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

In the Matter of:	)	
	)	
Digital Output Protection Technology and Recording Method Certifications	)	
	)	
MagicGate Type-R for Secure Video Recording for Hi-MD Hardware	)	MB Docket No. 04-55
	)	
MagicGate Type-R for Secure Video Recording for Memory Stick PRO Software	)	MB Docket No. 04-56
	)	
MagicGate Type-R for Secure Video Recording for Hi-MD Software	)	MB Docket No. 04-57
	)	
MagicGate Type-R for Secure Video Recording for Memory Stick PRO Hardware	)	MB Docket No. 04-58
	)	
SmartRight	)	MB Docket No. 04-59
	)	
Vidi Recordable DVD Protection System	)	MB Docket No. 04-60
	)	
High Bandwidth Digital Content Protection	)	MB Docket No. 04-61
	)	
Content Protection Recordable Media for Video Content	)	MB Docket No. 04-62
	)	
TiVoGuard Digital Output Protection Technology	)	MB Docket No. 04-63
	)	
Digital Transmission Content Protection	)	MB Docket No. 04-64
	)	
Helix DRM Trusted Recorder	)	MB Docket No. 04-65
	)	
Windows Media Digital Rights Management Technology	)	MB Docket No. 04-66
	)	
D-VHS	)	MB Docket No. 04-68
	)	

ORDER

Adopted: August 4, 2004 **Released: August 12, 2004**

By the Commission: Commissioner Martin approving in part, concurring in part and issuing a statement.

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I. INTRODUCTION

1. As a part of its efforts to further the digital television ("DTV") transition, on November 4, 2003, the Commission issued a *Report and Order and Further Notice of Proposed Rulemaking* adopting a redistribution control content protection system to protect against the mass indiscriminate

redistribution of digital broadcast television ("*Broadcast Flag Order*").[1] In conjunction with this system, the Commission set forth in Section 73.9008 of its rules an interim process by which digital output protection technologies and recording methods could be authorized for use in Covered Demodulator Products required to respond and give effect to the Redistribution Control Descriptor set forth in ATSC Standard A/65B (the "ATSC flag" or "flag").[2] Proponents of specific digital output protection technologies and recording methods can certify to the Commission under this interim process that their technology is appropriate for use with Unscreened Content and Marked Content to give effect to the flag.[3]

2. The above-captioned thirteen certifications were received in response to a January 23, 2004, public notice issued by the Commission opening an initial certification window.[4] Each certifying entity submits that its technology is appropriate for use in DTV reception equipment to give effect to the flag.[5] In response, various parties filed responses and oppositions with respect to the certifications during the requisite comment and opposition window.[6] Each certifying entity subsequently filed a reply.

3. Section 73.9008(d) of the Commission's rules sets forth the relevant criteria that the Commission may consider, where applicable, in evaluating the appropriateness of digital output

[1] *Digital Broadcast Content Protection*, 18 FCC Rcd 23550 (2003).

[2] *Broadcast Flag Order*, 18 FCC Rcd at 23574-76; 47 C.F.R. § 73.9008. *See* ATSC A/65B, Program and System Information Protocol for Terrestrial Broadcast and Cable (ATSC 2003). Covered Demodulator Product is defined in Section 73.9000(f) of the Commission's rules and, for the purposes of this *Order*, includes Peripheral TSP Products, as defined in Section 73.9000(j) of the Commission's rules. 47 C.F.R. §§ 73.9000(f), (j). Section 73.9000(g) defines a demodulator as a component, or set of components, that is designed to perform the function of 8-VSB, 16-VSB, 64-QAM or 256-QAM demodulation and thereby produce a data stream for the purpose of digital television reception. *Id.* § 73.9000(g).

[3] *Broadcast Flag Order*, 18 FCC Rcd at 23575; 47 C.F.R. § 73.9008. Unscreened Content is specifically defined in Section 73.9000(q) of the Commission's rules, but in simple terms means digital broadcast television content that has not been screened for the flag. 47 C.F.R. § 73.9000(q). Likewise, Marked Content is defined in Section 73.9000(l) of the Commission's rules and refers to digital broadcast television content that is marked with the flag. *Id.* § 73.9000(l).

[4] *See Initial Certification Window*, DA No. 04-145 (rel. Jan. 23, 2004).

[5] *See* Certification for MagicGate Type-R for Secure Video Recording for Hi-MD Hardware as an Authorized Recording Technology ("MagicGate Hi-MD Hardware Certification"); Certification for MagicGate Type-R for Secure Video Recording for Memory Stick Pro Software as an Authorized Recording Technology ("MagicGate Memory Stick Pro Software Certification"); Certification for MagicGate Type-R for Secure Video Recording for Hi-MD Software as an Authorized Recording Technology ("MagicGate Hi-MD Software Certification"); Certification for MagicGate Type-R for Secure Video Recording for Memory Stick Pro Hardware as an Authorized Recording Technology ("MagicGate Memory Stick Pro Hardware Certification"); SmartRight Certification for FCC Approval for Use With the Broadcast Flag ("SmartRight Certification"); Vidi Recordable DVD Protection System Broadcast Flag Certification ("Vidi Certification"); Certification of Digital Content Protection, LLC for Approval of its High Bandwidth Digital Content Protection as an Approved Digital Output Protection Technology ("HDCP Certification"); Certification of 4C Entity, LLC for Approval of its Content Protection Recordable Media for Video Content as an Approved Digital Content Protection Recording Method ("CPRM Certification"); Broadcast Flag Certification of TiVo Inc. ("TiVoGuard Certification"); Certification of Digital Transmission Licensing Administrator LLC for Approval of DTCP as an Authorized Output Protection Technology ("DTCP Certification"); Broadcast Flag Certification Response to the Federal Communications Commission of RealNetworks, Inc. ("Helix Certification"); Certification of Windows Media Digital Rights Management Technology for Use with Broadcast Flag ("WMDRM Certification"); Certification of Victor Company of Japan, Limited for Approval of its "D-VHS" Format as a Digital Content Protection Technology and Recording Method to be Used in Covered Demodulator Products ("D-VHS Certification").

[6] *See Certifications for Digital Output Protection Technologies and Recording Methods to be Used in Covered Demodulator Products*, DA No. 04-715 (rel. Mar. 17, 2004).

protection technologies and recording methods under this interim process.[7] These criteria include:

(1) Technological factors including but not limited to the level of security, scope of redistribution, authentication, upgradability, renewability, interoperability, and the ability of the digital output protection technology to revoke compromised devices;

(2) The applicable licensing terms, including compliance and robustness rules, change provisions, approval procedures for downstream transmission and recording methods, and the relevant license fees;

(3) The extent to which the digital output protection technology or recording method accommodates consumers' use and enjoyment of unencrypted digital terrestrial broadcast content; and

(4) Any other relevant factors the Commission determines warrant consideration.[8]

4. Based upon the records in the above-captioned proceedings, we conclude that all thirteen digital output protection technologies and recording methods satisfactorily fulfill these evaluative criteria, subject to the conditions described herein. We believe each technology will provide content owners with reasonable assurance that digital broadcast television content will not be indiscriminately redistributed while protecting consumers' use and enjoyment of broadcast video programming and facilitating innovative consumer uses.[9] This, in turn, will ensure the continued availability of high value digital television content to consumers through broadcast outlets.[10] We reiterate that our goal of preventing the indiscriminate redistribution of digital broadcast television content "will not (1) interfere with or preclude consumers from copying broadcast programming and using or redistributing it within the home or similar personal environment as consistent with copyright law, or (2) foreclose use of the Internet to send digital broadcast content where it can be adequately protected from indiscriminate redistribution."[11] Below we provide an overview of each proposed technology, and then consider in a consolidated fashion various issues implicated in multiple certifications.

II. OVERVIEW OF THE CONTENT PROTECTION TECHNOLOGIES AND RECORDING METHODS

A. OUTPUT PROTECTION TECHNOLOGIES

1. Digital Transmission Content Protection

5. Digital Transmission Content Protection ("DTCP") is a digital output protection technology that employs a cryptographic protocol to protect various types of "audio/video entertainment content from unauthorized copying, interception and tampering as it traverses high performance digital

[7] 47 C.F.R. § 73.9008(d).

[8] *Id.* § 73.9008(d). In this context, unencrypted digital terrestrial broadcast content is defined as "audiovisual content contained in the signal broadcast by a digital television station without encrypting or otherwise making the content available through a technical means of conditional access, and includes such content when retransmitted in unencrypted digital form." *Id.* § 73.9000(p).

[9] *Broadcast Flag Order,* 18 FCC Rcd at 23552.

[10] *Id.* at 23554-55.

[11] *Id.* at 23555.

interfaces."[12] The DTCP specification was jointly created by Hitachi, Ltd., Intel Corporation, Matsushita Electrical Industrial, Co., Ltd., Sony Corporation, and Toshiba Corporation (the "5C Companies") but is licensed directly from the Digital Transmission Licensing Administrator, LLC ("DTLA").[13] Although DTCP was originally designed to transport compressed video over IEEE 1394, it has since been mapped[14] to other physical connectors such as USB, Op-iLink, and MOST, as well as to Internet Protocol ("IP") for use with wired and wireless transports, including Ethernet and 802.11.[15]

6. DTLA asserts that the availability of DTCP over many protocols and platforms promotes flexibility, convenience and consumer choice, and emphasizes that DTCP is already incorporated into numerous DTV products.[16] DTLA further avers that DTCP is an authorized digital output protection technology under the Dynamic Feedback Arrangement Scrambling Technique ("DFAST") and POD-Host Interface License agreements ("PHILA"), which are administered by representatives of the cable television industry.[17] DTCP has also been approved for the protection of movie content on DVDs by the DVD Copy Control Association ("DVD CCA") and authorized as an approved transport protection method for use with Content Protection Recordable Media ("CPRM"), Content Protection for Prerecorded Media ("CPPM") and D-VHS.[18] DTLA indicates that it has signed 85 agreements with adopters, resellers and content participants and that Motion Picture Association of America, Inc. ("MPAA") member companies have expressed support for the use of DTCP in a broadcast flag regime.[19]

7. DTCP uses authentication, key exchange techniques, and content encryption as part of its protection system.[20] Under this system, a connected device must first verify through the exchange of keys that another connected device is "authentic," meaning also DTCP-compliant, before sharing protected information.[21] Content can receive varying levels of protection in the DTCP regime, which is communicated through the use of Copy Control Information ("CCI") embedded in the content stream.[22] DTLA explains that Marked Content will be encoded as "encryption plus nonassertion" ("EPN"), which triggers encryption as the content is transported, but permits unlimited copying in protected forms.[23] Unmarked digital terrestrial broadcast transmissions will be able to be both copied and redistributed freely

[12] DTCP Certification at 1.

[13] *Id.* at 1-2.

[14] Mapping refers to the process by which the parameters of a content protection technology are defined for use in connection with a specific transport or media.

[15] DTCP Certification at 3. DTLA also recently completed work on mapping DTCP to Bluetooth. *Id.*; *see* Letter from Seth Greenstein, McDermott, Will and Emory, to Marlene Dortch, FCC at Attachment (June 24, 2004) ("*DTLA 6/24/04 Ex Parte*").

[16] DTCP Certification at 13-14, 25-26.

[17] *Id.* at 13.

[18] *Id.* at 15.

[19] DTLA Reply at 42; DTCP Certification at 14.

[20] When it encrypts content, DTCP uses 56 bit M6 encryption in connection with physical transports and 128 bit AES encryption over IP. DTCP Certification at 5-6.

[21] *Id.* at 3-5. Authentication can be performed at a full or restricted level, depending on the type of content and devices involved. *Id.* at 4.

