

viewers, because it reduces transaction costs to consumers as well as MVPDs' and networks' costs, particularly costs of equipment and marketing.⁸²⁰

C. Competitive Issues in Small and Rural Markets

186. In the Notice, we requested information and comment regarding issues specific to video programming distribution in rural and smaller markets.⁸²¹ NTCA, a trade association for rural telecommunications providers, reports that a significant portion of its members are providing video service, but that their efforts are hampered due to an inability to receive terms similar to those that large cable MSOs receive, and due to tying requirements by programmers.⁸²² OPASTCO, a trade association representing rural telephone companies, reports that half its members operate small cable television companies, and others offer video service via DSL, sometimes overbuilding neighboring service territories.⁸²³ Still others provide video satellite services, or have deployed fiber to the home. OPASTCO indicates that bundling of video services with other advanced services increases penetration rates and thus spurs further investment in advanced services in rural areas. OPASTCO also states, however, that the higher prices rural video providers pay for programming and retransmission consent agreements that require carriage of additional channels on the basic tier, raise costs and impede market entry. OPASTCO recommends that video providers have the option of providing programming on an la carte basis so its members can provide video in a manner that matches the needs of customers.⁸²⁴ ACA, which represents small cable operators, states that more than half of its members currently offer digital cable service, more than half offer cable modem service, and more are planning on providing these services in the next 12 months.⁸²⁵ ACA also reports difficulties with high programming costs, programming tying arrangements, and retransmission consent agreements, recommends allowing more flexibility for small video providers in packaging video programming, and supports some legislative changes to the retransmission consent and program access laws to address the problems ACA raises.⁸²⁶ For example, ACA reports that some companies acquiring systems from major MSOs estimate that programming costs increase up to 30 percent, solely because a smaller company acquired ownership.⁸²⁷ Citing a study by the Carmel Group, ACA notes that 53 percent of the small cable operators surveyed allocated between 35 and 49 percent of total expenses to programming costs, and 20 percent of respondents allocated more than 50 percent.⁸²⁸

⁸²⁰ See, e.g., Fox Comments at 2-4. See also Fox Comments Statement of Gustavo Bamberger at 1-2, that bundling of programming products by programmers and by MVPDs generally reduces costs and is economically efficient.

⁸²¹ Notice, 19 FCC Rcd 10919-20 ¶ 30.

⁸²² See NTCA Comments, *generally*. NTCA refers specifically to tying requirements under which a large programmer will require carriage of less popular networks it owns as a condition for carriage of its most popular network(s). See paras. 161-63 *supra* for further discussion of programming tying requirements and issues surrounding retransmission consent.

⁸²³ See also *Fourth 706 Report*, 19 FCC Rcd at 20570.

⁸²⁴ See OPASTCO Reply Comments, *generally*.

⁸²⁵ ACA Comments at Exhibit 2.

⁸²⁶ *Id.* at Exhibit 1. ACA does not advocate Commission intervention to enable operators to offer their programming on an la carte basis.

⁸²⁷ *Id.* at 39.

⁸²⁸ *Id.*

D. Technical Issues

1. Navigation Devices

187. As mentioned previously, the Commission's *Plug and Play Rules* allow for television sets to be built with one-way "plug-and-play" functionality (e.g., premium channels).⁸²⁹ Consumers still need a set-top box to receive two-way services (e.g., video-on-demand), while the cable and consumer electronics industries continue to work on an agreement for two-way "plug-and-play" functionality.⁸³⁰ Since our last *Report*, more than 60 models of Digital Cable Ready (DCR) televisions by 11 different manufacturers are now certified for retail sale.⁸³¹ As of August 2004, the top 10 cable operators had deployed CableCARDS⁸³² to the approximately 5,000 subscribers nationwide that have thus far requested them.⁸³³ The cable industry indicates that it has begun to educate consumers about the retail availability of CableCARDS and unidirectional digital cable products by working with local retailers and training their customer service representatives, and by providing consumers with educational material directly via websites, monthly bills, brochures, and advertisements.⁸³⁴

188. **OpenCable.** In July 2004, the OpenCable Applications Platform (OCAP) was approved by the American National Standards Institute (ANSI) to standardize cable set-top box software applications.⁸³⁵ Many cable operators have begun to develop applications using the OCAP standard, which are designed to run on a variety of set-top boxes and should facilitate the growth of interactive television.⁸³⁶ For example, Comcast and Time Warner have announced the creation of OCAP Development, LLC, a joint venture dedicated to creating an OCAP middleware implementation. The joint venture expects that its middleware will accelerate the development of OCAP-compliant software and help hasten the development of various applications.⁸³⁷ Also, Time Warner announced plans to strip out the existing interactive program guides (IPG) from Scientific-Atlanta and Pioneer set-top boxes, and

⁸²⁹ 47 U.S.C. § 549. *Plug and Play Rules*, 18 FCC Rcd 20885 (2003). See Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 11-13, 18-22, 24-27, 29-30.

⁸³⁰ *Plug and Play Rules*, 18 FCC Rcd 20885 (2003).

⁸³¹ CableLabs, *CableLabs Verifies Three DTVs, More Than 60 Models Now Approved* (press release), Aug. 24, 2004.

⁸³² See fn. 157, 173 *supra*. The OpenCable specification is designed to support the retail sale of advanced digital set-top boxes and other devices such as CableCARDS. See CableLabs, at <http://www.cablelabs.com/news/glossary.html#C> (visited Oct. 5, 2004).

⁸³³ Letter from Neal M. Goldberg, General Counsel, NCTA, to Marlene H. Dortch, Secretary, FCC (Nov. 19, 2004) (NCTA Nov. 19 Ex Parte, Docket No. 97-80), at 2. See also Letter from Neal M. Goldberg, General Counsel, NCTA, to Marlene H. Dortch, Secretary, Federal Communications Commission (Sept. 30, 2004), Attachment (Memorandum) at 1.

⁸³⁴ Letter from Neal M. Goldberg, General Counsel, NCTA, to Marlene H. Dortch, Secretary, Federal Communications Commission (Sept. 30, 2004), Attachment (Memorandum) at 1. See also TiVo Reply Comments *generally*.

⁸³⁵ Society of Cable Telecommunications Engineers, *SCTE Standard on CableLabs OCAP Specification Achieves ANSI Approval* (press release), July 1, 2004.

⁸³⁶ See Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 10-13, 16-19, 22, 25-27, 29-31.

⁸³⁷ Time Warner Cable, *Comcast and Time Warner Cable Partner to Deliver OCAP Middleware* (press release), Aug. 10, 2004.

replace them with an OCAP-based navigation system, which will be able to handle VOD, subscription VOD, and other OCAP applications.⁸³⁸

189. On October 21, 2004, Samsung Electronics was the first to enter into agreements with CableLabs allowing Samsung to implement OCAP compliant middleware on their interactive digital television sets and set-top boxes. This agreement is seen by most in the cable industry as a significant advance for making interactive two-way cable products available at retail.⁸³⁹ On November 12, 2004, representatives from the cable and consumer electronics industries met with the Commission to report on the status of two-way plug-and-play negotiations. Industry representatives said that progress continues to be made at scheduled bi-weekly meetings, though no target date for completion was expressed.⁸⁴⁰

190. In October 2003, the Advanced Television Systems Committee (ATSC) announced that it had successfully coordinated its DTV Application Software Environment (DASE) specifications with OCAP to create the Advanced Common Applications Platform (ACAP), which provides broadcasters with the same advantages that OCAP provides for cable operators.⁸⁴¹ In November 2004, Starz Encore Group LLC demonstrated a satellite television feed paired with an application designed to run on OCAP. The transmission was successful and the results were verified by CableLabs. This was the first "out-of-lab" use of OCAP, making Starz the first programmer to embed OCAP functionality within a U.S. broadcast.⁸⁴² News Corp. owns approximately 77 percent of NDS Group plc, a supplier of conditional access systems, and approximately 41 percent of Gemstar-TV Guide International, the leading provider of EPGs and IPGs.⁸⁴³ Gemstar states that improvements in software, coupled with the introduction of open cable platforms, has permitted the development of new EPGs and their rapid deployment by MVPDs.⁸⁴⁴

2. Emerging Technologies

191. *Fiber to the Premises (FTTP)*.⁸⁴⁵ The number of telephony and broadband operators deploying or testing fiber-to-the-premises (FTTP) networks continues to grow monthly.⁸⁴⁶ The two major

⁸³⁸ Jeff Baumgartner, *Time Warner Looks Inside for IPG Guidance*, CED BROADBAND DIRECT, May 19, 2004.

⁸³⁹ CableLabs, *Samsung Electronics First to Sign CableLabs Licenses for Two-Way Digital Cable Products* (press release), Oct. 21, 2004.

⁸⁴⁰ See NCTA Nov. 19, 2004 Ex Parte, Docket No. 97-80.

⁸⁴¹ Advanced Television Systems Committee, Inc., *ATSC Publishes New Interactive "ACAP" Candidate Standard* (press release), Oct. 2, 2003.

⁸⁴² Starz Encore Group, LLC, *Starz Hosts First Satellite Transmission Using OCAP Platform* (press release), Nov. 1, 2004.

