications Act. As an initial matter, there is some question about the applicability of Section 629(c) of the Communications Act to Motorola's request for a waiver of Section 76.640(b)(4) of the Commission's rules. Section 629(c) addresses the standard for granting a waiver to allow a "new or improved multichannel video programming or other service." Motorola does not and cannot assert that omitting a network port somehow results in a new service (because a port is a product) and does not and cannot assert that the ports it promises to include on its set-top boxes are something new or improved. But even if Section 629(c) was applicable, Motorola cannot clear the statutory hurdle imposed by Section 629(c) with respect to obtaining a waiver of Section 76.640(b)(4). In order to grant a waiver, the Commission must find that a "waiver is *necessary* to assist the development or introduction of a new or improved multichannel video programming or other service offered over multichannel video programming systems, technology, or products."[8]

Motorola's waiver request does not meet the "necessary" standard. The market has been providing low-cost solutions to meet the Commission's IEEE-1394 requirements. The IEEE-1394 solution is technically superior, provides more bandwidth for HD channels, provides lower CPU utilization, and achieves this at the same, or lower, cost as would be possible with Ethernet,

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[7] 47 C.F.R. § 76.640(b)(4).

[8] 47 U.S.C. § 549(c) (emphasis added).

wireless IP, or any other port. It is clearly not *necessary* for Motorola's waiver to be granted in order for there to be development or introduction of new or improved multichannel video programming or other services. Indeed, Motorola does not even attempt to explain what new services might result from not including the IEEE-1394 port on its set-top boxes.

TiVo, perhaps aware that Section 629(c) may be inapplicable to its waiver request, or perhaps cognizant that its request does not meet the "necessary" standard of Section 629(c), argues that its request fits within the traditional requirements for the Commission to waive its rules and regulations. But TiVo does not clear the "high hurdle" facing waiver applicants. TiVo has not shown any hardship or any special circumstances that justify a waiver.[9] Rather, TiVo has simply stated that it would be cheaper to build a set-top box without an IEEE-1394 port.

Conclusion

For the foregoing reasons, the respective requests by Motorola and TiVo for a waiver of Section 76.640(b)(4) of the Commission's rules should be denied.

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[9] *See Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153, 1158 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972).