[22] *Id.* at 6-8. An Encryption Mode Indicator ("EMI") is a more readily-accessible indicator of CCI that is used to convey the appropriate encryption mode to sink devices. *Id.* at 7-8.

[23] *Id.* at 6-7.

without triggering authentication or encryption.[24]

8. The scope of redistribution for EPN-encoded content is limited as a result of the encryption of the content. A single content source can distribute the same protected content to 34 DTCP-compliant devices.[25] As a further restriction, DTLA states that it will not approve for use with DTCP any downstream output or recording technology that enables unauthorized redistribution outside home and personal networks.[26] The inherent length limitations of IEEE 1394 and USB serve this goal in the case of physical connectors.[27] With respect to network-based technologies using IP, DTLA commits to the localization of content through a limit of 3 on the Time to Live ("TTL") field in IP packets, which represents the number of routers through which an IP packet can pass before it is discarded.[28] Pursuant to its recently-completed localization work plan for DTCP over IP, DTLA has additionally committed to a limit of 7 milliseconds or less on Round Trip Time ("RTT"), which represents the amount of time that an IP packet and associated responses can travel between devices.[29] DTLA also affirms that it will use Wired Equivalency Privacy ("WEP") or Wi-Fi Protected Access ("WPA") encryption for the exchange of data over wireless IP transports.[30] Other localization mechanisms are being explored pursuant to a two-phase work plan.[31]

9. DTLA certifies that DTCP offers a high level of protection "designed to be effective to thwart or frustrate attempts to send DTCP-protected content to noncompliant devices, and to limit distribution of such protected content to DTCP-compliant devices within the home and personal network."[32] To ensure the integrity of its system, DTCP utilizes System Renewability Messages ("SRMs") as the basis for revocation where a device is no longer authorized to receive content.[33] SRMs, which contain a list of revoked device certificates, are generated by DTLA and delivered through content and new devices.[34] Upon receipt of an SRM identifying a particular device as revoked, that device is rendered unable to exchange content with other devices via DTCP.[35] Since it believes revocation is a

[24] *Id.* at 6.

[25] *Id.* at 10.

[26] *Id.*

[27] *Id.* Likewise, MOST is used to interconnect audiovisual devices in automobiles or a "similarly contained mobile environment," thereby restricting the scope of redistribution. *Id.*

[28] *Id.* at 10-11.

[29] Letter from Brad Hunt, MPAA, and Seth Greenstein, McDermott, Will & Emery, to Kenneth Ferree, FCC at 2 (July 20, 2004) ("*DTLA 7/20/04 Ex Parte*"); Letter from Seth Greenstein, McDermott, Will & Emery, to Marlene Dortch, FCC (July 22, 2004) ("*DTLA 7/22/04 Ex Parte*").

[30] DTCP Certification at 10-11.

[31] *Id.* at 11; DTLA Reply at 3; Letter from Seth Greenstein, McDermott, Will & Emery, to Marlene Dortch, FCC at Attachment (June 1, 2004) ("*DTLA 6/1/04 Ex Parte*"); *DTLA 7/20/04 Ex Parte* at 1-2 (noting that although its localization work plan is complete with respect to DTCP-IP, "[w]ork ... continues as to the localization of additional protocols to which DTCP has been mapped, including IEEE 1394 and 1394-similar transports, USB, Bluetooth and MOST")..

[32] DTCP Certification at 11.

[33] *Id.* at 8-9. Revocation involves the process of disabling a key so that it can be no longer used for decryption. Depending on the system architecture of a particular technology, revocation can therefore be applied to specific applications or content, individual devices, or a class of devices. This process is distinguished from renewal, which we interpret as the ability of a content protection technology to change its cryptography without hardware or software upgrades.

[34] *Id.*

[35] *Id.*

drastic measure, DTLA has identified a limited number of circumstances in which it may be invoked.[36]

10. Licensing of DTCP is accomplished through two primary documents – an adopter agreement and a content participant agreement.[37] The DTCP adopter agreement grants manufacturers a license for any intellectual property rights that are "necessary" to implement the DTCP specification, and requires in return that adopters agree not to assert any patent claims that they might possess that fall within the same "necessary claims" scope.[38] DTLA suggests that this necessary claims and reciprocal non-assert approach to intellectual property licensing is commonly used in licenses for digital video content protection technologies.[39]

11. The DTCP adopter agreement also sets forth the compliance and robustness rules governing source and sink function devices; DTLA characterizes these rules as mirroring those in the DFAST license.[40] Change management is provided for with respect to the compliance rules and the DTCP technical specification.[41] DTLA describes its change management rights as limited to non-material changes.[42] Under this process, content participants receive advance notice and the right to object to certain proposed amendments to the DTCP specification, adopter and content participants agreements.[43] Adopters who participate in a Content Protection Implementers Forum receive advance notice and have the opportunity to comment on proposed changes to the compliance rules.[44] Content participants also possess third party beneficiary rights to enforce equitable and injunctive relief against adopters who violate the DTCP adopter agreement's compliance and robustness rules.[45]

12. DTLA submits that DTCP was designed to coexist and be compatible with existing and

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[36] Revocation may only be imposed where: (a) a Device Key and corresponding Device Certificate have been cloned such that the same key and certificate are found in more than one device or product; (b) a Device Key and/or Device Certificate have been lost, stolen, intercepted, misdirected or made public or disclosed; or (c) revocation is required by court order or other government authority. *Id.* at 9, n.1; *see also id.* at Appendix 2 at § 4.2 ("*DTCP Adopter Agreement*").

[37] *See DTCP Adopter Agreement*; *see also* DTCP Certification at Appendix 3 ("*DTCP Content Participant Agreement*").

[38] DTCP Certification at 16; *DTCP Adopter Agreement* at §§ 5.3-5.4. DTLA has indicated that it will not enforce its intellectual property rights in DTCP against content owners that use or require use of DTCP without signing the *DTCP Content Participant Agreement*, so long as the content owner follows the applicable encoding rules. DTCP Certification at 12, Appendix 4.

[39] DTCP Certification at 16.

[40] *Id.* at 19.

[41] *Id.* at 20-22; *DTCP Adopter Agreement* at § 3.3.

[42] Although DTLA indicates that material changes to the DTCP specification are not allowed, it reserves the right to make limited changes to enable DTCP to be used over additional interfaces, to correct omissions or errors, or to make changes that would clarify, but not materially amend, alter or expand the specification. DTCP Certification at 20; *DTCP Adopter Agreement* at § 3.3.1. Any mandatory changes to the DTCP specification must be implemented within 18 months after adoption by DTLA. DTCP Certification at 21; *DTCP Adopter Agreement* at § 3.3. Under the terms of the *DTCP Adopter Agreement*, DTLA cannot make any changes to the compliance rules that would materially increase the cost or complexity of implementation of products "except as DTLA, in consultation with [content] owners ... may conclude is necessary to ensure and maintain content protection." *DTCP Adopter Agreement* at § 3.3.3. Changes to the compliance rules become effective within 12 months of adoption by DTLA. DTCP Certification at 21; *DTCP Adopter Agreement* at § 3.3.

[43] *DTCP Content Participant Agreement* at § 3.7.

[44] DTCP Certification at 21; *DTCP Adopter Agreement* at § 3.4.

[45] DTCP Certification at 12; *DTCP Content Participant Agreement* at §§ 3.4, 11.2, Ex. A.

future content protection technologies.[46] Notwithstanding this fact, DTLA considers it essential that DTCP only pass protected content to downstream technologies that provide protection at least as effective as DTCP.[47] In evaluating downstream output protection technologies and recording methods, DTLA considers a number of criteria, including the applicable compliance and robustness rules, enforcement provisions, and content owner and adopter support.[48] Any resulting decision to approve a technology is subject to change management review by content participants.[49] DTLA represents that it has not refused a request for approval from any technology proponent and has to date approved High Bandwidth Digital Content Protection ("HDCP"), D-VHS and CPRM.[50]

13. DTLA asserts that the DTCP adopter and content participant agreements have always been freely offered on a nondiscriminatory basis to any potential signatory.[51] Both content participants and adopters pay annual administration fees, with an additional per certificate fee for adopters.[52] DTLA provides that these fees were established on a cost-recovery basis and have not increased since 1999 for adopters and 2001 for content participants.[53]

2. High Bandwidth Digital Content Protection

14. HDCP is a digital output protection technology designed by Intel Corporation to protect uncompressed digital video content from a consumer source device to a consumer display device.[54] HDCP is licensed by Digital Content Protection, LLC ("DCP") for use with the Digital Visual Interface ("DVI") and the High Definition Multimedia Interface ("HDMI").[55] DCP indicates that HDCP enjoys support from all MPAA members and has been approved by the DVD CCA and under the DFAST, DTCP, CPRM, and D-VHS licenses.[56] To date, 85 product manufacturers have signed an HDCP license and compliant products are currently available in the marketplace.[57] Although HDCP does not permit content to be copied, DCP suggests that this will not inhibit consumer use and enjoyment of digital broadcast television content since HDCP is used at points in the consumer environment where they are viewing and hearing content rather than enabling a networked application or making a copy of content.[58]

15. HDCP uses explicit authentication between source and display devices, in combination

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[46] DTCP Certification at 2.

[47] *Id.* at 22-23.

[48] *Id.* at 22, Appendix 5.

[49] *Id.* at 23; *DTCP Content Participant Agreement* at § 3.7.

[50] DTCP Certification at 23. An approval request filed by Philips Electronics North America Corporation ("Philips") and Hewlett-Packard Company ("Hewlett-Packard") for their Vidi Recordable DVD Protection System ("Vidi") is currently under consideration by DTLA. DTLA Reply at 48, n.66.

[51] DTCP Certification at 18.

[52] *Id.* at 24. Content participants pay an annual administration fee of $18,000, while adopters' administration fees range from $10,000 to $18,000 per year. *Id.* Per certificate fees range from $ 0.05 to $0.07. *Id.*

[53] *Id.* at 24-25.

[54] HDCP Certification at 3.

[55] *Id.*

[56] *Id.* at 8-9.

[57] *Id.* at 9.

[58] *Id.* at 10.

with content encryption, to prevent the unauthorized interception of content.[59] Since HDCP was designed to be the "last link" in the consumer chain in which other technologies permit authorized copying or management of content in networked environments, HDCP was not designed to accommodate different CCI states and instead contains a uniform prohibition on copies.[60] Display devices may not output decrypted content in any form, unless the display device is serving as a repeater to another display device and the content is output digitally and re-encrypted with HDCP.[61] As a practical matter, these restrictions effectively truncate the scope of redistribution for content protected with HDCP and prevent its interoperability with downstream content protection technologies. Revocation is accomplished in the HDCP universe much the same as it is with DTCP – in a narrow set of prescribed circumstances and through the transmission of revocation lists in SRMs, which are delivered in media and transmitted content.[62]

16. The HDCP licensing regime is comprised of four types of agreements, including an adopter and a content participant license.[63] Manufacturers that execute the HDCP adopter agreement receive a "a nonexclusive worldwide license to Intel-owned necessary claims and to Intel and DCP owned trade secrets and copyrights with respect to HDCP and the HDCP specification."[64] As a companion to its necessary claims approach to intellectual property licensing, the HDCP adopter agreement contains a reciprocal non-assert similar to that in the DTCP adopter agreement.[65]

17. DCP describes the HDCP compliance rules as simple, given the technology's limited purpose, but recognizes that the robustness rules follow the detailed ones employed by DTCP, CPRM and DFAST.[66] DCP explains that it can make changes to the HDCP specification, compliance and robustness rules, and procedural appendix, but only where changes that implicate product design do not interfere with the backward compatibility of HDCP or do not materially increase the cost or complexity of implementation of the HDCP specification.[67] Pursuant to these change management procedures, content

[59] Each device contains an array of 40 secret device keys, each 56-bit in length, which are used for authentication. *Id.* at 7. A 84-bit block cipher is used to encrypt data. *Id.* at 4.