⁸⁴³ NDS Group plc, *Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the Fiscal Year Ended June 30, 2004*, at 7; Gemstar-TV Guide International Inc., *Quarterly Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the Quarterly Period Ended September 30, 2004*, at 10. See also *News Corp Order*, 19 FCC Rcd at 479, 576 ¶¶ 7, 227.

⁸⁴⁴ Gemstar Reply Comments at 6. Gemstar reports that it has arrangements with Comcast and Time Warner that allow the cable operators to combine Gemstar technology with that of other vendors; it has a non-exclusive licensing agreement with its affiliate, DIRECTV; and a non-exclusive agreement with EchoStar that allows it to use Gemstar technology for its EPG. *Id.* at 7-9. See also *News Corp Order*, 19 FCC Rcd 576-81, 284-5 ¶¶ 227-241, 247-250.

⁸⁴⁵ See *Fourth 706 Report*, 19 FCC Rcd 20555-57. As of May 2004, carriers have deployed FTTH Technology to 128 communities in 32 states. In addition, companies plan to deploy FTTH further in the future. For example, Verizon has accelerated its FTTH deployment with the goal of passing 1 million homes by the end of 2004. SBC has also announced plans to implement a limited FTTH deployment . . . in 2004, and to implement FTTH to approximately 300,000 premises in 2005. *Id.* See also paras. 127-128 *supra*.

⁸⁴⁶ Jeff Baumgartner, *Sizing up the Fiber Smorgasbord*, CED MAGAZINE.COM, Oct. 5, 2004.

optical techniques employed over fiber networks are active and passive. The passive technique operates over two different types of architectures: Broadband Passive Optical Network (BPON) and Gigabit PON (GPON). Standards are in force for these technologies as ITU-T recommendations G.983 and G.984, respectively.⁸⁴⁷ Verizon, Bell South, and SBC Communications currently use BPON. Verizon states that the passive nature of BPON will provide huge savings on plant maintenance because the architecture does not use electronics in the field except at the customer location.⁸⁴⁸ Verizon and SBC have launched multibillion dollar efforts to roll out fiber lines that can deliver Internet service, voice, and video through a single connection.⁸⁴⁹

192. Active networks, on the other hand, use active electronic devices (e.g., amplifiers, splitters) and the platform enables sending only the channel the subscriber is watching, preventing signal theft from rogue set-top boxes. Makers of active FTTP architectures are entering into agreements primarily with smaller telephone companies, municipalities, and utilities. For example, the Utah Telecommunication Open Infrastructure Agency (UTOPIA) and iProvo are using active FTTP architecture. UTOPIA is connecting 50,000 premises in Salt Lake City. iProvo is building out a network that reaches 27,000 homes and 4,100 businesses.⁸⁵⁰

193. **Distributed Television Transmission (DTx).** A DTV distributed transmission system employs multiple synchronized transmitters spread around a station's service area. Each transmitter broadcasts the station's DTV signal on the same channel, relying on the performance of "adaptive equalizer" circuitry in DTV receivers to cancel or combine the multiple signals plus any reflected signals to produce a single signal. Such distributed transmitters are considered to be similar to analog TV booster stations, a secondary, low power service used to "fill in" gaps in the parent station's coverage area, but DTV technology has the potential to enable this type of operation in a much more efficient manner than its analog predecessor.⁸⁵¹ The Commission approved such systems in principle and has agreed to begin a proceeding on the necessary rules, allowing use of the technology on a case-by-case basis in the interim.⁸⁵²

194. **Digital Video Recording Technologies.** In August 2004, the Commission approved 13 content protection technologies for use with the Broadcast Flag, of which, several facilitate new uses of digital television content.⁸⁵³ The Digital Rights Management (DRM) technologies allow consumers to securely share digital video files within a home network environment and on portable media players.⁸⁵⁴ One DRM technology also allows a user to securely share digital video files outside the home with a

⁸⁴⁷ BPON uses ATM as a bearer protocol for transmitting in both directions. It originally supported 155 Mbps in both directions, but the latest version supports downstream rates of 622 Mbps and upstream of 155 Mbps. GPON is a new standard that carries gigabit rate streams. It is capable of up to 2.5 Gbps in each direction and supports legacy ATM infrastructure.

⁸⁴⁸ *Id.*

⁸⁴⁹ Almar Latour, *Showdown of the Giants*, WALL STREET JOURNAL, Nov. 8, 2004, at B1.

⁸⁵⁰ *Id.*

⁸⁵¹ The Commission's Spectrum Policy Task Force has recommended that digital television broadcasters be permitted to operate single frequency low power distributed transmission systems within their present service areas. See *Spectrum Policy Task Force Report*, ET Docket No. 02-135 (Nov. 2002), at 64, <http://www.fcc.gov/sptf/reports.html> (visited Jan. 14, 2005).

⁸⁵² *Id.* at paras. 177-8. See also para. 92 *supra*.

⁸⁵³ *Digital Output Protection Technology and Recording Method Certifications*, 19 FCC Rcd 15876 (2004). See also para. 91 *supra*.

⁸⁵⁴ The approved DRM technologies are TiVoGuard, Helix DRM, Microsoft Windows DRM, and SmartRight. *Id.* at ¶¶ 19, 46-60.

limited number of devices registered on the user's account.⁸⁵⁵ Several other technologies allow users to store digital video onto new portable media formats.⁸⁵⁶ In addition, high-definition DVRs have begun to appear on the market, which will further facilitate delivery of digital video content.⁸⁵⁷

195. **Home Networking and Wi-Fi.**⁸⁵⁸ Several cable operators are beginning to offer home networking services for their subscribers. Home networking allows cable operators to connect multiple devices in the consumer's home (e.g., set-top boxes, television sets, personal computers) to a central processing device (e.g., set-top box, cable modem).⁸⁵⁹ Currently, the most common application for home networking is to connect multiple computers in the home to cable modem services, but the service can be used to transmit video such as downloaded VOD movies. Comcast, Time Warner and Cox all offer home networking using a wireless system based on CableLabs' CableHome specifications, connecting as many as five computers in the home.⁸⁶⁰

196. In addition to CableHome technology, some cable operators are reportedly conducting trials of the power industry's Home Plug technology.⁸⁶¹ HomePlug can be used to send data between cable modems, computers and other devices throughout the household at speeds of up to 14 Mbps using the electrical wiring already in the household.⁸⁶²

197. Cable operators also are forming alliances with wireless hotspot providers to offer their subscribers high-speed data access via Wi-Fi hotspots.⁸⁶³ Comcast, for example, offers to sign up its high-speed Internet access subscribers with Wi-Fi enabled laptops for T-Mobile subscription HotSpot service.⁸⁶⁴ Cox has joined Intel and Arizona State officials to offer a Wi-Fi hotspot service known as

⁸⁵⁵ *Id.* at ¶ 19.

⁸⁵⁶ MagicGate Type-R allows storage on Minidisc and MemoryStick media. CPRM allows storage onto DVD-R/RW Secure CompactFlash, Microdrive media, and SD Memory Cards. Vidi allows storage onto DVD+R/RW, D-VHS allows storage on VHS cassettes. *Id.* at ¶¶ 24, 36, 30, 41.

⁸⁵⁷ See, e.g., Motorola, Inc., *Motorola: Never Miss a Play with Motorola HD DVR*, <http://broadband.motorola.com/getdvr/> (visited Nov. 11, 2004); DIRECTV Group Inc., *DIRECTV HD DVR*, http://www.directv.com/DTVAPP/imagine/TiVo_HD.dsp (visited Dec. 3, 2004).

⁸⁵⁸ See *Fourth 706 Report*, 19 FCC Rcd at 20557-58.

⁸⁵⁹ CableLabs, *CableHome Home*, <http://www.cablelabs.com/projects/cablehome/> (visited Dec. 3, 2004).

⁸⁶⁰ Alan Breznick, *Cable Operators Explore HomePlug for High-Speed Data, Home Networks*, CABLE DATACOM NEWS, June 2004. CableLabs has been developing a new home networking specification called CableHome. CableLabs now has 10 Cable Home 1.0 certified products and three CableHome 1.1 certified products. See CableLabs, *CableHome Home*, <http://www.cablelabs.com/projects/cablehome/> (visited Dec. 3, 2004).

⁸⁶¹ Alan Breznick, *Cable Operators Explore HomePlug for High-Speed Data, Home Networks*, CABLE DATACOM NEWS, June 2004. See Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 9, 25, 32.

⁸⁶² Alan Breznick, *Cable Operators Explore HomePlug for High-Speed Data, Home Networks*, CABLE DATACOM NEWS, June 2004. See paras. 133-134 *supra*.

⁸⁶³ Wi-Fi is an interoperability certification for wireless local area network (LAN) products based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standard. A hotspot is a place where the public can access Wi-Fi service, either for free or for a fee. Hotspots can be found at coffeeshops, airport lounges, train stations, convention centers, hotels or any other public meeting areas. Corporations, campuses, local governments also are implementing hotspots to provide wireless Internet access to their visitors and guests. Wi-Fi Alliance, <http://www.wi-fi.com/OpenSection/glossary.asp?TID=2> (visited Jan. 14, 2005).

