



Technology Paper

Embedded Hard Drives in Televisions

Opportunities for Business Growth

Introduction

Advances in technology have furthered the evolution of television from a static, one-way format to an increasingly interactive, customizable and popular entertainment platform. To keep pace with rising consumer demand for flexible and consolidated personal media storage, manufacturers are ramping up investment in the development and marketing of televisions with embedded hard drives. In addition, manufacturers have recently introduced TVs featuring built-in ports for removable hard drives. Further, new modes of content delivery, including Tru2Way and Internet Protocol Television (IPTV), continue to drive investment in the development of consumer electronics devices that deliver on the promise of greater interactivity and simpler interfaces.

Though consumer demand for televisions with embedded and removable drives remains strongest in Asian markets, evidence shows that these applications are gaining traction worldwide. These developments expose significant market opportunities for original equipment manufacturers (OEMs).

As the world's largest maker of hard disk drives, including drives engineered for optimum performance in a range of home entertainment applications, Seagate can help OEMs act on these opportunities to stay ahead of the competition and maximize business growth.

The Growing Market for Embedded Hard Drive Televisions

As an entertainment medium, television has exhibited tremendous staying power. Despite the emergence of alternative media channels and outlets in recent years, large numbers of consumers still turn to television as their principal source of news and entertainment, partly because of the familiarity of the format, but also because of the breadth of programming.

Even in a weakened economy, indicators show a robust market for TVs and DVRs. Recent findings from a study conducted by telecommunications giant Verizon indicate that TV viewing in many

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American households is likely to increase in the coming months, linked perhaps to reduced spending on entertainment. In the Verizon study, the majority (57 percent) of 1026 American adults surveyed said that they plan to spend more time at home watching TV, rather than pursuing entertainment options outside of the home.¹

Furthermore, an increase in the amount of broadcast content available to consumers has produced a surge in demand for DVRs worldwide. Reports indicate that by 2011 more than 50 percent of U.S. households will own a DVR.² Rapid consumer adoption of DVR technology enhances the commercial viability of television. In fact, a 2008 Nielsen Media Research study indicates that television viewing in American homes has actually increased in parallel with growing DVR uptake.³ These findings comport with similar trends in Asian and European markets. Consumers worldwide are signaling that television is here to stay—a message not lost on manufacturers.

The Evolution of Televisions With Built-in Hard Drives

Major television manufacturers continue to invest in research and development of televisions with embedded hard drives. In 2005, LG Electronics became the first manufacturer to release a model equipped with an integrated hard drive. The LG PY2DR series featured an embedded HD-DVR powered by a 160-GB Seagate® DB35 Series™ drive, enabling storage of up to 14 hours of high-definition programming or up to 62 hours of standard-definition content. Other manufacturers have followed suit, and storage capacity in televisions with embedded hard drives continues to expand. The Hitachi Wooo UT Series includes a built-in 250-GB hard drive, and several leading manufacturers, including Sony and Panasonic, recently announced plans to introduce models with integrated hard drives up to 1 TB in capacity.

Popularity in the Japanese Market

Televisions with embedded hard drives enjoy considerable commercial success in Asian countries, especially in Japan. Several causes likely drive this development. First, because most of the world's leading consumer electronics manufacturers are based in Japan, consumers there often gain exposure to emerging television technologies ahead of consumers in other markets. A cultural fascination with novel home-entertainment devices, especially enhancements to digital television technology, reinforces this influence. Indeed, consumer electronics analysts routinely look to Japan to search for leading indicators of broader market trends. Moreover, many Japanese consumers need to optimize the utilization of their living space. Accordingly, large numbers of Japanese consumers have embraced televisions that offer integrated high-capacity HD DVR functionality in an ultra-slim profile design.