[60] *Id.* at 3, 5; Letter from Bruce Turnbull, Weil, Gotshall & Manges, to Marlene Dortch, FCC at 1-3 (June 25, 2004) ("*DCP 6/25/04 Ex Parte*").

[61] HDCP Certification at 3, Appendix 2 at Exhibit C, § 5.3 ("*HDCP Adopter Agreement*").

[62] HDCP Certification at 8. The legal standard for revocation also mirrors DTCP in that it may only be imposed where: (a) a Device Key Set associated with a Key Selection Vector have been cloned and found in more than one device; (b) a Device Key Set associated with a Key Selection Vector have been lost, stolen, intercepted, misdirected or made public or disclosed; or (c) revocation is required by court order or other government authority. *Id.*; *see also HDCP Adopter Agreement* at § 7.2.

[63] HDCP Certification at 12. The other agreements cover component manufacturers and resellers. *Id.* Since many of the relevant provisions of the component manufacturer and reseller agreements are largely duplicated in the adopter agreement, we focus our description of the HDCP licensing regime on its adopter and content participant agreements.

[64] *Id.*; *HDCP Adopter Agreement* at § 2.1.

[65] HDCP Certification at 13; *HDCP Adopter Agreement* at § 2.2. A similar reciprocal non-assert is contained in the HDCP content participant agreement. *See* HDCP Certification at 13, Appendix 5 at § 2.2 ("*HDCP Content Participant Agreement*").

[66] HDCP Certification at 5; *HDCP Adopter Agreement* at Ex. C, D. The HDCP compliance rules prohibit HDCP from being used to copy and/or redistribute content, except in limited cases to another digital display over a repeater. HDCP Certification at 5.

[67] HDCP Certification at 14; *HDCP Adopter Agreement* at § 5.1. All changes require advance notice, with 12 to 18 months before effectiveness for changes implicating product design. HDCP Certification at 14; *HDCP Adopter Agreement* at § 5.2; *HDCP Content Participant Agreement* at § 3.6(b).

participants have the right to review and object to any changes that are material and adverse to the integrity or security of HDCP, the operation of HDCP with respect to the protection of content from unauthorized output, transmission, interception or copying, or content participant rights under the HDCP content participant agreement.[68] Content participants also gain third party beneficiary rights to seek injunctive relief against implementations that materially fail to satisfy any HDCP adopter agreement requirements, as well as rights to initiate and participate in the revocation process.[69]

18. DCP does not articulate the basis on which its license is offered to potential signatories, but details the applicable license fees, including annual administrative fees for adopters and content participants, as well as unit fees to cover the costs of generating and delivering keys.[70] DCP submits that these fees do not reflect full market rates, but are aimed at cost recovery.[71]

3. TiVoGuard Digital Output Protection Technology

19. TiVo Inc. ("TiVo") has certified its TiVoGuard digital output protection technology ("TiVoGuard") as a component in its end-to-end security system that allows content to be transferred among a limited number of TiVo devices registered with a TiVo customer account, also known as a "secure viewing group."[72] TiVo states that it does not offer TiVoGuard as a free-standing digital output protection or recording technology, and has no intention to do so in the future.[73] In place of publicly licensing TiVoGuard, TiVo contractually obligates equipment manufacturers that produce TiVo digital video recorders ("DVRs"), and other devices for which TiVo specifies the hardware and software, to utilize TiVoGuard as a part of its security specifications.[74] TiVo indicates that these equipment manufacturers may, at their discretion, also include in their final product other digital output protection technologies that have been approved by the Commission.[75] MPAA, on behalf of its content owner members, does not support TiVo's certification.[76]

20. TiVo explains that TiVoGuard limits the redistribution of protected content to a secure viewing group of devices that belong to the same owner and that are associated with the same TiVo

[68] HDCP Certification at 14; *HDCP Content Participant Agreement* at §§ 3.5-3.6(b).

[69] HDCP Certification at 12; *HDCP Content Participant Agreement* at § 3, Ex. B; *HDCP Adopter Agreement* at § 11.6, Ex. A, § 2.

[70] DCP questions the Commission's ability to review the license terms applicable to content protection technologies and recording methods. HDCP Certification at 10, n.2. Adopters pay an administrative fee of $15,000 per year, with unit fees ranging from $1,000 to $5,000 based on the number of key sets involved. *Id.* at 15; *HDCP Adopter Agreement* at Ex. A, § 1. The applicable administrative fee for content participants is $50,000 per year. HDCP Certification at 15; *HDCP Content Participant Agreement* at Ex. C.

[71] HDCP Certification at 11, 15. The change management provision governing license fees limits adjustments to costs. *Id.* at 14; *HDCP Adopter Agreement* at § 4.2; *HDCP Content Participant Agreement* at § 4.1.

[72] TiVoGuard Certification at 25.

[73] *Id.* at 34.

[74] *Id.* at 32-33. TiVo indicates that it has granted licenses to several manufacturers to create products providing DVR capabilities, including Pioneer Corporation, Toshiba Corporation, Toshiba American Consumer Products, Inc., Sony Electronics, Inc., Humax Corporation, Ltd. and DIRECTV, Inc. *Id.* at 32. TiVo specifies that it has not yet licensed its TiVoToGo technology to any equipment manufacturer. *Id.* TiVo avers that it will contractually require downstream product manufacturers to design and build devices in accordance with the Commission's flag compliance and robustness rules. TiVo Reply at 3-4.

[75] TiVoGuard Certification at 33.

[76] Opposition to the Application of TiVo for Interim Authorization of TiVoGuard by the Motion Picture Association of America, Inc., *et al.* at 3 ("MPAA Opposition to TiVo"). *See infra* ¶¶ 70, 92, 94, 101, 104.

service account, which must in turn be billed to the owner's credit card.[77] Under its current policy, TiVo limits the number of devices comprising a secure viewing group to 10, but makes provision for waivers in exceptional circumstances.[78] A single TiVo device can be in only one secure viewing group and must be registered through a password protected web interface or by calling TiVo customer support.[79] TiVo uses Transmission Control Protocol/Internet Protocol ("TCP/IP") as a communications channel between networked devices to transfer encrypted content.[80]

21. Before transmitting encrypted content to another device, TiVoGuard authenticates the intended recipient device to ensure it is in the same secure viewing group and that it periodically communicates with TiVo's central servers.[81] TiVo asserts that the ability of its devices to regularly communicate with its central servers plays an important role not only in authentication but also in revocation, renewal and upgrade.[82] When a TiVo device contacts the central servers, it receives a "TiVoGuard certificate" which authorizes the device up to a specific expiration date.[83] If a TiVo device does not contact the central server to routinely update its TiVoGuard certificate, the device is automatically revoked and can no longer send content to another device.[84] TiVo indicates that revocation information can also be transmitted to a device or class of devices during their regular communications with the central server to affirmatively revoke their authorizations.[85] In a similar manner, TiVo submits that it can send secure software and data updates from its central servers to upgrade and renew its TiVoGuard technology.[86]

22. Once a recipient TiVo device has been authenticated, TiVoGuard permits content to be transferred to that device in encrypted form.[87] TiVo states that its encryption protocols use unique keys to encrypt small blocks of content to limit the amount of content potentially compromised if a cryptographic attack were successful.[88] Upon receipt by the downstream TiVo device, the content is re-encrypted in a

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[77] TiVoGuard Certification at 25-26; Letter from James Burger, Dow, Lohnes & Albertson, PLLC, to Susan Mort, FCC at Attachment (June 22, 2004) ("*TiVo 6/22/04 Ex Parte*"); Letter from James Burger, Dow, Lohnes & Albertson, PLLC, to Marlene Dortch, FCC at Attachment (July 21, 2004) ("*TiVo 7/21/04 Ex Parte*").

[78] TiVoGuard Certification at 25. TiVo's user agreement expressly limits subscribers to transfer content among 10 DVRs on a single account, but TiVo will consider waiver requests initiated by subscribers up to an absolute cap of one-tenth of one percent of TiVo subscribers. Letter from James Burger, Dow, Lohnes & Albertson, PLLC, to Marlene Dortch, FCC at Attachment (July 28, 2004) ("*TiVo 7/28/04 Ex Parte*"). Written waiver requests must indicate: (1) why a waiver is necessary, (2) where the devices will be located, (3) that the subscriber reaffirms the provisions in the TiVo user agreement requiring the subscriber not to violate copyright laws and pledging to only use copyrighted content for personal, non-commercial purposes. *Id.* TiVo indicates that it will exercise care and consistency in granting waivers. *Id.* Waivers may be granted for up to 20 devices, although the current technical limit is 16. *Id.*; TiVoGuard Certification at 25.

[79] TiVoGuard Certification at 25-26.

[80] *Id.* at 26-27; *TiVo 6/22/04 Ex Parte* at 1.

[81] *TiVo 6/22/04 Ex Parte* at 3. Authentication is accomplished using a 894-bit El Gamal public and private key pair. TiVoGuard Certification at 17.

[82] TiVoGuard Certification at 26.

[83] *Id.*

[84] *Id.* at 26, 32.

[85] *Id.* at 26, 31-32.

[86] *Id.* at 31.

[87] *TiVo 6/22/04 Ex Parte* at 5.

[88] TiVo specifies that it uses a 128-bit Linear-Feedback Shift Register stream cipher to encrypt content in small blocks of between 5 and 15 minutes length. TiVoGuard Certification at 16, 27-30; *TiVo 6/22/04 Ex Parte* at 4-6.

(continued....)

manner that uniquely associates it with that device and prevents it from being accessed in usable form by another product, except by TiVoGuard or another Commission-approved output protection technology.[89]

23. TiVo submits that TiVoGuard is also designed to function with a new implementation known as TiVoToGo, which allows a TiVo customer to transfer recorded content from a TiVo DVR in their secure viewing group to a personal computer equipped with TiVo Media Player software and a hardware plug-in dongle also registered to the customer's account.[90] Since a registered dongle must be physically connected to a computer for a consumer to be able to view transferred content, only one computer at a time can be used in association with a specific dongle.[91] Once a consumer inserts the dongle into a computer and initiates a request to view protected content stored on a DVR registered to their account, the TiVo Media Player software authenticates the request by verifying that the content is protected with TiVoGuard and is authorized to be played in connection with that specific dongle.[92] The protected content is sent through the Internet to the TiVo Media Player which authenticates it and uses the dongle to decrypt it for display on the computer.[93] TiVo asserts that this proprietary combination of hardware and software protects content in accordance with the Commission's rules.[94]

B. RECORDING METHODS

1. Content Protection Recordable Media for Video Content

24. CPRM is an encryption-based recording method that can be used to record standard definition ("SD") and limited resolution digital video content to removable or portable media including DVD-R/-RW, SD Memory Cards, Secure CompactFlash and Microdrive media.[95] CPRM was developed by International Business Machines Corporation, Intel Corporation, Matsushita Electric Industrial Co., Ltd., and Toshiba Corporation (the "4C Companies") and is licensed by 4C Entity, LLC ("4C").[96] 4C states that CPRM has widespread support among MPAA members and the more than 100 product manufacturers that have taken a license to produce compliant devices.[97] In addition, CPRM has been approved by DTLA under the DTCP downstream approval procedures, and authorized by Japan's BS Digital Broadcast Promotion Association as a secure recording method for use with content distributed through Japan's digital satellite and terrestrial television broadcast system.[98] 4C promotes CPRM as

(...continued from previous page)
As a part of this process, a 128-bit Blowfish cipher is used for symmetric data exchange. TiVoGuard Certification at 16, 27-29.