⁸⁶⁴ Alan Breznick, *MSOs Explore Data Connections Outside The Home*, CABLE DATACOM NEWS, Mar. 2004.

Public Online Wireless Electronic Resource (POWER), which provides free wireless broadband service to members of the public in Arizona.⁸⁶⁵

198. Consumer demand of the home gateway along with the evolution of IEEE standards and CableLabs specifications continues to enhance innovation in the home networking segment.⁸⁶⁶ Many companies including Intel, Cisco, D-Link, and Motorola, have recently delivered products based upon the newly revised IEEE 802.11n, CableHome 1.1, and PacketCable 1.1 standards.⁸⁶⁷ These new devices provide connectivity in the home powerful enough for VoIP and/or Wi-Fi hotspots to be supplied by Comcast and Time Warner.⁸⁶⁸

199. *Interactive Television (ITV)*. As we have reported previously, ITV services are services that support subscriber-initiated choices or actions that are related to one or more video programming streams (e.g., t-commerce, data enhancements, interactive gaming, VOD, DVRs, and EPGs).⁸⁶⁹ Cable operators, DBS operators, application developers, and technology manufacturers continue to explore a variety of ITV services in order to increase revenue and subscribership, and to reduce MVPD churn.

200. CableLabs continues to host events in which the developers of ITV services can test products to run over any cable television system. Under the OpenCable standard, applications written by independent content developers can run successfully on OpenCable compliant consumer devices, and manufacturers can develop products that will support all services delivered by cable operators.⁸⁷⁰ In August 2004, CableLabs conducted an interoperability event in which application developers demonstrated a wide variety of ITV applications (e.g., an airline travel reservation system, a medical advisor application, t-commerce applications, an advanced real-time and local weather application), and 11 different manufacturers presented OpenCable compliant hardware platforms.⁸⁷¹

201. *WiMAX*. WiMAX is a developing wireless standard that is expected to become a last mile solution for cable operators, broadband providers, and others.⁸⁷² The technology, embodied in IEEE Standard 802.16, has the potential to reach rural customers outside of the range of today's infrastructure and can also be implemented to provide an entire metropolitan area with high-speed Internet access. With speeds up to 75 Mbps at ranges as far as 30 miles, WiMAX technology is a crucial step towards a transition to IP communication entirely without wires.⁸⁷³

⁸⁶⁵ *Id.*

⁸⁶⁶ Satish Gupta, *Design Challenges for Home Gateway Devices*, CED MAGAZINE, Mar. 2003. The home gateway provides consumer benefits such as broadband Internet sharing, VPN, firewall security, voice/video-over-IP and home automation.

⁸⁶⁷ Wi-Fi Alliance, *IEEE 802.11n QA Final*, <http://www.wi-fi.org> (visited Nov. 9, 2004).

⁸⁶⁸ Craig Kuhl, *Does it Take Two (or More) to Tango?*, CED MAGAZINE, Nov. 2004.

⁸⁶⁹ See 2003 Report, 19 FCC Rcd at 1712-5 ¶¶ 187-192. See also *Nondiscrimination in the Distribution of Interactive Television Services Over Cable*, 16 FCC Rcd 1321 (2001) (ITV NOI).

⁸⁷⁰ CableLabs, *Twenty Four Firms Participate in CableLabs OCAP Interoperability Event* (press release), Aug. 18, 2004.

⁸⁷¹ *Id.*

⁸⁷² See *Fourth 706 Report*, 19 FCC Rcd at 20557. See also Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 23, 31; Jeff Baumgartner, *RF Magic Conjures Up Comcast Investment*, CED MAGAZINE, Oct. 26, 2004.

⁸⁷³ Intel Corp., *Broadband Wireless Access: IEEE 802.16 and WiMAX White Paper*, 2003.

202. *Next Generation Network Architecture LLC (NGNA)*. NGNA is an undertaking by Comcast, Cox, and Time Warner to help the transition to the all-digital network without undergoing expensive rebuilds. NGNA released a Request for Information (RFI) early this year. Some of the many topics under analysis are advanced codecs, such as MPEG-4 and Windows Media 9, solutions to migrate to an alternative conditional access system while still supporting the legacy, all-digital migration devices that can be used to convert digital signals to analog signals at or in a subscriber's home with as much transparency as possible and advanced codec transcoders, which could accept streams based on advanced codecs and convert them to MPEG-2. It is expected that NGNA initiative will be operated by CableLabs in the near future.⁸⁷⁴

203. *Advanced Compression Techniques*. These techniques can increase the number of video streams that can be transmitted in a given amount of spectrum by at least 2:1 and commonly closer to 3:1 compared to the current standard MPEG-2.⁸⁷⁵ Advanced codecs such as MPEG-4/H.264 and Microsoft's VC-1 (formerly Windows Media 9/VC-9) have approximately the same technical capabilities. The differences between the two are primarily in the licensing models, with MPEG-4 fees based on actual usage of the codec, rather than on a per-device basis.⁸⁷⁶ Both MPEG-4 and VC-1 were recently added to the HD-DVD and Blu-Ray BD-ROM high-definition disc specifications along with MPEG-2.⁸⁷⁷ Incorporation of advanced codecs into the ATSC standard for use in the main DTV video stream is not likely in the near future, as the MPEG-2 decoders present in all ATSC tuners are not capable of decoding the advanced codecs. The ATSC is, however, evaluating MPEG-4 and VC-1 for use in the Enhanced-VSB mode.⁸⁷⁸ Use of advanced codecs is currently limited to IPTV, VOD and services developed within the last few years. MPEG-2 users may transition into MPEG-4, first by launching new services utilizing advanced codecs to get the hardware on the market.⁸⁷⁹

204. *Cellular Video*.⁸⁸⁰ Texas Instruments recently introduced a chip for mobile phones called "Hollywood" that will support high quality digital broadcast TV for the wireless industry. The chip will use both the Digital Video Broadcasting – Handheld (DVB-H) standard from Europe and the Integrated Services Digital Broadcasting – Terrestrial (ISDB-T) standard from Japan. The DVB-H standard is expected to be extended to North America. Additional infrastructure must be deployed, as these standards require a dedicated wireless network,⁸⁸¹ although this requirement may be relaxed as IBOC datacasting, capable of carrying the video programming, becomes more prevalent.⁸⁸² Crown Castle has deployed a single-frequency DVB-H test site in Pittsburgh, Pennsylvania, using spectrum in

⁸⁷⁴ Jeff Baumgartner, *NGNA: A Sneak-Peek At Cable's Battle Plan For The Future*, CED MAGAZINE, May 2004.

⁸⁷⁵ Envivio, Inc., *About H.264*, <http://www.envivio.com/products/h264.html> (visited Nov. 9, 2004).

⁸⁷⁶ Chris Forrester, *IBC Agonizes Over Standards*, SATMAGAZINE.COM, Oct. 20, 2004, at 19.

⁸⁷⁷ Martyn Williams, *Blu-Ray Disc to Support MPEG-4, VC-1*, PCWORLD, Sept. 2, 2004.

⁸⁷⁸ Advanced Television Systems Committee, Inc., *ATSC Approves Enhancements to DTV Standard* (press release), July 20, 2004. E-VSB adds additional forward error correction layers to a portion of the data stream, creating a more robust but low payload capacity fallback stream.

⁸⁷⁹ Ina Fried, *Comcast Taps Microsoft for Seattle Set Tops*, CNET NEWS.COM, Nov. 8, 2004. For example, Comcast's partnership with Microsoft puts VC-1 capable set-top boxes in subscriber's homes.

⁸⁸⁰ See also para. 107 *supra*.

⁸⁸¹ Texas Instruments, *Texas Instruments Brings Live Digital TV to Your Cell Phone* (press release), Oct. 21, 2004.

⁸⁸² Junko Yoshida, *Cell Phone Video Gets Real*, EE TIMES, Sept. 20, 2004.

the 1440-1790 MHz band.⁸⁸³ The service will provide video at 24-30 frames per second, with the first mass deployments expected in 2007.⁸⁸⁴

3. Cable Modems

205. Cable modems allow cable subscribers to access high-speed data services, over hybrid fiber-coaxial (HFC) cable plant.⁸⁸⁵ Cable operators began offering high-speed data services using cable modems in order to better compete with other providers of video programming, such as DBS, which has not widely deployed two-way facilities-based high-speed Internet access services.⁸⁸⁶ High-speed data services provided using cable modems now enable emerging video services such as Internet video and video-on-demand.⁸⁸⁷

206. Cable modem deployment continues to increase, with manufacturers shipping approximately 2.3 million cable modems in North America during the second quarter of 2003.⁸⁸⁸ Internet access subscribers using cable modems also continues to increase. By June 2004, there were approximately 18.5 million cable modem subscribers in the United States.⁸⁸⁹

207. **DOCSIS.** We continue to report on the progress of the CableLabs Certified Cable Modem Project (also known as Data Over Cable Service Interface Specification or DOCSIS).⁸⁹⁰ DOCSIS defines interface requirements for cable modems used for high-speed data distribution over cable television networks.⁸⁹¹ As a result of this standard, DOCSIS certified modems are compatible with and interchangeable across similarly certified DOCSIS-equipped cable systems.⁸⁹² Industry analysts note that DOCSIS is the foundation of essentially all of CableLabs' specification initiatives.