Expansion to Other World Markets

As the technology matures, we can expect a surge in demand for televisions with integrated hard drives in other world markets. Hitachi recently released its Wooo Series in the United Kingdom.⁴ In addition, in a survey of American consumers conducted by In-Stat, more than 40 percent of respondents indicated interest in purchasing a television with built-in DVR capabilities.⁵

1 Source: MediaBiz: www.mediabiz.com/news/articles/index.cfm?edit_id=10524

2 Source: The Carmel Group report: http://carmelgroup.com/publications/document/digital_video_recorders_time_in_a_magical_box_present_trends_future_project/

3 Source: Nielsen Media Research report: www.nielsenmedia.com/nc/portal/site/Public/menuitem.55dc65b4a7d5adff3f65936147a062a0/?vgnnextoid=709879ab6a818110VgnVCM100000ac0a260aRCRD

4 Source: *HDTV News*: www.hdtv-news.co.uk/2008/03/06/hitachi-wooo-displays-coming-to-uk/

5 Source: In-Stat survey: www.instat.com/panels/pdf/2005/2005_feb_dtv.pdf

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Several compelling benefits of televisions equipped with hard drives favor the trend towards increased adoption of this technology worldwide:

- Ample storage for recording and playback of high-definition programming
- Compact complement to external DVR storage
- Availability of newer models with larger screen sizes and ultra-thin profiles
- Optional support on some models for Information Versatile Disk for Removable storage (iVDR) to augment default capacity and enable easy transfer of content between sets and other devices
- Potential cost savings and convenience associated with reduced device maintenance

Lower retail prices for televisions with built-in hard drives, driven by increased production and competition among major manufacturers, also favor stronger demand for these products in the coming years. Consumers looking to replace their current set, or upgrade to a newer model with more features, are likely to see substantial value in a combination device.

Use of External DVRs With Embedded Hard Drive Televisions

In a growing number of households, external DVRs fulfill their original function—recording television programming for future playback. At present, these devices still offer optimal storage and playback of longer-format media, including full-length high-definition movies. But as more consumers choose to record their favorite shows, movies and other HD programming content, televisions with embedded DVRs offer a convenient, practical means of supplementing media storage capacity in the home.

When manufacturers expand the functionality of hard drive televisions to include ports for removable hard drives, consumers are likely to use external DVRs and hard drive televisions to serve specialized, yet complementary roles in a more flexible manner. While traditional DVRs still readily fit the need for archiving dozens of hours

of movies, sporting events and entire seasons of serial shows, hard-drive televisions could be used to store news media or other time-sensitive content. Consumers could use the Ethernet port to quickly transfer this kind of content to other devices, including laptop PCs, to share it with people in virtually any location.

Television, Convergence, and the Demand for Removable Storage

The transformation of virtually all media into digital format, a technological phenomenon referred to as convergence, continues to blur the distinctions between various entertainment platforms and devices. The steady expansion of online digital media outlets, spurred by the rise in availability of broadband and amplified by the phenomenon of digital social networking, occurs alongside the evolution of television as an entertainment medium. More content, faster download speeds and the increasing use of the Internet as a social utility expand the overall frequency of use of the PC in the home. But large numbers of consumers still consider television to be the optimum viewing device for many types of content, including on-demand video or full-length movies downloaded from Internet sites.⁶



Figure 1. Hitachi P42-HV01, L37-XR01 HDTV with Removable iVDR Storage

Consumer demand for ever-greater portability with regard to digital media, combined with the popularity of the television as the device of choice for viewing content, drives production of television sets

featuring ports for removable storage devices. Several major manufacturers, including Sony, Hitachi and Toshiba, currently offer large-screen LCD/PDP models equipped with an Ethernet port designed for cartridge drives based on the iVDR standard.

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This interoperability radically simplifies the transfer of content between sets and among various devices. Using the Ethernet port, consumers can save files stored on their PC, or download files from the Internet directly to a portable cartridge drive, plug the cartridge into the port on the back panel of their television set, and view the content on the television screen.