[89] TiVoGuard Certification at 28; *TiVo 6/22/04 Ex Parte* at 5.

[90] TiVo Reply at 18.

[91] *Id.*

[92] *Id.* at Attachment at 4.

[93] *Id.* at Attachment at 4-5.

[94] *Id.* at Attachment at 1. For example, TiVo argues that TiVoToGo complies with 47 C.F.R. § 73.9000(r) in that unencrypted media travels in a direct path from the memory of the TiVo Media Player to the user's display via a protected bus. *Id.*

[95] CPRM Certification at 3. Although CPRM can be used to record both audiovisual and pure audio content, it has only been certified to the Commission for its audiovisual implementation. *Id.* at 3, n.1. As such, references in this *Order* to CPRM only refer to its audiovisual implementation. DVD-R/-RW is an optical disc media format supported by technologies companies such as Pioneer, Toshiba and Apple.

[96] *Id.* at 3.

[97] *Id.* at 11.

[98] *Id.*

beneficial to consumers in that it affords flexibility in the playback of content on any CPRM-compliant player, including computer-based products and more traditional consumer electronics devices.[99]

25. CPRM employs a publicly-scrutinized encryption algorithm to cryptographically bind content to the recordable media.[100] As a result, protected content can only be read on CPRM-compliant devices.[101] Although the binding process prevents serial copies from being made directly from an individual piece of media, CPRM-compliant devices have the ability to respond to and assert DTCP's CCI encoding, including EPN for Marked Content, so as to allow unlimited, multiple secure copies of content to be made.[102] 4C adds that the scope of redistribution is further restricted through a requirement that compliant devices only permit the digital output of content through DTCP or HDCP protected connectors.[103]

26. 4C describes two forms of revocation and upgrade applicable to CPRM-compliant devices.[104] In its standard implementation where each compliant device has its own unique key, revocation can be achieved on a device-by-device basis through the dissemination of a list of revoked device keys in new media.[105] When a device attempts to playback content on media identifying its device key as revoked, it will be unable to decrypt that content.[106] 4C specifies that revocation may only occur in a limited number of circumstances.[107] In implementations of CPRM where a series of devices share the same key, an upgrade system that changes the keys on a regular interval is required.[108]

27. CPRM is licensed through a series of adopter and reseller agreements, in addition to a content participant agreement.[109] The adopter agreement applicable to audiovisual content grants a limited license to use the CPRM technology to protect digital content in accordance with the applicable compliance rules, and takes a necessary claims and reciprocal non-assert approach to the licensing of patent claims.[110] 4C identifies two sets of compliance rules for recorders and players, each of which

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[99] *Id.* at 12.

[100] *Id.* at 5. A 56-bit C2 Block Cipher is used to encrypt content. *Id.*

[101] *Id.* When a consumer seeks to playback encrypted content, a form of implicit authentication occurs between the CPRM-compliant device and the recorded media. *Id.* at 9.

[102] *Id.* at 6-7; *see also* CPRM Certification at Appendix 1 at Ex. C-3a, § 4.2 ("*CPRM Adopter Agreement*").

[103] CPRM Certification at 7-8; *CPRM Adopter Agreement* at Ex. C-3a, § 4.1.1.

[104] CPRM Certification at 9-10.

[105] *Id.* at 10. The list of revoked device keys are contained in the Media Key Block in newly made media. *Id.*

[106] *Id.*

[107] The legal standard for revocation, which echoes those of DTCP and HDCP, is triggered where: (a) a Device Key Set has been cloned and found in more than one device (other than legitimate key sharing between limited numbers of devices and software); (b) a Device Key Set has been lost, stolen, intercepted, misdirected or made public or disclosed; or (c) revocation is required by court order or other government authority. *Id.*; *see also CPRM Adopter Agreement* at § 9.2.

[108] CPRM Certification at 10.

[109] *Id.* at 6, 14, 17. A single adopter agreement covers both audiovisual content and prerecorded audio content, while separate agreements apply to parties that make related components and to manufacturers of SD memory cards for storing content. *Id.* Since many of the relevant provisions of the component manufacturer, media manufacturer and reseller agreements are largely duplicated in the primary adopter agreement, we focus our description of the CPRM licensing regime on its primary adopter and content participant agreements.

[110] *Id.* at 4, 8, 14; *CPRM Adopter Agreement* at § 1.4.1, 2.2-2.4, 2.7; *see also* CPRM Certification at Appendix 3, § 3 ("*CPRM Content Participant Agreement*").

articulates how protected content is to be handled, including limits on digital output of protected content to DTCP or HDCP protected connectors.[111] The corresponding robustness rules prescribe a high level of protection.[112]

28. Under the adopter agreement's change management terms, provision is made for 4C to make non-material changes to the CPRM technical specifications once they are released at version 1.0, and to make changes in the compliance rules that are necessary to protect content.[113] Although adopters that serve on the 4C Advisory Board and content participants can each request changes to the CPRM adopter agreement, its compliance rules, or the technical specifications, only content participants have the right to object to changes that are material and adverse to their interests.[114] Content participants also have third party beneficiary rights to take direct enforcement actions against adopters whose products are materially non-compliant with the CPRM adopter agreement's compliance and robustness rules.[115]

29. 4C indicates that it offers its licenses to potential adopters on reasonable and non-discriminatory terms and stresses that it views the licensing of content protection technologies to be market-enabling.[116] As such, 4C states that its license fees are aimed at actual costs rather than commercial rates.[117] Fee adjustments are limited to any increase in 4C's administrative costs.[118]

2. Vidi Recordable DVD Protection System

30. Vidi Recordable DVD Protection System ("Vidi") also utilizes encryption to record and bind SD video content to compliant DVD+R/+RW media.[119] Vidi has been jointly developed by Philips Electronics North America Corp. ("Philips") and Hewlett-Packard Company ("Hewlett-Packard") and will be directly licensed by Philips.[120] Although Vidi is a new technology that has yet to be deployed in the marketplace, Philips and Hewlett Packard indicate they have the endorsement of industrial partners including Ricoh Company, Ltd., Yamaha Corporation, and Ahead Software AG.[121] Subject to certain caveats raised in its response to the certification filed by Philips and Hewlett-Packard which are addressed

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[111] CPRM Certification at 7; *CPRM Adopter Agreement* at Ex. C-3a, §§ 3.3, 4.

[112] The robustness rules require that the security functions cannot be defeated or circumvented using widely available tools or specialized tools and can only with difficulty be defeated using professional tools. *CPRM Adopter Agreement* at Ex. C-4, § 4.

[113] CPRM Certification at 16; *CPRM Adopter Agreement* at § 3.3. Non-material changes to the compliance rules require 90 days advance notice, while all other changes to the compliance rules or specifications require 18 months notice prior to implementation. *Id.*

[114] CPRM Certification at 17; *CPRM Adopter Agreement* at § 3.2; *CPRM Content Participant Agreement* at § 2.2, 3.7.

[115] CPRM Certification at 17; *CPRM Adopter Agreement* at § 8.5-8.10; *CPRM Content Participant Agreement* at § 2.4, 8.

[116] CPRM Certification at 12-13.

[117] *Id.* at 13, 16-17. Adopters pay annual administrative fees ranging from $6,000 to $12,000 with per unit fees, where applicable, ranging from $ 0.02 to $ 0.14. *Id.*; *see also CPRM Adopter Agreement* at § 4, Ex. B. Content participants pay an undisclosed annual administration fee. *CPRM Content Participant Agreement* at § 4.

[118] CPRM Certification at 17; *CPRM Adopter Agreement* at § 4.1-4.2; *CPRM Content Participant Agreement* at § 4.

[119] Vidi Certification at 6. DVD+R/+RW is an optical disc media format developed by the DVD+RW Alliance, which includes Philips, Hewlett Packard, Dell and other technology companies.

[120] *Id.* at 1; *see also id.*at Appendix B ("*Vidi Content Protection Agreement*").

[121] Vidi Certification at 1.

below, MPAA supports the approval of Vidi for use in this context.[122] Philips and Hewlett Packard promote Vidi as a technology that "fully embraces consumer use and enjoyment of digital television content."[123]

31. As with CPRM, the Vidi recording process binds content to the physical media using proven cryptographic methods.[124] Vidi DVDs must be used to record or play protected content, which will only be accessible on Vidi-compliant drives and software applications.[125] Vidi will read and record Marked Content as having the "Redistribution Controlled" CCI state, which allows the content to be copied freely, but prohibits its indiscriminate redistribution.[126] The binding of content to physical media prevents serial copies from being directly made from that piece of media, but usable copies can be made with a Vidi-compliant device.[127] To restrict the scope of redistribution, Vidi-compliant devices will only output digital forms of protected content using Commission-approved output protection technologies.[128]

32. Should the security of a Vidi-compliant device be compromised, individual devices can be revoked in specific circumstances.[129] Revocation is accomplished through the inclusion of a list of revoked device keys in Vidi DVDs.[130] At the time a consumer initiates the recording or playback of content, an authentication process will verify whether that device appears on the revocation list contained in the Vidi DVD.[131] If so, authentication will fail and the device will be unable to utilize that media.[132] As new media is released, Philips and Hewlett Packard anticipate that compromised devices will quickly be rendered obsolete.[133]

33. Philips offers a single Vidi license to all adopters and content participants.[134] Under the terms of the license, Philips and Hewlett-Packard agree not to assert the intellectual property they each have in Vidi within the relevant "field of use," which includes the use of Vidi to protect content in this

[122] MPAA Response to Philips and Hewlett Packard at 2.

[123] Vidi Certification at 2.

[124] *Id.* at 7, 13-14. A 128-bit AES cipher is used in the encryption process. *Id.*

[125] *Id.* at 7. Philips and Hewlett-Packard emphasize that Vidi DVDs will still be compatible with legacy equipment to make unprotected recordings in order to preserve the use of existing consumer equipment to the greatest extent possible. *Id.* at 7, 29.

[126] *Id.* at 16.

[127] *Id.* at 7, 17.

[128] *Id.* at 10.

[129] *Id.* at 9. Hardware keys may be revoked if: (1) the same key is found in more than one device, (2) the implementer has disclosed the key, or (3) the key has been lost, stolen or otherwise misdirected. *Id.* at 25; *Vidi Content Protection Agreement* at Art. 7, Ex. D. Software keys may be revoked if: (1) the key is found in applications widely used in conjunction with unauthorized copying or distribution, (2) the key has been lost, stolen or otherwise misdirected or is made public, or (3) if the software key is used in a hardware device. Vidi Certification at 25; *Vidi Content Protection Agreement* at Art. 7, Ex. D.

[130] Vidi Certification at 9.

[131] *Id.* As part of the recording and playback process, Vidi authenticates the device through the use of device ids and node key sets to access root keys contained in the device key blocks on Vidi DVDs. *Id.* at 7-8.

[132] *Id.* at 9.