208. The first specification, DOCSIS 1.0, allows cable operators to deliver high-speed Internet services on a "best effort" basis simultaneously over the same plant as video services.⁸⁹³ To date, CableLabs has certified 241 DOCSIS 1.0 modems.⁸⁹⁴ The next specification, DOCSIS 1.1, was designed

⁸⁸³ *Id.*

⁸⁸⁴ Texas Instruments, *Texas Instruments Brings Live Digital TV to Your Cell Phone* (press release), Oct. 21, 2004.

⁸⁸⁵ As described above, cable modem service is primarily residential service, but may also include some small business service. See fn. 137 *supra*. See also *Fourth 706 Report*, 19 FCC Rcd at 20553; See also Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 5-6, 15, 17, 25-27, 32.

⁸⁸⁶ See paras. 45-49, 52, 66-7 *supra*.

⁸⁸⁷ See paras. 113-119 *supra*.

⁸⁸⁸ Kinetic Strategies, *Cable Modem Market Stats & Projections*, CABLE DATACOM NEWS, Sept. 1, 2004, at <http://www.cabledatcomnews.com/cm/cmic/cm16c.html> (visited Sept. 17, 2004).

⁸⁸⁹ See High-Speed Service Report at Table 3.

⁸⁹⁰ CableLabs, *Cable Modem/DOCSIS: Cable Modem Home*, <http://www.cablemodem.com> (visited Sept. 17, 2004). See Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 5-6, 15, 17, 25-27, 32. See also *Fourth 706 Report*, 19 FCC Rcd at 20553-54; Douglas Shapiro, *CableLabs Financial Analyst Day*, Banc of America Securities, May 20, 2004, at 3-6.

⁸⁹¹ CableLabs, *Cable Modem/DOCSIS: Cable Modem Home*, <http://www.cablemodem.com> (visited Sept. 17, 2004).

⁸⁹² *Id.*

⁸⁹³ Best effort is a term for a quality of service class with no specified parameters and with no assurances that the traffic will be delivered across the network to the target device. Newton's Telecom Dictionary, 17th Edition, at 88.

⁸⁹⁴ CableLabs, *DOCSIS Certified Products*, at http://www.cablemodem.com/downloads/Certified_Products.pdf (visited Sept. 17, 2004).

to provide quality of service (QoS) functionality allowing operators to offer such products as IP telephony and tiered services.⁸⁹⁵ To date, CableLabs has certified 124 high-speed cable modems that comply with the DOCSIS 1.1 specification.⁸⁹⁶ The DOCSIS 2.0 standard is designed to address issues concerning the upstream portion of the cable plant (the transmission from the consumer to the Internet), and allow a network to operate at 30 Mbps capacity in both directions.⁸⁹⁷ To date, CableLabs has certified 62 high-speed cable modems that comply with the DOCSIS 2.0 specification.⁸⁹⁸ As of September 2004, 403 DOCSIS modems have received certification under DOCSIS.⁸⁹⁹ All DOCSIS 2.0 updates are compatible with earlier versions of DOCSIS products.⁹⁰⁰

209. Since our *2003 Report*, CableLabs has discontinued its plan to create a new DOCSIS 2.x specification that would have mandated support for additional features via software upgrades to cable modem equipment.⁹⁰¹ Instead, Cable Labs will add many of the planned features to the existing DOCSIS 2.0 specification through routine "Engineering Change Requests,"⁹⁰² and save other changes for the DOCSIS 3.0 specification.⁹⁰³ DOCSIS 3.0 is a much higher standard that will enable advanced services such as Internet video by making it possible to deliver hundreds of Mbps to a single DOCSIS device.⁹⁰⁴

210. As we reported last year, most operators continue to improve their high-speed Internet access service, increasing data transfer speeds and offering additional tiers of service.⁹⁰⁵ Cable operators are also experimenting with lower-priced tiers of service, some for as low as \$25 a month.

⁸⁹⁵ CableLabs, *CableLabs Certifies Two DOCSIS 2.0 Modems* (press release), Aug. 16, 2004. QoS guarantees network bandwidth and availability for applications. Any real-time media needs to be given prioritized traffic management treatment in order to assure the best user-perceived quality. NCTA, *Glossary of Cable & Telecommunications Terms*, CABLE DEVELOPMENTS 2004, at 335.

⁸⁹⁶ CableLabs, *DOCSIS Certified Products*, at http://www.cablemodem.com/downloads/Certified_Products.pdf (visited Sept. 17, 2004).

⁸⁹⁷ CableLabs, *CableLabs Certifies Two DOCSIS 2.0 Modems* (press release), Aug. 16, 2004.

⁸⁹⁸ CableLabs, *DOCSIS Certified Products*, at http://www.cablemodem.com/downloads/Certified_Products.pdf (visited Sept. 17, 2004).

⁸⁹⁹ *Id.*

⁹⁰⁰ CableLabs, *CableLabs Certifies Two DOCSIS 2.0 Modems* (press release), Aug. 16, 2004.

⁹⁰¹ Alan Breznick, *CableLabs Drops DOCSIS 2.x Plans, Eyes DOCSIS 3.0 Spec*, CABLE DATACOM NEWS, Sept. 2004.

⁹⁰² An Engineering Change Request (ECR) is the first step in the procedure to change CableLabs specifications. CableLabs posts the proposed change to their website and sends the ECR to a subject area working group mail list for work on the proposed change. CableLabs then posts an Engineering Change Order (ECO) to their website with indication of an ECO Comment Deadline. The final step in the procedure to change specifications is called an Engineering Change Notice (ECN), in which the proposed change is officially considered to be part of the specification that it modifies. CableLabs, *Glossary*, at <http://www.cablelabs.com/news/glossary.html#E> (visited Sept. 17, 2004).

⁹⁰³ Alan Breznick, *CableLabs Drops DOCSIS 2.x Plans, Eyes DOCSIS 3.0 Spec*, CABLE DATACOM NEWS, Sept. 2004.

⁹⁰⁴ *Id.*; Douglas Shapiro, *CableLabs Financial Analyst Day*, Banc of America Securities, May 20, 2004, at 3-6.

⁹⁰⁵ See para. 48 *supra*. See also Alan Breznick, *MSOs Boost Data Speeds Again, Add Low-Priced Options*, CABLE DATACOM NEWS, Sept. 2004.

211. *PacketCable*. PacketCable, another CableLabs project, is the specification standard developed for delivering advanced, real-time multimedia services over two-way cable plant.⁹⁰⁶ PacketCable uses IP technology to enable a wide range of services, including IP telephony, multimedia conferencing, interactive gaming, and general multimedia applications.⁹⁰⁷ As of August 2004, 11 PacketCable-embedded multimedia terminal adapter devices were certified by CableLabs.⁹⁰⁸

IV. FOREIGN MARKETS

212. In the *Notice*, the Commission invited comment on the status of competition in foreign markets for the delivery of video programming that would provide insights regarding the nature of competition in the United States.⁹⁰⁹ We requested information regarding the differences between the United States and other markets with respect to video programming distribution and advanced services provision that would be instructive as to the efficiency of market structures and regulations within the United States. Although none of the commenters responded to our request for data analysis or case studies of video delivery in foreign markets, we continue to believe that insights may be derived from examining such developments. In this section, we report on some interesting developments in foreign markets, covering video over IP broadband, the digital television transition, and terrestrial, cable and satellite competition, that we find relevant to our examination of video programming in the United States. In particular, we have chosen to examine video provided via IP broadband (also known as IPTV) in Hong Kong, Italy, and the United Kingdom. We also report on the transition to digital television in Germany and the United Kingdom, in order to provide insight into the relative efficiency of market structures and regulations within the United States.

A. Video Over IP Broadband

213. As discussed above, a potential source of new video competition is video offered over broadband Internet service.⁹¹⁰ Connection speeds are needed, however, such that standard full-screen viewing is possible. In the densely populated Hong Kong market, Now Broadband TV, a subsidiary of PCCW, the incumbent wireline telecommunications operator in Hong Kong, offers subscribers a service similar to cable and satellite television services using DSL connections on copper phone lines.⁹¹¹ According to company reports, this 24-hour service has 62 programming channels, distributed as true a la

⁹⁰⁶ Cable Labs, *PacketCable Home*, <http://www.packetcable.com> (visited Sept. 17, 2004). See *Fourth 706 Report*, 19 FCC Rcd at 20554; Letters from Paul Glist, Cole, Raywid & Braverman, Counsel for CableLabs, to Marlene Dortch, Secretary, FCC, July 28, 2004 and July 29, 2004, at 7-8, 25.

⁹⁰⁷ Cable Labs, *PacketCable Home*, <http://www.packetcable.com> (visited Sept. 17, 2004).

⁹⁰⁸ CableLabs, *PacketCable Certified Products*, at http://www.packetcable.com/downloads/Certified_Products.pdf (visited Sept. 17, 2004); CableLabs, *PacketCable Qualified Products* http://www.packetcable.com/downloads/Qualified_Products.pdf (visited Sept. 17, 2004). An embedded multimedia terminal adapter (E-MTA) is a device used to enable voice services over a cable modem.