Opportunities Abound for Consumer Electronics Manufacturers

Increasing consumer demand for televisions with embedded and removable hard drives, and innovative content delivery models, such as IPTV and Tru2Way technology, expose a variety of market opportunities for consumer electronics manufacturers.

IPTV and True2Way technology embody the most significant advances toward the perennial industry promise of interactive television. By delivering on this promise and facilitating greater portability of personal digital media assets, manufacturers can take full advantage of these opportunities to grow their businesses well into the future.

Tru2Way—Extending Interactive TV

Formerly known as the Open Cable Application Platform (OCAP), Tru2Way is software platform that allows recording and viewing devices to connect directly to cable's interactive digital services, enabling a completely new cable television architecture. By putting the cable box on an open platform, manufacturers can embed the box components in televisions and other devices. This technology lets consumers directly access content and services from any True2Way-enabled device without the need for cable installation and set-up. In October 2008, Panasonic debuted its Tru2Way-ready Viera Plasma HDTV—the first of its kind on the market.

But the value proposition for Tru2Way technology extends beyond more sophisticated devices. Innovative companies can develop products

across a range of home media applications that integrate the Tru2Way network. And content and service providers can deliver new offerings that increase interactivity and change the way viewers experience and participate in television programming.

IPTV—Merging Internet and Television Service

A method of delivering television programming using an IP network and high-speed broadband infrastructure—IPTV is truly game-changing technology. While traditional broadcast television relies on the continuous transmission of the same pool of content to viewers, IPTV effectively removes this limitation. IPTV technology enables viewers to access a broad network of content and select the content they want to watch.

Several factors support a growing market for IPTV in the coming years. First, access to high-speed broadband is growing. According a survey conducted in 2007 by the Pew Internet and American Life Project, 55 percent of all Americans have broadband Internet connections in their homes—and this number is steadily rising.⁷ Moreover, developed nations worldwide follow the same trend.⁸ Based on these statistics, the growth of the IPTV market over the next several years is likely to be strong. In Japan, for example, which boasts one of the fastest-growing broadband penetration rates in the world, the number of IPTV subscribers is expected to exceed three million by 2012, up from an estimated 400,000 subscribers in 2008.⁹

In addition, intense competition between telecommunication companies and cable providers continues to drive significant investment in IPTV. And technology companies like Microsoft and Apple, to name just a few, are also making a strong play for their products and services in this market.

⁷ Source: Pew Internet and American Life Project report: www.pewinternet.org/ppf/r/257/report_display.asp

⁸ Source: Gartner press release: www.gartner.com/it/page.jsp?id=729907

⁹ MarketWatch report: www.marketwatch.com/news/story/Research-Markets-a-Report-Examining/story.aspx?guid=%7B8B2CD1AA-70B2-4D81-BDCE-23ED24333B5B%7D

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Conclusion

Market trends indicate increasing demand for televisions with embedded hard drives, which enable consumers to consolidate their home entertainment centers by offering built-in DVR functionality. And new digital media offerings will drive an increased need for high-capacity, flexible storage solutions. To meet the steadily rising need for personal media storage and capitalize on the increasing adoption of DVR technology worldwide, manufacturers need access to high-capacity storage solutions with a broad range of home entertainment applications. The Seagate Pipeline HD™ family of drives is suited to meet the needs of these applications, offering superior performance and reliability to enable manufacturers to take advantage of a substantial growth opportunity.

Additional Resources

Additional information regarding innovations in television technology, new consumer electronics devices, and industry and market research data is available from the following sources:

Consumer Electronics Association:

www.ce.org

Nielsen Media Research:

www.nielsenmedia.com

IPTV News:

www.iptv-news.com

Cable Labs:

www.cablelabs.com

iVDR Hard Drive Consortium:

www.ivdr.org

Consumer Electronics Show (CES):

www.cesweb.org/aboutces.asp

CEATEC Japan:

www.ceatec.com

Engadget:

www.engadget.com

For More Information

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spp.seagate.com

Contact Seagate:

www.seagate.com/contact/index.html

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