[133] *Id.*

[134] *Id.* at 23.

context.[135] Adopters and content participants must in turn covenant to license any patent claims necessary for the use of Vidi on reasonable and nondiscriminatory terms.[136] Philips and Hewlett-Packard liken this approach to intellectual property licensing to that used in the DFAST license.[137] The Vidi license also contains compliance rules that are modeled after those established by the Commission for Covered Demodulator Products.[138] As noted by Philips and Hewlett-Packard, Vidi's robustness rules reflect a higher standard than that imposed by the Commission since Vidi will also be used to protect copy controlled content.[139]

34. Change management is accomplished under what Philips and Hewlett-Packard characterize as an open process.[140] Limited changes to the Vidi technical specification and the compliance and robustness rules are permitted, with advance notice and an opportunity to comment provided to adopters and content participants.[141] Objections are handled through consultation and arbitration.[142] Third party beneficiary rights are granted to content participants to seek injunctive relief and liquidated damages for material breaches likely to compromise the security of content protected by Vidi or of the underlying technology itself.[143] Philips and Hewlett-Packard assert that Vidi will be offered to all potential signatories on reasonable, non-discriminatory, and equal terms and conditions.[144] Implementers must pay a one-time fee at execution of the Vidi license, in addition to a per device key fee, while content participants are responsible for annual administrative fees.[145]

3. MagicGate Type-R for Secure Video Recording

35. Sony Corporation ("Sony") has certified four derivations of its MagicGate Type-R for Secure Video Recording ("MagicGate") technology, including hardware and software implementations for each of two different media formats - Hi-MD recordable discs and Memory Stick PRO.[146] Sony states that while it will license its hardware implementations to third parties, it intends to keep its software

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[135] *Id.* The relevant field of use is defined as the use of Vidi to encrypt audiovisual content on DVD+R and DVD+RW discs, to decrypt such content for playback from such discs, and the embedding of keys in blank discs. *Id.*; *Vidi Content Protection Agreement* at §§ 1.2, 2.1.

[136] Vidi Certification at 22-23; *Vidi Content Protection Agreement* at § 2.5.

[137] Vidi Certification at 22-23.

[138] *Id.* at 22; *Vidi Content Protection Agreement* at Ex. A, § A.1.2.2.1; *see also* 47 C.F.R. §§ 73.9003-73.9006.

[139] Vidi Certification at 22; *Vidi Content Protection Agreement* at Ex. A; *see also* 47 C.F.R. §§ 73.9007.

[140] Vidi Certification at 24-25.

[141] Examples of permitted changes include those needed to fix errors, omissions or bugs, to add analog outputs, and to conform to government mandates. *Id.*; *Vidi Content Protection Agreement* at §§ 6.2, 6.3.1-6.3.2.

[142] Vidi Certification at 25; *Vidi Content Protection Agreement* at §§ 6.2, 6.3.3-6.3.5.

[143] Vidi Certification at 3, 22, 25, 29; *Vidi Content Protection Agreement* at Art. 9. In order to seek injunctive relief, content participants must produce audiovisual content with an annual turnover threshold of € 100,000,000. Vidi Certification at 25; *Vidi Content Protection Agreement* at § 1.2, 9.3.2.

[144] Vidi Certification at 3, 22, 27, 29; *Vidi Content Protection Agreement* at § 13.9.

[145] The one-time implementer fee is € 5,000, with a per device key fee of € 0.05. Vidi Certification at 23-24; *Vidi Content Protection Agreement* at § 3.1a, 3.3.1. Content participants pay an annual fee of € 10,000. Vidi Certification at 24; *Vidi Content Protection Agreement* at § 3.1b.

[146] *See* MagicGate Hi-MD Hardware Certification; MagicGate Memory Stick PRO Software Certification; MagicGate Hi-MD Software Certification; MagicGate Memory Stick PRO Hardware Certification. Hi-MD recordable discs currently are available in either 300 MB or 1GB capacities. *See* Sony Reply at 5.

implementations proprietary for its own use and that of its affiliates.[147] Given the commonalities among these four implementations, we discuss them here in a consolidated fashion. Sony indicates that Fox, Warner Brothers and Sony Pictures Entertainment have deemed the security elements of this new technology as sufficient to protect against the unauthorized redistribution of content.[148] Sony also advances MagicGate from a consumer perspective, noting that the small format of its Hi-MD and Memory Stick PRO media promotes portability.[149]

36. MagicGate allows high definition ("HD"), SD or constrained resolution content to be transferred from a compliant device to a Secure Drive Module where the content is recorded and bound in encrypted format to either Hi-MD or Memory Stick PRO media.[150] Content recorded using MagicGate can be played back on any compliant MagicGate device using the same media format.[151] Since content is cryptographically bound in the recording process, it prevents usable bit-by-bit copies from being made directly from that media.[152] Marked Content will be treated as having DTCP's EPN encoding, thereby limiting its redistribution without any copy controls.[153] Sony currently restricts the digital output of MagicGate protected content to connectors using DTCP or HDCP.[154]

37. Revocation can be effectuated for individual devices in MagicGate hardware implementations and for all copies of a specific version of software in its software implementations.[155] Sony explains that revocation information can be propagated through the release of new media carrying

[147] MagicGate Hi-MD Hardware Certification at 2; MagicGate Memory Stick PRO Software Certification at 2; MagicGate Hi-MD Software Certification at 2; MagicGate Memory Stick PRO Hardware Certification at 2.

[148] Sony acknowledges that Fox, Warner Brothers and Sony Pictures Entertainment have reserved final approval pending review of the MagicGate license terms. MagicGate Hi-MD Hardware Certification at 10-11; MagicGate Memory Stick PRO Software Certification at 10; MagicGate Hi-MD Software Certification at 10-11; MagicGate Memory Stick PRO Hardware Certification at 10-11.

[149] MagicGate Hi-MD Hardware Certification at 19; MagicGate Memory Stick PRO Software Certification at 14-15; MagicGate Hi-MD Software Certification at 15; MagicGate Memory Stick PRO Hardware Certification at 18-19.

[150] Content is transferred from a MagicGate compliant device to a Secure Drive Module over a Secure Authenticated Channel. MagicGate Hi-MD Hardware Certification at 3; MagicGate Memory Stick PRO Software Certification at 3; MagicGate Hi-MD Software Certification at 3; MagicGate Memory Stick PRO Hardware Certification at 3. USB is used in the transfer process. MagicGate Hi-MD Hardware Certification at 3; MagicGate Hi-MD Software Certification at 3; MagicGate Memory Stick PRO Software Certification at Appendix A at 8; MagicGate Memory Stick PRO Hardware Certification at Appendix A at 8.

[151] MagicGate Hi-MD Hardware Certification at 8; MagicGate Memory Stick PRO Software Certification at 8; MagicGate Hi-MD Software Certification at 8; MagicGate Memory Stick PRO Hardware Certification at 8.

[152] An Integrity Check Value is calculated using an AES-based hash. MagicGate Hi-MD Hardware Certification at 3, 6-7; MagicGate Memory Stick PRO Software Certification at 3, 6-7; MagicGate Hi-MD Software Certification at 3, 6-7; MagicGate Memory Stick PRO Hardware Certification at 3, 6-7. AES 128-bit encryption is used for both unscreened and marked content. *Id.*

[153] MagicGate Hi-MD Hardware Certification at 5; MagicGate Memory Stick PRO Software Certification at 5; MagicGate Hi-MD Software Certification at 5-6; MagicGate Memory Stick PRO Hardware Certification at 5.

[154] A limited exception is also made for computer products produced prior to June 30, 2005 that send a constrained image to DVI outputs. MagicGate Hi-MD Hardware Certification at 8, 15-16; MagicGate Memory Stick PRO Software Certification at 8, 11; MagicGate Hi-MD Software Certification at 8-9, 12; MagicGate Memory Stick PRO Hardware Certification at 8, 15.

[155] MagicGate Hi-MD Hardware Certification at 7; MagicGate Memory Stick PRO Software Certification at 7; MagicGate Hi-MD Software Certification at 7; MagicGate Memory Stick PRO Hardware Certification at 7.

updated lists of revoked devices and software.[156] If a MagicGate device or software implementation has been revoked, it will be unable to retrieve a common key that is necessary for decrypting content when it attempts authentication prior to recording or playback.[157]

38. MagicGate hardware implementations are licensed through a series of adopter agreements for device hardware, media, and integrated chip manufacturers, format agreements for the underlying Hi-MD and Memory Stick PRO formats, and content participant agreements.[158] The device hardware adopter agreements authorize manufacturers to implement MagicGate in conjunction with Hi-MD and Memory Stick PRO products and utilize a necessary claims and reciprocal non-assert approach to intellectual property licensing.[159] The applicable compliance rules detail the permitted output and recording controls applicable to Marked and Unscreened content.[160] Sony asserts that the robustness rules were modeled after those used in the DFAST license and are at least as protective of DTV content as the Commission's flag robustness requirements.[161] Although Sony will not be publicly licensing its software implementations, it pledges to maintain them by the same compliance and robustness requirements applicable to its hardware implementations.[162]

39. The device hardware adopter agreements provide for change management with respect to the MagicGate technical specifications and compliance and robustness rules in specific circumstances.[163]

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[156] The revocation information consists of a list of revoked Device Node Keys for both hardware and software which is contained in the Enabling Key Block of new media. MagicGate Hi-MD Hardware Certification at 7-8; MagicGate Memory Stick PRO Software Certification at 7-8; MagicGate Hi-MD Software Certification at 7-8; MagicGate Memory Stick PRO Hardware Certification at 7-8.

[157] MagicGate Hi-MD Hardware Certification at 7; MagicGate Memory Stick PRO Software Certification at 7; MagicGate Hi-MD Software Certification at 7; MagicGate Memory Stick PRO Hardware Certification at 7.

[158] MagicGate Hi-MD Hardware Certification at 11-12; MagicGate Memory Stick PRO Hardware Certification at 11. In the case of the Hi-MD Hardware implementation, the device hardware adopter agreement is also supplemented with a Video Addendum. MagicGate Hi-MD Hardware Certification at 11; *see also* MagicGate Hi-MD Hardware Certification at Appendix E ("*Hi-MD Video Addendum*"). Since many of the relevant provisions of the media manufacturer, integrated chip manufacturer, and format agreements are largely duplicated in the device hardware adopter agreement, we focus our description of the MagicGate licensing regime on its device hardware adopter and content participant agreements.

[159] MagicGate Hi-MD Hardware Certification at 11-12; MagicGate Memory Stick PRO Hardware Certification at 11-12; *see also* MagicGate Hi-MD Hardware Certification at Appendix D, Art. II ("*Hi-MD Device Hardware Adopter Agreement*"); MagicGate Memory Stick PRO Hardware Certification at Appendix D, Art. II ("*Memory Stick PRO Device Hardware Adopter Agreement*").

[160] MagicGate Hi-MD Hardware Certification at 15-16; MagicGate Memory Stick PRO Hardware Certification at 14-16.

[161] MagicGate Hi-MD Hardware Certification at 16-17; MagicGate Memory Stick PRO Hardware Certification at 16.

[162] MagicGate Memory Stick PRO Software Certification at 2, 11-13; MagicGate Hi-MD Software Certification at 2, 11-13.