⁹⁰⁹ *Notice*, 19 FCC Rcd at 10933 ¶ 76.

⁹¹⁰ See paras. 113-116 *supra*.

⁹¹¹ See fn. 514 *supra*. See also *Fourth 706 Report*, 19 FCC Rcd at 20579-20582. In terms of absolute numbers of broadband subscribers, the United States leads the world. See *id.* Chart 13.

carte service with subscribers paying only for the channels they select to watch.⁹¹² As of October 2004, the service had 370,000 subscribers.⁹¹³

214. Another leader, outside of the United States, in the provision of video content over a non-traditional broadband system is the FastWeb/e.Biscom system that provides service in a number of large Italian cities, including Milan, Rome, Genoa, Turin, Naples, and Bologna. The FastWeb/e.Biscom system provides voice, data, and over 120 channels of video service to residential and business customers over a combination of fiber-to-the-home and DSL technology. The DSL technology enables reception speeds of up to 4 Mbps.⁹¹⁴ At the end of June 2004, the system had approximately 151,000 video subscribers, up 116 percent from the previous year.⁹¹⁵ Approximately 43 percent of customers were directly connected to the fiber optic network, with the remaining 57 percent connected via DSL.⁹¹⁶

215. A basic television subscription is 10 Euros per month (\$12) for mainly free channels, but there is a menu of extra channels and VOD options. Many subscribers take the television service as part of a triple bundle of television, Internet, video conferencing and telephone, which costs 110 Euros per month (\$142). Without television and video communication, the service is 85 Euros/month (\$110). New films on the VOD service cost 6 Euros (\$8) per 24 hours, older movies cost 4 Euros (\$5) per 24 hours.⁹¹⁷

216. In the United Kingdom, several companies are developing broadband-based video services, spurred on in part by a reduction in the cost of securing unbundled local loop connections.⁹¹⁸ The first provider to enter the UK market was HomeChoice, which offers conventional TV channels, VOD, BBC programming, and highly popular BSkyB sports and movie channels.⁹¹⁹ HomeChoice's network reaches approximately 1.25 million homes through 73 telephone exchanges, but the company is reported to have only 3,300 subscribers.⁹²⁰ BT has initiated trials of a digital set-top box that allows users to download television programs on pay-per-view basis over broadband, with a projected commercial deployment in summer 2005.⁹²¹ Wanadoo UK, a France Telecom subsidiary, plans to launch television

⁹¹² See PCCW Ltd. *Now Broadband TV*, <http://www.nowbroadbandtv.com/eng/> (visited Jan. 14, 2005). See also Lee Gomes, *Web TV Is Changing The Way Programming Is Watched and Sold*, WALL STREET JOURNAL, May 10, 2004, at B1; Dan Gillmor, *Future of TV Looks a Lot Like Broadband*, MERCURY NEWS, Dec. 7, 2003.

⁹¹³ PCCW Ltd, *Now Broadband TV Wins CASBAA Chairman's Award* (press release), Oct. 31, 2004.

⁹¹⁴ Between 1.5 Mbps and 3.8 Mbps are thought to be necessary for good standard definition picture quality.

⁹¹⁵ E.Biscom, *Revenues Rise 77% in the First Half of 2004 to Euro 336.7 Million* (press release), Aug. 27, 2004.

⁹¹⁶ *Id.*

⁹¹⁷ See e.Biscom, <http://www.ebiscom.it/index.php?sid=64> (visited Oct. 10, 2004).

⁹¹⁸ See United Kingdom Office of Communications, *Ofcom Publishes Wholesale Price Proposals for Competitive Broadband Market* (press release), Aug. 26, 2004. Ofcom initiated its price review in May 2004. The final price adjustments are expected to take place in December 2004. *Id.* See also United Kingdom Office of Communications, *Review of the Wholesale Local Access Market Explanatory Statement and Notification*, Aug. 26, 2004, at <http://www.ofcom.org.uk/consult/condocs/rwlam/rwlam/> (visited Jan. 14, 2005).

⁹¹⁹ See United Kingdom Office of Communications, *The Communications Market – October 2004 Quarterly Update (Ofcom Report)*, at 46. HomeChoice offers approximately 80 channels of broadcast and on demand programming. The company offers service packages priced according to the download speed of the service: 512 Kbps (£27.50 per month, or \$51.00), 1 Mbps (£35.00 per month, or \$65.00), or 2 Mbps (£45.00 per month, or \$83.00). See Video Networks Ltd., *Home Choice*, http://www.homechoice.co.uk/our_tv_broadcast.html (visited Dec. 3, 2004).

⁹²⁰ *Id.*

⁹²¹ Graeme Weardon, *BT Video Trials to Fuel Broadband Speed Race*, ZDNet UK, Sept. 20, 2004. BT was granted a broadcasting license in March 2002, giving it the right to transmit television and video in the UK. *Id.* The set-top boxes are an enhanced version of BT's Freeview set-top boxes which receive digital terrestrial television signals. *Ofcom Report* at 46. See also Sean Byrne, *BT Trials a Video-On-Demand Service Over Broadband*, CD

(continued....)

and VOD services on its broadband platform sometime in 2005 using a wireless broadband gateway platform.⁹²² Finally, Ofcom, the UK communications regulator, has proposed to create a new “Public Service Publisher,” which would distribute public interest programming, of the type presently required of the BBC, in a digital format through broadband networks, networked DVRs, and mobile networks.⁹²³

217. Other incipient DSL-based video service offerings have been started in such places as Taipei, Taiwan; Monaco; Saskatchewan, Canada; Stavanger, Norway; and Canberra, Australia.⁹²⁴ Notwithstanding these efforts, video over DSL faces a number of serious obstacles, including lack of technical standards, entrenched competition from cable, satellite, and digital terrestrial television,⁹²⁵ the lack of a well developed business model, and difficulties in obtaining rights to distribute programming because of intellectual property and digital copyright issues.⁹²⁶

B. Digital Television Transition in Foreign Markets

218. Several European countries are switching from analog to digital transmission.⁹²⁷ There are operational platforms in the United Kingdom, Sweden, Spain, Finland, Netherlands, and Italy. France, Switzerland, Austria and Norway are expected to initiate digital television transitions beginning in 2005.⁹²⁸ Generally, European regulatory authorities plan to switch off analog broadcast transmissions between 2006 and 2012.⁹²⁹ For an overview of overall foreign markets’ transition to digital platforms, including terrestrial, cable and satellite, see Table 7.

219. In our last *Report* we noted the successful completion of the digital television broadcasting transition in the Berlin-Brandenburg television market in Germany. This experience was the subject of a subsequent report issued by the General Accountability Office (formerly the General Accounting Office).⁹³⁰ Over the course of the last year, further geographic “islands” of analog terrestrial

(...continued from previous page)

FREAKS.COM, Sept. 21, 2004; John Delaney, *TV and Video Over Broadband: BT May be Setting the Bar Too High*, Ovum Research, Sept. 1, 2004.

⁹²² *Ofcom Report* at 46. See also Wanadoo, *Wanadoo Launches LiveBox* (press release), July 19, 2004.

⁹²³ United Kingdom Office of Communications, *Hypothetical Tender Document for a Public Service Publisher*, Nov. 3, 2004, at <http://www.ofcom.org.uk/consultations/current/psp/psp.pdf?a=87101> (visited Dec. 3, 2004).

⁹²⁴ See, e.g., Point Topic Ltd., *Video-on-Demand*, at <http://www.point-topic.com/content/bmm/profiles/video+on+demand.htm>; Kevin Fitchard, *Canadian Telcos Pave Road to Telco TV*, TELEPHONY, Oct. 11, 2004.

⁹²⁵ Generally, throughout Europe, the term “terrestrial” is used to refer to over-the-air analog and digital broadcasting. For example, to describe new digital broadcasting, most European countries refer to digital terrestrial television, or DTT, whereas in the United States we use the term digital television or DTV.

⁹²⁶ Vince Vittore, *Video Over DSL: Loud But Not Clear*, TELEPHONY, Mar. 8, 2004; Research and Markets, *Tough Challenges Ahead for Europe’s Video-Over Broadband Providers*, June 2004, at <http://www.researchandmarkets.com/reports/219736/> (visited Dec. 4, 2004); Amber Chung, *Video Offerings the Next Star Attraction for ISPs*, TAIPEI TIMES, June 24, 2004, at 10; *European Video-Over-Broadband Arrives, Profits Lag Behind*, ELECTRONIC NEWS, Aug. 6, 2004.

⁹²⁷ See, e.g., Eric Pfanner, *Will Digital TV Hit Jackpot in Europe? Stay Tuned*, INTERNATIONAL HERALD TRIBUNE, Nov. 1, 2004.

⁹²⁸ Alexander Shulzycki, *DTT in Europe: Overview and Assessment*, Presentation to DigiTAG Seminar, Oct. 2004, at <http://www.digitag.org/lateupdate/globupdate.htm> (visited Jan. 14, 2005) (*Shulzycki Presentation*).

⁹²⁹ *Id.* at 3. See also *Teething Troubles for DTT in Europe*, European Broadcasting Union, DIFFUSION, 2004, at <http://www.ebu.ch/en/union/publications/diffusion/index.php> (visited Dec. 3, 2004).