[163] The change management provisions in the *Hi-MD Device Hardware Adopter Agreement* and *Memory Stick PRO Device Hardware Adopter Agreement* prohibit any revisions to the MagicGate technical specifications, compliance or robustness rules that would materially increase the cost or complexity of implementation of devices, or that would require material modifications to product design or manufacturing of devices, unless changes are necessary to protect content. MagicGate Hi-MD Hardware Certification at 17; MagicGate Memory Stick PRO Software Certification at 13; MagicGate Hi-MD Software Certification at 13-14; MagicGate Memory Stick PRO Hardware Certification at 16-17; *Hi-MD Device Hardware Adopter Agreement* at Art. III; *Memory Stick PRO Device Hardware Adopter Agreement* at Art. III. Upon notification of any changes, adopters must comply within 18 months. *Id.*

Content participants receive advance notice of proposed changes and may object where a change will have a material and adverse effect on their interests.[164] Content participants may also assert third party beneficiary rights over adopters with respect to the compliance and robustness rules.[165] As a counterpoint, Sony notes that adopters possess their own third party beneficiary rights over content participants with respect to content encoding rules.[166]

40. Like DTLA, Sony considers it essential that all MagicGuard implementations only pass protected content to downstream technologies that provide protection at least as effective as MagicGate.[167] Sony does not detail the procedures or standards applicable to the approval process, but specifies that future decisions to approve downstream technologies are subject to change management review by content participants.[168] To date, Sony has approved DTCP and HDCP.[169] Finally, Sony indicates that it will offer all adopter agreements on a nondiscriminatory basis.[170] All adopters and content participants pay a one-time license fee.[171] Device hardware adopters pay an additional per unit key fee.[172]

4. D-VHS

[164] Specifically, content participants may object where a proposed change will have a material and adverse effect on the integrity and security of MagicGate, the operation of MagicGate with respect to the protection of content from unauthorized transmission, interception, or copying, or the rights of content participants with respect to MagicGate. MagicGate Hi-MD Hardware Certification at 17-18; MagicGate Memory Stick PRO Hardware Certification at 17; *see also* MagicGate Hi-MD Hardware Certification at Appendix C, §§ 3.5-3.6 ("*Hi-MD Content Participant Agreement*"); MagicGate Memory Stick PRO Hardware Certification at Appendix C, §§ 3.5-3.6 ("*Memory Stick PRO Content Participant Agreement*").

[165] MagicGate Hi-MD Hardware Certification at 13-14; MagicGate Memory Stick PRO Software Certification at 10-11; MagicGate Hi-MD Software Certification at 11; MagicGate Memory Stick PRO Hardware Certification at 13-14; *Hi-MD Content Participant Agreement* at §§ 3.3, 12.1, Ex. A; *Hi-MD Video Addendum* at Art. VI; *Memory Stick PRO Content Participant Agreement* at §§ 3.3, 12.1, Ex. A.

[166] MagicGate Hi-MD Hardware Certification at 14; MagicGate Memory Stick PRO Hardware Certification at 13-14; *Hi-MD Content Participant Agreement* at § 11.2; *Hi-MD Device Hardware Adopter Agreement* at Art. X, Ex. B; *Memory Stick PRO Content Participant Agreement* at § 11.2; *Memory Stick PRO Device Hardware Adopter Agreement* at Art. X, Ex. B.

[167] MagicGate Hi-MD Hardware Certification at 18; MagicGate Memory Stick PRO Software Certification at 13-14; MagicGate Hi-MD Software Certification at 14-15; MagicGate Memory Stick PRO Hardware Certification at 17-18.

[168] MagicGate Hi-MD Hardware Certification at 18; MagicGate Memory Stick PRO Software Certification at 13-14; MagicGate Hi-MD Software Certification at 14-15; MagicGate Memory Stick PRO Hardware Certification at 17-18.

[169] MagicGate Hi-MD Hardware Certification at 8, 15-16; MagicGate Memory Stick PRO Software Certification at 8; MagicGate Hi-MD Software Certification at 8-9, 12; MagicGate Memory Stick PRO Hardware Certification at 8.

[170] MagicGate Hi-MD Hardware Certification at 12; MagicGate Memory Stick PRO Hardware Certification at 12.

[171] For both the Hi-MD and Memory Stick PRO hardware implementations, the one time fees are: (1) device hardware adopters, ¥ 300,000, (2) content participants, $ 12,000. MagicGate Hi-MD Hardware Certification at 15; *Hi-MD Device Hardware Adopter Agreement* at Ex. I; *Hi-MD Content Participant Agreement* at Ex. B; MagicGate Memory Stick PRO Hardware Certification at 14; *Memory Stick PRO Device Hardware Adopter Agreement* at Ex. I; *Memory Stick PRO Content Participant Agreement* at Ex. B.

[172] The Device Node Key fee applicable to Hi-MD device hardware adopters is ¥ 2 per key. MagicGate Hi-MD Hardware Certification at 15; *Hi-MD Video Addendum* at Ex. H. For Memory Stick PRO device hardware adopters, the applicable fee is ¥ 3 per key. MagicGate Memory Stick PRO Hardware Certification at 14; *Memory Stick PRO Device Hardware Adopter Agreement* at Ex. H.

41. D-VHS is a recording format developed and licensed by Victor Company of Japan, Limited ("JVC") for use with removable magnetic tape cassettes to record SD or HD video content.[173] JVC states that D-VHS is fully backward-compatible and can record and play back analog video content on VHS or S-VHS cassettes.[174] As such, JVC suggests that D-VHS is user friendly and familiar to consumers.[175] JVC promotes industry adoption of D-VHS in so far as several manufacturers produce compliant products and Twentieth Century Fox, Universal, Artisan and DreamWorks studios have agreed to release prerecorded HD movies in D-VHS format.[176] D-VHS has also been provisionally approved as a secure storage technology by DTLA for DTCP-protected content.[177]

42. D-VHS operates in a fundamentally different manner than CPRM, Vidi and MagicGate. JVC explains that, as a format rather than an added content protection technology, D-VHS uses a proprietary variant-seed method to scramble content as part of the recording process.[178] D-VHS cassettes will therefore only play on devices that utilize JVC's proprietary format specifications.[179] According to JVC, the fact that D-VHS does not employ means for revocation, renewal or upgrade is also attributable to its nature as a format-related consumer electronics device.[180] In order to restrict the scope of redistribution, JVC limits the digital output of protected content to connectors utilizing DTCP or HDCP.[181] If a multi-industry consensus on the security of additional downstream protection technologies emerges, JVC is committed under the terms of its content beneficiary agreement to permit their use in D-VHS products.[182]

43. Another key difference distinguishing D-VHS from its counterparts involves the marking of content during the recording process. Specifically, Marked Content will be signaled as "copy restricted" in Copy Generation Management System ("CGMS") when recorded in order to effectuate redistribution control.[183] Despite this copy restriction, JVC provides that format-cognizant D-VHS products capable of recognizing EPN encoding can make additional copies from the original recording.[184] A recent change to the D-VHS copy protection requirements facilitates the ability of format non-cognizant devices to read the embedded CCI and EPN indicator in content and convert it to a "copy one generation" setting when output to DTCP.[185] This change in essence permits a consumer to link two D-

[173] D-VHS Certification at 3.

[174] *Id.*

[175] *Id.* at 11.

[176] *Id.* at 9-10. Manufacturers producing D-VHS products include Panasonic, Mitsubishi, Hitachi, Sony, Toshiba and Marantz. *Id.* at 10.

[177] *Id.* at 9-10.

[178] *Id.* at 7.

[179] This in effect results in an implicit form of authentication. *Id.* at 8.

[180] *Id.*

[181] *Id.* at 5.

[182] *See Id.* at Appendix F, Art. 1(A) ("*Content Beneficiary Agreement*"). JVC offers a second content beneficiary agreement which has limited applicability to content owners releasing prerecorded HD content using JVC's D-Theater platform. D-VHS Certification at 11.

[183] D-VHS Certification at 11.

[184] *Id.* at 6, 11; *see also* Letter from Bruce Turnbull, Weil, Gotshal & Manges, LLP, to Marlene Dortch, FCC at 1-2 (June 24, 2004) ("*JVC 6/24/2004 Ex Parte*").

[185] *JVC 6/24/2004 Ex Parte* at 2.

VHS products and make multiple protected copies of Marked Content.[186]

44. In addition to offering a content beneficiary agreement, JVC licenses D-VHS through a format license applicable to manufacturers.[187] JVC specifies that it is the owner of, or has the right to sublicense, the patents necessary to implement the D-VHS specification for the manufacture of compliant products.[188] The format license requires adopters to abide by the terms of JVC's copy protection requirements, which have been supplemented to encompass redistribution control over digital broadcast television content.[189] Adopters must design and manufacture D-VHS products so as to effectively frustrate the alteration or circumvention of the copy protection requirements.[190] JVC undertakes pre-release testing of all D-VHS models to ensure their compliance with the copy protection requirements and JVC's robustness standards.[191]

45. Change management of the copy protection requirements is provided for in the content beneficiary agreement.[192] Specifically, content beneficiaries receive advance notice and an opportunity to object to any proposed changes in the copy protection requirements to reduce the level of content protection.[193] Third party beneficiary rights are also granted to content beneficiaries to take enforcement action against manufacturers of non-compliant D-VHS products.[194]

46. JVC states that licenses to manufacturers are available on reasonable and non-discriminatory terms, with certain provisos relevant to the D-VHS format.[195] Since D-VHS is a follow-on format to the original VHS format, JVC only permits VHS format licensees to accede to the D-VHS format license.[196] Although it generally offers the D-VHS format to any interested VHS licensee, JVC reserves the right to refuse to license D-VHS to any entity that has not met its obligations with respect to format compliance, content protection requirements, or fee payment.[197] Further, JVC determines pricing on a licensee-by-licensee basis, based in large part on the nature and extent of each licensee's patents that are granted back to JVC.[198] JVC stresses that its terms and fees have been accepted in the marketplace without any objection from licensees or prospective licensees.[199]

C. DIGITAL RIGHTS MANAGEMENT TECHNOLOGIES

1. Windows Media Digital Rights Management Technology

[186] *Id.*

[187] *See* D-VHS Certification at Appendix A ("*Format Agreement*").

[188] D-VHS Certification at 3. JVC has identified in a sample list some of the patents it holds in the United States that are essential to the design and manufacture of D-VHS products. *Id.* at Appendix A.

[189] *See* D-VHS Certification at Appendix B ("*Copy Protection Requirements*"), Appendix C ("*CPR Supplement A*").

[190] *Format Agreement* at Art. 10(2)(b).

[191] JVC Reply at 13-15, Appendices A-B.

[192] D-VHS Certification at 7.

[193] *Id.*; *Content Beneficiary Agreement* at Art. 1(D).

[194] D-VHS Certification at 11; *Content Beneficiary Agreement* at Art. 4.

[195] D-VHS Certification at 11.

[196] *Id.*

[197] *Id.*

[198] *Id.*

[199] *Id.* at 11-12.

47. Microsoft Corporation ("Microsoft") has certified its Windows Media Digital Rights Management Technology ("WMDRM") as an end-to-end digital rights management ("DRM") content protection system that can be used both for output protection as well as for secure recording and storage.[200] As an end-to-end DRM system, WMDRM is transport agnostic. Microsoft asserts that WMDRM is supported in nearly 60 consumer electronics products and more than 450 million Windows-enabled personal computers.[201] In addition, Microsoft points to the fact that major movie studios and record labels have made movie and music content available online through services using WMDRM as reflecting their support for the underlying technology.[202] Although MPAA initially disputed the applicability of content owner use or approval of WMDRM for the protection of movie content to the instant proceeding, subsequent clarifications by Microsoft on its flag-based WMDRM implementation have led MPAA and its members to express support for the approval of WMDRM under this interim process.[203]

48. WMDRM is a multi-purpose, open-platform system that can be used to protect a wide variety of audiovisual content.[204] In the case of Marked Content, WMDRM would encrypt the content and bind it to the individual device in which it was first demodulated.[205] WMDRM will also prescribe a set of usage rights that will limit the content's use and redistribution.[206] Specifically, WMDRM will allow Marked Content to be: (1) simultaneously shared among ten network streaming WMDRM-enabled devices, and (2) sent to an unlimited number of WMDRM-enabled storage devices directly connected by a USB cable, or (3) sent to a limited number of connected WMDRM-enabled storage devices over an IP-based home network.[207] Microsoft indicates that in both instances it will institute proximity controls consisting of a TTL limit of 3 and a RTT cap of 7 milliseconds or less.[208] Microsoft has committed to enabling Marked Content protected with WMDRM to be handed off to all other content protection

[200] WMDRM Certification at 1.