⁹³⁰ U.S. General Accounting Office, *German DTV Transition Differs From US Transition in Many Respects, But Certain Key Challenges are Similar*, GAO-04-926T (July 2004).

television have completed the transition process in Germany. This experience, and the apparent ease with which the population accepted it, has triggered a search for lessons that might be transferred to the United States.

220. At the outset, it is obvious that there are significant differences in market and regulatory conditions that suggest that the German transition cannot be immediately or entirely replicated within the U.S. First, the German market does not distribute high-definition programming content, and thus the digital conversion results in more programming becoming available rather than higher quality versions of the same programming. Second, satellite service, beyond the initial cost of the reception equipment, is essentially free of direct charges for a significant quantity of programming and thus is for many a ready substitute for terrestrial service. Third, digital to analog conversion equipment (set-top-boxes) could be made readily available in Germany at a reasonably low cost due to the absence of any need to convert HD service content and the existing market for very similar devices elsewhere in Europe (e.g., U.K.). And fourth, providers of terrestrial broadcast content do not have their own distribution facilities (either terrestrial transmitters, cable or satellite) and must, subject to governmental carriage regulations, arrange for each mode of distribution.⁹³¹

221. Notwithstanding these critical differences, the ability of the German DTV transition to move forward may share with the U.S. the fact that members of the public already receiving either cable or satellite service could continue to receive either analog or digital service after the transition without significant disruption. Prior to the Berlin-Brandenburg transition, members of the public in the area each received a letter from the local media authority responsible for the transition that included the following language:

Therefore, most important for everyone is: Those affected by the change are only households that receive their television programming using an antenna, roof-top antennas or room antennas. Households that exclusively receive television via cable or satellite (also via secondary or tertiary devices) are not affected.⁹³²

222. In the United Kingdom, digital television penetration was estimated to have reached over 55 percent of households by the end of June 2004, thus making the UK the most highly penetrated digital television market in the world.⁹³³ The principal driver of digital television penetration is Freeview, a free service allowing the reception of 30 digital broadcast channels, which accounts for close to four million of the total 13.7 million digital households.⁹³⁴ Nevertheless, the UK government has determined that market forces alone would not be sufficient to compel consumers to switch to digital service and thus

⁹³¹ For a detailed discussion of Berlin's experience, see Berlin Media Authority, *Berlin Goes Digital: The Switchover of Terrestrial Television from Analogue to Digital Transmission in Berlin-Brandenburg – Experiences and Perspectives*, at http://www.mabb.de/bilder/Projektbericht_engl.pdf (visited Jan. 14, 2005). See also Oliver Werner, Alfred Riedel and Stefan Wirts, *Switchover – the German Approach*, EBU TECHNICAL REVIEW, Oct. 2004; Ed Wilson, *Digital Terrestrial Television Rollout in Europe: Case Study – Germany*, Presentation to DigiTAG Seminar, Oct. 2004, at <http://www.digitag.org/lateupdate/globupdate.htm> (visited Jan. 14, 2005).

⁹³² Letter to television viewers from Dr. Hans Hege, Director for the Media Institute Berlin-Brandenburg.

⁹³³ *Ofcom Report* at 45.

⁹³⁴ Alan Jay, *55% of UK Households Receive Digital Television*, DIGITAL SPY, Sept. 17, 2004, at <http://www.digitalspy.co.uk/article/ds15789.html> (visited Jan. 14, 2005). The remaining digital households are cable and satellite subscribers. Freeview requires a set-top box that connects to existing televisions and analog antennas, and which retails for approximately £60 (\$111), but there is no subscription fee once installed. See Freeview, at <http://www.freeview.co.uk/> (visited Jan. 14, 2005).

instituted a formal process towards that end, expected sometime in 2012.⁹³⁵ In March 2004, Finland adopted an analog to digital transition plan whereby all television broadcast transmissions would convert to digital by August 2007.⁹³⁶ The transition is being conducted on a geographic basis, with major cities converting first and, by the end of 2004, approximately 94 percent of the Finnish population will live within range of the digital broadcast network.⁹³⁷ Following a failed attempt to launch a pay model for digital television, Spain has launched a new effort to transition to digital using the Freeview model presently finding success in the UK. In July 2004, free digital television service was launched in the Maresme region near Barcelona, covering approximately 170,000 homes and delivering four digital channels and an interactive channel.⁹³⁸ Sweden launched digital terrestrial television in 1999, and it is available to 90 percent of the 4.2 million Swedish households, but penetration stands at approximately 300,000 television households.⁹³⁹ In March 2004, Sweden adopted legislation establishing a February 2008 deadline for its analog to digital transition.⁹⁴⁰

⁹³⁵ See United Kingdom Office of Communications, *Driving Digital Switchover: A Report to the Secretary of State*, Apr. 5, 2004. Switch overs are expected to take place on a regional basis and will begin in 2007. The bulk of switchovers are expected between 2008 and 2011. See Richard Lindsay-Davies, Director of Public Affairs of DTG UK, Presentation to the DigiTAG Seminar, October 2004.

⁹³⁶ See Digitv.fi, *Parliamentary Working Group: Finland Will Switch Over to Digital Television in 2007* (press release), Dec. 8, 2003.

⁹³⁷ For detailed information on the roll-out of the digital broadcast network, see Digitv.fi, Digital TV Coverage Area, at <http://www.digitv.fi/sivu.asp?path=9;4710> (visited Jan. 14, 2005). Finland has approximately 2.4 million television households. See Digitv.fi, *Introduction to Digital Finnish Digital Terrestrial Television*, Sept. 2004, at <http://www.digitv.fi/binary.asp?page=4644&file=attachments\2004\9\1134146118891\Digitv%20stationary.pdf> (visited Jan. 14, 2005).

⁹³⁸ *Shulzycki Presentation* at 8.

⁹³⁹ *Id.* at 6 and 11.

⁹⁴⁰ Per Mellberg, *Swedish DTT Roll-Out*, Presentation to DigiTAG Seminar, October 2004, at <http://www.digitag.org/lateupdate/globupdate.htm> (visited Jan. 14, 2005). See also Christina Jutterstrom, Lisa Soderberg, Christina Bjork, *Digital in Sweden*, DIFFUSION, 2004, at <http://www.ebu.ch/en/union/publications/diffusion/index.php> (visited Jan. 14, 2005).

Table 7: Digital TV Households by Platform in Selected Countries in 2003⁹⁴¹

Country	Total TV HHs	Total Digital TV HH		Cable Digital TV HH		Satellite Digital TV HH		Over-the-Air Digital TV HH	
	(mil.)	(mil.)	Percent	(mil.)	Percent	(mil.)	Percent	(mil.)	Percent
Australia ⁹⁴²	7.8	0.41	5.25%	-		-		-	
Austria	3.2	0.55	17.1%	0.05	1.6%	0.5	15.5%	0	0.0%
Belgium	4.2	0.18	4.3%	0.16	3.8%	0.02	0.5%	0	0.0%
Canada ⁹⁴³	11.1	4.11	37.02%	2.12	19.1%	1.99	17.8%	No data	<0.1%
Denmark	2.3	0.35	15.5%	0.08	3.5%	0.27	11.9%	0	0.0%
Finland	2.3	0.21	9.2%	0.02	0.9%	0.1	4.4%	0.09	3.9%
France	24.4	4.62	18.9%	0.92	3.8%	3.7	15.2%	0	0.0%
Germany	36.6	5.16	14.1%	1.63	4.5%	3.15	8.6%	0.38	1.0%
Greece	3	0.25	8.4%	0	0.0%	0.25	8.4%	0	0.0%
Ireland	1.3	0.46	35.1%	0.1	7.6%	0.36	27.4%	0	0.0%
Italy	20.9	2.85	13.6%	0	0.0%	2.85	13.6%	0	0.0%
Japan ⁹⁴⁴	48.5	12.17	25.1%	4.0	8.24%	6.2	12.8%	No data	No data
Luxembourg	0.2	0.01	5.3%	0	1.0%	0.01	4.2%	0	0.0%
Netherlands	7.1	0.69	9.7%	0.11	1.6%	0.55	7.8%	0.03	0.4%
Portugal	3.1	0.51	16.2%	0.02	0.6%	0.49	15.6%	0	0.0%
Spain	12.6	2.38	18.9%	0.15	1.2%	2.06	16.4%	0.17	1.3%
Sweden	4.5	1.25	28.0%	0.17	3.8%	0.88	19.7%	0.2	4.5%
U.K.	24.4	13.14	53.8%	2.29	9.4%	8.04	32.9%	2.81	11.5%
U.S. ⁹⁴⁵	106.6	41.75	40.0%	21.5	20.2%	20.25	19.0%	0.85	0.8%

C. Terrestrial, Cable, and Satellite Competition

223. In contrast to the United States, the majority of European households continue to receive television by terrestrial means, with 46 percent receiving television via terrestrial means only, 32 percent receiving it via cable only, and 13 percent receiving it via satellite only. Greece has the highest terrestrial penetration rate, with 94 percent, followed by Spain at 83 percent, and Italy at 78 percent. In terms of cable penetration, Netherlands maintains the highest penetration, at 93 percent of households, followed by Belgium at 90 percent and Luxemburg at 70 percent. Greece has no cable penetration. Germany maintains the highest satellite penetration of households, reaching 38 percent, followed by Austria at 33 percent and the United Kingdom at 19 percent. Finally, seven percent of EU households overall receive programming by some combination of terrestrial, cable and satellite.

⁹⁴¹ Unless otherwise noted, data is from Commission of the European Communities, *Ninth Report on the Implementation of the Telecommunications Regulatory Package*, Nov. 19, 2003, Technical Annex 1, at 100.

⁹⁴² Data for Australia is from *Digital Broadcasting Australia Newsletter*, Sept.-Oct. 2004, at <http://www.dba.org.au/newsletter/ib-sep04-full>.

⁹⁴³ Data for Canada is from the *CRTC Broadcasting Monitoring Report*, Dec. 2003 (digital cable TV includes MDS subscribers); total TV households from ITU statistics.

⁹⁴⁴ Data for Japan is from *Digiworld 2003: The European Way to Think the Digital World* (2004), at 114.

⁹⁴⁵ Total television household and cable household data for the United States is from *NCTA 2003 Year-end Industry Overview*, at 6. Satellite household data is from *2003 Report*, 19 FCC Rcd at 1718. Over the air digital households data is based on the Consumer Electronics Association estimate for the number of DTV receivers sold to date.

Table 8. Television and Means of Reception – 2003 - 2004⁹⁴⁶

	Percent of Terrestrial Only HH		Percent of Cable Only HH		Percent of Satellite Only HH		Percent of HH with Two or More		Percent of HH with None at all	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
EU Average	47	46	32	32	12	13	7	7	2	2
Austria	19	14	34	37	32	33	11	13	2	1
Belgium	2	3	92	90	2	2	1	2	2	3
Denmark	19	16	66	68	3	6	10	9	2	2
Finland	52	46	30	42	9	3	4	2	4	5
France	72	65	10	11	9	12	6	8	3	4
Germany	7	5	56	53	32	38	4	2	1	2
Greece	94	94	0	0	2	2	4	3	1	1
Ireland	36	33	42	43	12	15	8	6	1	3
Italy	80	78	3	4	5	6	9	8	2	2
Luxembourg	5	6	69	70	16	15	8	9	1	1
Netherlands	3	2	90	93	3	3	3	2	1	1
Portugal	62	65	31	28	5	5	2	2	0	0
Spain	81	83	7	6	6	2	6	8	0	0
Sweden	27	25	47	51	9	11	13	10	3	2
U.K.	52	49	14	13	17	19	16	16	1	2

V. ADMINISTRATIVE MATTERS

224. This *2004 Report* is issued pursuant to authority contained in sections 4(i), 4(j), 403, and 628(g) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 154(j), 403, and 548(g).

225. It is ORDERED that the Office of Legislative Affairs shall send copies of the *2004 Report* to the appropriate committees and subcommittees of the United States House of Representatives and the United States Senate.

226. It is FURTHER ORDERED that the proceeding in MB Docket No.04-227 IS TERMINATED.

⁹⁴⁶ Data is from Ipsos, Telecoms Services Indicators, Report Produced for the European Commission, DG Information Society 2004.

227. *Accessible Formats.* To request materials in accessible formats for people with disabilities (Braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (TTY).

FEDERAL COMMUNICATIONS COMMISSION

A handwritten signature in black ink that reads "Marlene H. Dortch". The signature is fluid and cursive, with a long, sweeping underline that extends to the left.

Marlene H. Dortch
Secretary

APPENDIX A**LIST OF COMMENTERS****Initial Comments**

The America Channel
American Cable Association (ACA)
BellSouth Corporation (BellSouth)
Broadband Service Providers Association (BSPA)
City of Weston, Florida and the Town Foundation, Inc. (Weston)
Comcast Corporation (Comcast)
Consumer Electronics Association (CEA)
The DIRECTV Group, Inc. (DIRECTV)
EchoStar Satellite L.L.C. (EchoStar)
Fox Cable Networks Group (Fox)
National Association of Telecommunications Officers and Advisors and the Alliance for Community Media (NATOA)
National Association of the Deaf (NAD)
National Cable & Telecommunications Association (NCTA)
National Rural Telecommunications Cooperative (NRTC)
National Telecommunications Cooperative Association (NTCA)
New Jersey Board of Public Utilities (New Jersey)
Paxson Communications Corporation (Paxson)
RCN Corporation (RCN)
Satellite Broadcasting and Communications Association (SBCA)
SBC Communications, Inc. (SBC)
SES Americom, Inc. (SES)
The Verizon Telephone Companies (Verizon)

Reply Comments

Advocate Communications, Inc. d/b/a Advanced Communication (Advocate)
The America Channel
Broadband Service Providers Association (BSPA)
Comcast Corporation (Comcast)
Consumers Union
The DIRECTV Group, Inc. (DIRECTV)
EchoStar Satellite L.L.C. (EchoStar)
Gemstar-TV Guide International, Inc. (Gemstar)
National Association of Broadcasters (NAB)
National Association of Telecommunications Officers and Advisors and the Alliance for Community Media (NATOA)
National Cable & Telecommunications Association (NCTA)
Organization for the Promotion and Advancement of Small Telecommunications Companies (OPASTCO)
Paxson Communications Corporation (Paxson)
Telecommunications for the Deaf, Inc. (TDI)
TiVo Inc.
The Verizon Telephone Companies (Verizon)
Viacom
The Walt Disney Company (Disney)

APPENDIX B

TABLE B-1

Assessment of Competing Technologies⁽¹⁾

Technology Used	June 00	June 01	June 02	June 03	June 04
(1) TV Households	100,801,720	102,184,810	105,444,330	106,641,910	108,410,160
Percent Change	1.41%	1.37%	3.19%	1.14%	1.66%
(2) MVPD Households ⁽ⁱⁱ⁾	82,973,717	86,062,074	87,562,641	89,772,191	92,295,766
Percent Change	4.38%	3.72%	1.74%	2.52%	2.81%
Percent of TV Households	82.31%	84.22%	83.04%	84.18%	85.14%
(3) Cable Subscribers	66,250,000	66,732,000	66,472,000	66,050,000 ⁽ⁱ⁾	66,100,000
Percent Change	1.51%	0.73%	-0.39%	-0.63%	0.08%
Percent of MVPD Total	79.84%	77.54%	75.91%	73.58%	71.62%
(4) MMDS Subscribers	700,000	700,000	490,000	200,000	200,000
Percent Change	-14.74%	0.0%	-30.00%	-59.18%	0.00%
Percent of MVPD Total	0.84%	0.81%	0.56%	0.22%	0.22%
(5) SMATV Subscribers	1,500,000	1,500,000	1,600,000	1,200,000	1,100,000
Percent Change	3.45%	0.0%	6.67%	-25.00%	-8.33%
Percent of MVPD Total	1.81%	1.74%	1.83%	1.34%	1.19%
(6) HSD Subscribers	1,476,717	1,000,074	700,641	502,191	335,766
Percent Change	-17.20%	-32.28%	-29.94%	-28.32%	-33.14%
Percent of MVPD Total	1.78%	1.16%	0.80%	0.56%	0.36%
(7) DBS Subscribers	12,987,000	16,070,000	18,240,000	20,360,000	23,160,000
Percent Change	28.86%	23.74%	13.50%	11.62%	13.75%
Percent of MVPD Total	15.65%	18.67%	20.83%	22.68%	25.09%
(8) OVS Subscribers ⁽ⁱⁱⁱ⁾	60,000	60,000	60,000		
Percent Change	0.00%	0.00%	0.00%		
Percent of MVPD Total	0.07%	0.07%	0.07%		
(9) BSP Subscribers ^(iv)				1,460,000	1,400,000
Percent Change				N/A	-4.11%
Percent of MVPD Total				1.63%	1.52%

Notes:

- (i) Some numbers have been rounded, and we have revised a number of the household and subscriber numbers based on improved data sources and to make consistent our use of data sources. In particular, we revised the 2003 Cable Subscriber number downward in order to allow consistent use of a source throughout the series.
- (ii) The total number of MVPD households is likely to be somewhat less than the given figure since some households subscribe to the services of more than one MVPD. See 1994 Report, 9 FCC Rcd at 7480. However, the number of households subscribing to more than one MVPD is expected to be low. Hence the given total can be seen as a reasonable estimate of the number of MVPD households.
- (iii) Beginning in 2003, we combined OVS subscribers with BSP subscribers. We are no longer therefore, reporting a separate number for OVS subscribers.
- (iv) This number includes some, if not all, OVS subscribers, and may double count some cable subscribers from newer cable overbuild systems. We started reporting this number last year and thus we do not have

subscribers for years previous to 2003. Obviously, the number did not increase from nothing, or 60,000 (the OVS subscribers) to 1.4 million in one year, but we lacked data to estimate the number previous to 2003.