[201] *Id.* at 15-16.

[202] *Id.* at 13-14. Among the studios are Disney, Paramount, MGM, Sony, Universal, and Warner Brothers; the record labels include BMG, EMI, Sony, Universal, and Warner. *Id.*

[203] Opposition to the Application of Microsoft for Interim Authorization of Windows Media DRM by the Motion Picture Association of America, Inc., *et al.* at 12-13 ("MPAA Opposition to Microsoft") (stressing that a flag-based implementation of WMDRM could differ greatly from its Internet-delivered movie content implementation); Letter from C. Bradley Hunt, MPAA, and Andrew Moss, Microsoft, to Marlene Dortch, FCC at 1 (July 9, 2004).

[204] Microsoft Reply at 23.

[205] WMDRM Certification at 4. WMDRM uses a public key based management system. *Id.* at 6. Among the encryption algorithms used for portable and other media storage devices are: 56-bit RC4, 56-bit DES, 160-bit ECC El Gamal, and 160-bit ECC-DSA. *Id.* at 7. For network devices, the algorithms include 128-bit AES and 2048-bit RSA. *Id.*

[206] *Id.* at 4-5.

[207] *Id.* at 8-10; Microsoft Reply at 5-6. The network streaming and connected devices are affirmatively authorized by the user of the originating device the first time a newly-attached network streaming or connected device requests content from the originating device. Microsoft Reply at 10-11; Letter from Mary Newcomer Williams, Covington & Burling, to Marlene Dortch, FCC at 4 (June 25, 2004) ("*Microsoft 6/25/04 Ex Parte*"); Letter from Mary Newcomer Williams, Covington & Burling, to Marlene Dortch, FCC at 2 (July 13, 2004) ("*Microsoft 7/13/04 Ex Parte*"); Letter from Mary Newcomer Williams, Covington & Burling, to Marlene Dortch, FCC at Attachment (July 15, 2004) ("*Microsoft 7/15/04 Ex Parte*"); Letter from Mary Newcomer Williams, Covington & Burling, to Marlene Dortch, FCC at 2 (July 28, 2004) ("*Microsoft 7/28/04 Ex Parte*").

[208] Microsoft Reply at 5; Letter from Gerald Waldron, Covington & Burling, and Andrew Moss, Microsoft Corporation, to Marlene Dortch, FCC at 9, 11 (May 18, 2004) ("*Microsoft 5/18/04 Ex Parte*").

systems approved by the Commission.[209]

49. WMDRM provides for revocation on a device, application, or WMDRM implementation basis.[210] In each instance, revocation occurs when the certificate of the device, application, or WMDRM implementation is compared against a list of revoked certificates at the time of authentication.[211] Revocation information is distributed with licenses for new WMDRM protected content delivered over the Internet or through physical media.[212] When a device or WMDRM implementation is revoked, the device or implementation loses access to any new WMDRM-protected content after the date of revocation but retains access to older content.[213] In the case of an application, revocation causes it to lose access to all WMDRM-protected content.[214] Revoked certificates can be renewed through a "re-individualization" process.[215] WMDRM is also extensible and upgradeable through software updates.[216]

50. WMDRM is licensed as part of the Windows Media Format Software Development Kit ("Windows Media Format SDK") and the Windows Media Rights Management Software Development Kit ("Windows Media Rights Management SDK").[217] Microsoft states that the Windows Media Format SDK and Windows Media Rights Management SDK license the use of all necessary patent claims required from Microsoft to deploy WMDRM.[218] Licensees are authorized to use WMDRM in specified applications and devices and to distribute WMDRM as an integrated component in those applications and devices.[219] Microsoft does not currently authorize third parties to implement WMDRM themselves, but plans to do so in the future.[220] Microsoft indicates that it has historically had no need to detail the specific robustness requirements applicable to WMDRM since it was directly responsible for implementation and set its own internal robustness guidelines.[221] As a result of its future plans to license third party implementations, however, Microsoft has crafted a series of detailed compliance and robustness rules applicable to personal computers, portable storage devices, and network devices.[222] Microsoft commits to

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[209] Microsoft Reply at 28. Microsoft notes that the hand off of content will require the receiving technology to take a WMDRM license. *Id.* Microsoft also acknowledges that interoperability between DRM systems will require the widespread implementation of an industry standard rights expression language and expresses its commitment to the use of MPEG-21 Part 5 Rights Expression Language in this regard. *Id.*

[210] WMDRM Certification at 12; Microsoft Reply at 14. In the case of devices, Microsoft indicates that it is more common for a class of devices to be compromised. Microsoft Reply at 14. A WMDRM implementation can be in a device or in a version of Windows. *Id.*

[211] WMDRM Certification at 12; Microsoft Reply at 14-15. Microsoft provides that it may revoke DRM certificates technically or contractually on two days notice where security has been publicly or generally compromised such that Microsoft cannot reasonably remedy the breach. *See* Microsoft Certification at Appendix 13, 3(b)-(c), Ex. B ("*DRM Addendum to Windows Media Format SDK License*").

[212] Microsoft Reply at 15.

[213] *Id.*

[214] *Id.*

[215] WMDRM Certification at 17; Microsoft Reply at 11.

[216] WMDRM Certification at 10.

[217] *Id.* at 17.

[218] *Id.* at 17-18.

[219] *Id.* at 18.

[220] *Id.*; Microsoft Reply at 20-21.

[221] WMDRM Certification at 18; Microsoft Reply at 19; *Microsoft 5/18/04 Ex Parte* at 12.

[222] *Microsoft 5/18/04 Ex Parte* at 11-14; *Microsoft 6/25/04 Ex Parte* at Attachments.

complying with these same rules in its own implementations of WMDRM and in its devices and applications using WMDRM.[223]

51. Microsoft does not provide content owners or other stakeholders with a formal role in revocation decisions or change management.[224] Likewise, content owners do not receive third party beneficiary or enforcement rights with respect to the WMDRM technical specifications and compliance and robustness rules under the Windows Media Format SDK and Windows Media Rights Management SDK.[225] In lieu of these mechanisms, Microsoft pledges that it will: (1) not change its implementation of WMDRM in a manner that would afford less protection to Marked Content than set forth in its certification and related filings, (2) use its best commercially reasonable efforts to address and remedy as promptly as possible any breaches to WMDRM that diminish the protection of Marked Content, and (3) work with content owners to afford them a meaningful and reasonable role in the development and deployment of WMDRM.[226] In particular, Microsoft suggests that its Security Advisory Board can provide content owners engaged in digital media distribution with a voice in revocation and change management matters.[227]

52. Microsoft states that the Windows Media Format SDK and Windows Media Rights Management SDK are available on reasonable and nondiscriminatory terms that are broadly and publicly disclosed.[228] Microsoft also affirms that the licenses do not impose any anticompetitive obligations on WMDRM licensees.[229] Both SDKs are included at no additional cost in the Microsoft's Windows client and server licenses.[230]

2. Helix DRM Trusted Recorder

53. Helix DRM Trusted Recorder ("Helix") is another end-to-end DRM system that can be used to protect a wide range of audiovisual content across multiple platforms.[231] RealNetworks, Inc. ("RealNetworks") licenses Helix and promotes its use as a digital output protection technology in association with Marked Content.[232] RealNetworks identifies a number of consumer electronics manufacturers that have licensed its Helix DNA Client, the technology that serves as the foundation for Helix, as well as movie studios and record labels that have authorized the use of Helix for Internet distribution of video and music content.[233] Although MPAA acknowledges that content owners have

[223] *Microsoft 5/18/04 Ex Parte* at 1.

[224] Microsoft Reply at 24-26; *Microsoft 5/18/04 Ex Parte* at 14-15.

[225] Microsoft Reply at 26-27; *Microsoft 5/18/04 Ex Parte* at 14-15.

[226] *Microsoft 5/18/04 Ex Parte* at 14-15.

[227] Microsoft Reply at 24-25.

[228] WMDRM Certification at 17.

[229] Microsoft Reply at 29.

[230] WMDRM Certification at 17.

[231] Letter from Laura Philips, Drinker Biddle & Reath, LLP, to Marlene Dortch, FCC, at 2 (June 18, 2004) ("*RealNetworks 6/18/04 Ex Parte*").

[232] RealNetworks Reply at 3.

[233] Licensees of Helix DNA Client include Hitachi, IBM, Intel, Motorola, NEC, Sharp, Sony, Sun Microsystems, Texas instruments, and Toshiba. Helix Certification at 45. Among the studios authorizing the Internet distribution of movie content through Helix-based MovieLink are MGM, Paramount, Warner Brothers, Universal and Sony. *Id.* at 41-42; RealNetworks Reply at 11-12. Similarly, RealNetworks identifies Universal Music, Sony Music, EMI, BMG, and Warner Brothers Music as having approved Helix DRM in association with the Internet distribution of their music. *Id.*

authorized the delivery of movie content through commercial services that utilize Helix, such as Movielink, it emphasizes that Helix would be implemented in a different manner for digital broadcast television content and that content owners have yet to use or approve Helix in this context.[234]

54. When Marked Content is received and demodulated by a Helix-compliant device, it will encrypt the content and bind it to the device in association with the Helix Device DRM software, which is referred to as a "Trusted Recorder."[235] The Trusted Recorder will only allow protected content to be accessed in a usable form by itself or a Helix-compliant device that it has validated, also referred to as a "Trusted Client."[236] A validation process is used to associate a Trusted Recorder with up to 10 Trusted Clients for a six month time frame, and that validation is authenticated by the Trusted Recorder prior to playback.[237] Each Trusted Client may only hold the validation from a single Trusted Recorder at a time, and it must be renewed at the end of each six month period to avoid automatic deletion.[238] In addition, RealNetworks indicates that it will further restrict the scope of redistribution through the imposition of TTL and RTT proximity controls and by limiting the output of protected content to Commission-approved protection technologies.[239]

55. Helix has the ability to revoke at both the content and component level.[240] Content revocation invalidates the key used by a particular Trusted Recorder to encrypt content, thereby rendering all content associated with that Trusted Recorder unusable.[241] Component revocation affects a Helix application, such as a Trusted Recorder or a Trusted Client.[242] When the playback of content and authentication is initiated, the digital signature of each component that will handle decrypted data is verified against a secure database of revoked signatures residing in the Trusted Recorder or Trusted Client.[243] If the digital signature of a component appears in the database, validation and playback will fail.[244] Revocation information can be disseminated in content delivered through the Internet or in physical media.[245] Revoked devices or applications can be renewed through software upgrades delivered by similar means.[246]

56. RealNetworks licenses Helix as a part of its Helix Device DRM Software Development

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[234] Opposition to the Application of RealNetworks Inc. for Interim Authorization of Helix DRM Trusted Recorder and Helix Device DRM by the Motion Picture Association of America, Inc., *et al.* at 10-11 ("MPAA Opposition to RealNetworks")

[235] RealNetworks Reply at 3. A 128-bit AES algorithm or its equivalent is used in the encryption process. *Id.*

[236] RealNetworks Reply at 4; *RealNetworks 6/18/04 Ex Parte* at 4-6.

[237] Helix Certification at 27-33; RealNetworks Reply at 4; *RealNetworks 6/18/04 Ex Parte* at 4. Letter from Laura Philips, Drinker, Biddle & Reath, LLP, to Marlene Dortch, FCC at 3-4 (July 1, 2004) ("*Real Networks 7/1/04 Ex Parte*").

[238] RealNetworks Reply at 3-4.