Sources:

- (1) Television households: All years, *Nielsen Media Research*.
- (2) Total MVPD households: The sum of the total number of subscribers listed under each of the categories of the various technologies. See note (ii) above.
- (3) Cable subscribers: All years, Kagan Research, LLC, *Kagan's 10-Pay TV Subscriber History*, Broadband Cable Financial Databook 2004, July 2004, at 9.
- (4) MMDS subscribers: 2000 from NCTA Comments for the *2000 Report* at 9; 2001 from NCTA Comments for the *2001 Report* at 7; 2002 from NCTA Comments for the *2002 Report* at 12; 2003 from NCTA Comments for the *2003 Report* at 8; 2004 from NCTA Comments at 7, fn. 12.
- (5) SMATV subscribers: 2000 subscribers from NCTA Comments for the *2000 Report* at 9; 2001 subscribers from NCTA Comments for the *2001 Report* at 9; 2002 subscribers from NCTA Comments for the *2002 Report* at 12; 2003 subscribers from NCTA Comments for the *2003 Report* at 8; 2004 subscribers from NCTA Comments at 7, fn. 12.
- (6) HSD subscribers: 2000 from SkyReport.com at http://www.skyreport.com/dth_us.htm; 2001 from SBCA Comments for the *2001 Report*, Table 1 at 4; 2002 from SkyReport.com at http://www.skyreport.com/dth_us.htm; 2003 from SBCA Comments for the *2003 Report* at 4; 2004 from para. 64 *supra*.
- (7) DBS subscribers: 2000 from SkyReport.com at http://www.skyreport.com/dth_us.htm; 2001 from SBCA Comments for the *2001 Report*, Table 1 at 4; 2002 from SkyReport.com at http://www.skyreport.com/dth_us.htm; 2003 from SBCA Comments for the *2003 Report* at 4; 2004 from paras. 54-55 *supra*.
- (8) BSP subscribers: 2003 subscribers from NCTA Comments for the *2003 Report* at 8; 2004 Subscribers from BSPA Comments at 6 and FCC estimates.

TABLE B-2

**Number and Subscriber Size of Major Cable System Clusters
(Cumulative Figures)**

Range of Clustered Subscribers (thousands)	2000		2001		2002		2003	
	Clusters	Subscribers (millions)						
100-199	26	3.6	30	4.3	31	4.5	34	4.9
200-299	13	3.2	17	4.2	18	4.4	18	4.4
300-399	22	7.4	18	6.1	21	7.1	17	5.7
400-499	13	5.9	10	4.4	10	4.4	10	4.4
>500	34	34.3	32	33.3	29	31.0	29	34.3
Total	108	54.4	107	52.3	109	51.3	108	53.6

Sources:

2000 from Kagan World Media, *Major Cable TV Systems/Clusters*, Broadband Cable Financial Databook 2001 at 36; 2001 from Kagan World Media, *Major Cable TV Systems/Clusters*, Broadband Cable Financial Databook 2002 at 38; 2002 from Kagan World Media, *Major Cable TV Systems/Clusters*, Broadband Cable Financial Databook 2003, at 39; and 2003 from Kagan Research, LLC, *Major Cable TV Systems/Clusters*, Broadband Cable Financial Databook 2004, at 39-40.

TABLE B-3

2004 Concentration in the National Market for Purchase of Video Programming⁽¹⁾

Rank	Company	Percent of Subscribers ⁽²⁾
1	Comcast	23.37
2	DirecTV	12.10
3	Time Warner	11.87
4	EchoStar	10.63
Top 4		57.97
5	Cox	6.92
6	Charter	6.73
7	Adelphia	5.88
8	Cablevision	3.19
Top 8		80.69
9	Bright House	2.37
10	Mediacom	1.66
Top 10		84.72
Top 25		90.41
Top 50		92.32
	HHI	1097 ⁽³⁾

Notes:

- (1) MSO subscriber totals as of March 2004, and reported in Top Cable System Operators as of March 2004, Kagan World Media, *Cable TV Investor*, July 29, 2004, at 16-17. There is no double counting of subscribers. If a cable operator is partially owned by more than one MSO, its subscribers are assigned to the largest MSO. Subscribers for DirecTV and EchoStar are based on the company's 10-Q filings.
- (2) The total number of MVPD subscribers used to calculate the HHI is 92,295,766 from Table B-1. This figure is for June 2004, whereas individual company subscriber total come from March. As a result, 1097 probably is slightly higher than the HHI in March.
- (3) The HHI is calculated on the basis of market shares for the top 65 companies. Because all of the remaining MVPDs have very small shares of the market, an HHI calculation that included all cable system operators could only be slightly higher (no more than 2-3 points) than the given HHI.
- (4) Due to a revision of cable and MVPD subscribers for 2003, the market shares of some of the top providers, particularly DirecTV and EchoStar, may have appeared to have shrunk, when, in fact, they grew since last year.

TABLE B-4

**Concentration in the National Market for the Purchase of Video Programming
2001-2004***

Market Share	Percent of MVPD Subscribers			
	2001	2002	2003	2004
Top Share	16.44	14.75	23.80	23.37
Top 2	30.79	29.04	36.72	35.47
Top 3	42.11	41.03	48.90	47.34
Top 4	51.64	50.48	58.71	57.97
Top 10	84.29	84.44	85.94	84.72
Top 25	89.70	90.26	91.72	90.41
Top 50	91.38	92.05	93.65	92.32
HHI	905	884	1134	1097

* -- Reported statistics for 2001-2003 are based on June data. For 2004, March data were used since June data are unavailable.

Sources:

Data for 2001 through 2002 were taken from *Reports, 2001-2002*. Data for 2003 have been revised to use consistent data sources. Data for 2004 are from Table B-3.

APPENDIX C

TABLE C-1

**National Video Programming Services
Affiliated With One or More Cable MSO**

Programming Service	Launch Date	MSO Ownership (%)
Action Max	Aug-80	Time Warner (100)
American Movie Classics (AMC)	Oct-84	Cablevision (60)
Animal Planet	Oct-96	Cox (25), Advance Newhouse (25)
@Max	May-01	Time Warner (100)
Boomerang		Time Warner (100)
Cartoon Network	Oct-92	Time Warner (100)
Cinemax	Jun-98	Time Warner (100)
CNN	Jun-80	Time Warner (100)
CNN En Español	Mar-97	Time Warner (100)
CNN Headline News	Jan-82	Time Warner (100)
CNN International	Jan-95	Time Warner (100)
Court TV	Jul-91	Time Warner (50)
Discovery Channel	Jun-85	Cox (25), Advance Newhouse (25)
Discovery En Español	Oct-98	Cox (25), Advance Newhouse (25)
Discovery Health Channel	Jul-98	Cox (25), Advance Newhouse (25)
Discovery HD Theatre	Jun-02	Cox (25), Advance Newhouse (25)
Discovery Home Channel	Oct-96	Cox (25), Advance Newhouse (25)
Discovery Kids Channel	Oct-96	Cox (25), Advance Newhouse (25)
Discovery Times	Oct-96	Cox (12.5), Advance Newhouse (12.5)
Discovery Wings: The Aviation and Adventure Network	Jul-98	Cox (25), Advance Newhouse (25)
E! Entertainment	Jun-90	Comcast (60.5)
5StarMax	May-02	Time Warner (100)
FITTV	Jan-04	Cox (25), Advance Newhouse (25)
Fuse	Jul-94	Cablevision (60)
Fuse On Demand	Jun-03	Cablevision (60)
G4techTV	Jun-02	Comcast (83.5)
Golf Channel	Jan-95	Comcast (99.85)

Programming Service	Launch Date	MSO Ownership (%)
HBO (Home Box Office)	Nov-72	Time Warner (100)
HBO 2	Oct-98	Time Warner (100)
HBO Comedy	May-99	Time Warner (100)
HBO Family	Oct-98	Time Warner (100)
HBO Latino	Nov-00	Time Warner (100)
HBO Signature	Oct-98	Time Warner (100)
HBO Zone	May-99	Time Warner (100)
iN Demand 35 multiplexed channels	Nov-85	Comcast (54.1), Time Warner (30.3), Cox (15.6)
iN Demand HD1	Sep-03	Comcast (54.1), Time Warner (30.3), Cox (15.6)
iN Demand HD2	Sep-03	Comcast (54.1), Time Warner (30.3), Cox (15.6)
Independent Film Channel	Sep-94	Cablevision (60)
International Channel	Jul-90	Comcast (100)
MoreMAX	Jun-98	Time Warner (100)
Outdoor Life Network	Jul-95	Comcast (100)
OuterMax	May-01	Time Warner (100)
Ovation: The Arts Network	Apr-96	Time Warner (5.1)
Science Channel	Oct-96	Cox (25), Advance Newhouse (25)
Source Suite	Nov-93	Insight Communications (100)
Style	Oct-98	Comcast (60.5)
TBS	Dec-76	Time Warner (100)
TLC (The Learning Channel)	Nov-80	Cox (25), Advance Newhouse (25)
Thriller Max	Jun-98	Time Warner (100)
TNT (Turner Network Television)	Oct-88	Time Warner (100)
Travel Channel	Feb-87	Cox (25), Advance Newhouse (25)
TCM (Turner Classic Movies)	Apr-94	Time Warner (100)
TV One	Jan-04	Comcast (38.8)
WE	Jan-97	Cablevision (60)
WMAX	May-01	Time Warner (100)