[239] *Id.* at 4; *RealNetworks 6/18/04 Ex Parte* at 3, 8. RealNetworks will impose a TTL limit of 3 and a RTT limit of 7 milliseconds or less. *RealNetworks 7/1/04 Ex Parte* at 2.

[240] RealNetworks Reply at 8; *RealNetworks 6/18/04 Ex Parte* at 5.

[241] RealNetworks Reply at 8; *RealNetworks 6/18/04 Ex Parte* at 5.

[242] RealNetworks Reply at 8; *RealNetworks 6/18/04 Ex Parte* at 5.

[243] RealNetworks Reply at 8-9; *RealNetworks 6/18/04 Ex Parte* at 4, 6.

[244] RealNetworks Reply at 9; *RealNetworks 6/18/04 Ex Parte* at 6.

[245] RealNetworks Reply at 9; *RealNetworks 6/18/04 Ex Parte* at 6.

[246] RealNetworks Reply at 10; *RealNetworks 6/18/04 Ex Parte* at 6.

Kit ("Helix Device DRM SDK").[247] Licensees are granted the right to use and distribute Helix as part of a bundle of associated software applications and are required to comply with both the Commission's flag compliance and robustness rules, as well as those imposed by RealNetworks.[248] The Helix Device DRM SDK license does not provide for content owner participation in change management or grant third party beneficiary enforcement rights.[249] RealNetworks reserves the right to change the functionality or pricing of the Helix Device DRM SDK at any time, but commits to making any such changes on a reasonable and non-discriminatory basis.[250] RealNetworks further asserts it will license Helix for the specific purpose of protecting Marked Content on a reasonable and non-discriminatory basis for all similarly situated companies and that its license fees will be structured as a per unit royalty arrangement to encourage the availability of low cost devices.[251]

3. SmartRight

57. Like WMDRM and Helix, the SmartRight technology ("SmartRight") recently developed by Thomson Inc. and its partners (collectively, "Thomson") is an end-to-end DRM system that can be used to protect marked digital broadcast television and other audiovisual content.[252] SmartRight differs from its DRM counterparts in that it protects content within a smart card-based domain of authorized devices known as a Personal Private Network ("PPN").[253] Licensing of SmartRight will be administered by the SmartRight Licensing Authority, LLC.[254] Thomson promotes SmartRight as a technology that will permit consumers to copy freely, use and enjoy digital broadcast content within the PPN.[255] On the basis of certain commitments made by Thomson, MPAA supports SmartRight's certification under this interim process.[256]

58. Under the SmartRight model, protected content can be shared among devices in a PPN consisting of up to ten display devices and an unlimited number of reception or secure storage devices.[257] Although SmartRight can be configured to authorize remote devices to a PPN through an IP network or over the Internet, Thomson initially commits to requiring physical propagation of the PPN through the direct insertion of an authorized smart card into new display devices.[258] When a SmartRight reception device demodulates Marked Content, it encrypts the content and encodes it as a "private copy" which

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[247] RealNetworks Reply at Attachment ("*Helix Device DRM SDK License*")

[248] *Helix Device DRM SDK License* at §§ 2-3, Appendix D.2-D.3; RealNetworks Reply at 11.

[249] RealNetworks Reply at 10-11.

[250] *Helix Device DRM SDK License* at § 6(c) (providing that RealNetworks cannot unilaterally change licensees' royalty or financial obligations); *RealNetworks 6/18/04 Ex Parte* at 7.

[251] Helix Certification at 45; RealNetworks Reply at 12; *RealNetworks 6/18/04 Ex Parte* at 7.

[252] SmartRight Certification at 2. Thomson developed SmartRight in coordination with its partners Axalto, Gemplus SA, Micronas, Nagravision SA, Pioneer Corporation, SCM Microsystems, and ST Microelectronics N.V. *Id.* at 26.

[253] *Id.* at 1, 12.

[254] *Id.* at Appendix A.

[255] *Id.* at 3. Thomson also points out that through use of a SmartRight set top box, consumers can preserve the functionality of their legacy analog equipment. *Id.* at 11, 21.

[256] Letter from C. Bradley Hunt, MPAA, and David Arland, Thomson, to Kenneth Ferree, FCC at 3 (May 28, 2004) ("*Thomson 5/28/04 Ex Parte*").

[257] Thomson Reply at 9, n.17.

[258] *Id.*

may only be viewed within the PPN linked to the reception device.[259] Protected content cannot be accessed in a usable format on any device outside that specific PPN, including devices linked to other SmartRight PPNs.[260] Thomson indicates that SmartRight can permit consumers to access content at a remote location linked to their PPN, such as a second home, office, or boat.[261] In response to concerns articulated by MPAA, however, Thomson has committed to implement TTL and RTT proximity controls on an interim basis.[262] Thomson also specifies that SmartRight is interface neutral and will receive digital broadcast television content from, and export to, other Commission-approved protection technologies.[263]

59. SmartRight permits revocation at three levels – PPN, smart card, and display device.[264] Lists identifying revoked keys and authorizations are created by the SmartRight Association, a not-for-profit corporation representing the interests of content providers and adopters, and are distributed in content.[265] Although the SmartRight Association is responsible for revocation decisions, content participants may request revocation.[266] SmartRight can also effectuate renewal of its entire security schema through smart card replacement, a measure which content participants can request.[267]

60. The licensing regime for SmartRight consists of two components, an adopter agreement and a content participant agreement.[268] Adopters who possess essential patent claims have the option to either agree to not assert those claims against fellow adopters or to license them on a reasonable and non-discriminatory basis.[269] Thomson describes the applicable compliance and robustness requirements as generally following the Commission's flag rules.[270] SmartRight's change management terms do not

[259] SmartRight Certification at 9. SmartRight uses 112-bit Triple DES for content scrambling, 128-bit AES for individual device communications and identification, 1024 or 2048-bit RSA for authentication and SHA1 hash function for verification. *Id.* at 16.

[260] *Id.* at 8.

[261] *Id.*

[262] *Thomson 5/28/04 Ex Parte* at 2; Letter from David Arland, Thomson, to Marlene Dortch, FCC at 2 (June 23, 2004) ("*Thomson 6/23/04 Ex Parte*"). The specific proximity controls consist of a TTL limit of 3 and a RTT limit of 7 milliseconds or less. *Thomson 5/28/04 Ex Parte* at 2.

[263] SmartRight Certification at 20.

[264] *Id.* at 2-3, 11, 18-19. Revocation may be applied in four instances: (1) where a device key has been copied such that it is found in more than one device or product; (2) where a key has been lost, stolen, intercepted or otherwise misdirected, or is made public or disclosed; (3) where a network key is present in more terminal modules than permitted by the maximum network size; or (4) it is required by court order, or other competent government authority. *See* Thomson Reply at Appendix A, Art. IV ("*SmartRight Adopter Agreement*"); *see also* Thomson Reply at Appendix B, § 5.3.2 ("*SmartRight Content Participant Agreement*").

[265] SmartRight Certification at 11, 24.

[266] Thomson Reply at 12. Content participants must provide the SmartRight Association with proof that one of the four revocation criteria has been met. *SmartRight Content Participant Agreement* at § 3.2, 5.3.1. Where proven, revocation must be initiated. *Id.*

[267] SmartRight Certification at 10, 18; Thomson Reply at 13. The SmartRight Association can institute renewal where: (1) unauthorized use or distribution of SmartRight content have reached a sufficient level to justify the cost of renewal; (2) it is feasible to upgrade the reliability and security of SmartRight; and (3) a requirement exists to implement a change in outstanding smart cards by court order, or other competent government authority. SmartRight Certification at 18; *see also SmartRight Adopter Agreement* at § 3.2, 4.3; *SmartRight Content Participant Agreement* at §§ 5.3.1, 5.3.4.

[268] Thomson Reply at 4.

[269] SmartRight Certification at 23; *SmartRight Adopter Agreement* at § 5.5.

[270] SmartRight Certification at 22, 25; *SmartRight Adopter Agreement* at Ex. B, C.

permit material changes to the technical specification or compliance rules that would materially increase the cost or complexity of compliance products, unless mandated by the Commission or other governmental authority.[271] Other changes are permitted upon notice to adopters, providing them with an opportunity to resolve objections, and allowing for a reasonable implementation period.[272] Content participants can object to any changes that would have a material and adverse effect on the integrity or security of the SmartRight system, as well as other changes to the adopter agreement and its compliance rules.[273] Third party beneficiary rights are also available to content participants to enforce the terms of the adopter agreement.[274] Thomson asserts that SmartRight will be licensed on a reasonable and non-discriminatory basis.[275] Adopters are responsible for an annual license fee, per unit royalties, and certified key fees.[276] Content participants must pay an annual administration fee.[277] Changes to the fees must be commensurate with administrative costs.[278]

III. DISCUSSION

61. Although each certification raises issues that are germane to its subject technology, certain commonalities also exist among the various filings which merit a uniform resolution. In particular, the oppositions and responses filed by MPAA with respect to each certification echo similar themes and topics.[279] We consider these common issues below in a consolidated fashion in an effort to streamline our evaluation of each content protection technology and recording method. We again reiterate that our goal in this proceeding is to establish a redistribution control system that will prevent the

[271] SmartRight Certification at 24; *SmartRight Adopter Agreement* at § 3.3.2.

[272] SmartRight Certification at 24; *SmartRight Adopter Agreement* at Art. 3.

[273] Thomson Reply at 14; *SmartRight Content Participant Agreement* at § 3.6.

[274] Thomson Reply at 11; *SmartRight Adopter Agreement* at § 10.4, Ex. A at § 3; *SmartRight Content Participant Agreement* at § 3.3.

[275] SmartRight Certification at 22.

[276] Adopters must pay a $10,000 annual fee for an evaluation license, with a $30,000 fee to convert to a full production license. *Id.* at 23; *SmartRight Adopter Agreement* at § 2.2-2.5, Ex. A. The per unit royalty is $2, and the certified key fee is $0.10. *Id.*

[277] The administration fee is $30,000. *SmartRight Content Participant Agreement* at § 4.1, Ex. A.

[278] *SmartRight Adopter Agreement* at § 2.1; *SmartRight Content Participant Agreement* at § 4.1.

[279] *See* Comments Pertinent to all Filings for Interim Certification Submitted by the Motion Picture Association of America, Inc., *et al.* ("MPAA Common Comments"); Response to the Application of Sony Corporation for Interim Authorization of MagicGate by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to Sony"); Opposition to the Application of Thomson, *et al.* for Interim Authorization of SmartRight by the Motion Picture Association of America, Inc., *et al.* ("MPAA Opposition to Thomson"); Response to the Application of Philips Electronics North America Corp. and Hewlett-Packard Co. for Interim Authorization of Vidi Recordable DVD Protection System by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to Philips and HP"); Response to the Application of Digital Content Protection, LLC for Interim Authorization of High Bandwidth Digital Content Protection by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to DCP"); Response to the Application of 4C Entity LLC for Interim Authorization of Content Protection Recordable Media for Video Content by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to 4C"); MPAA Opposition to TiVo; Response to the Application of Digital Transmission Licensing Administrator LLC for Interim Authorization of Digital Transmission Content Protection by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to DTLA"); MPAA Opposition to RealNetworks; MPAA Opposition to Microsoft; Response to the Application of Victor Company of Japan for Interim Authorization of D-VHS by the Motion Picture Association of America, Inc., *et al.* ("MPAA Response to JVC"). MPAA filed a motion asking that its late-filed oppositions and responses be accepted as timely. *See* Motion to Accept Late-Filed Comments as Timely (filed April 12, 2004). We hereby grant MPAA's motion.