@cn:Chapter 7
@ct:Interactive Television
@ics:T@ic:elevision has remained relatively unaltered over the past several decades. The methods of broadcasting, the business models, and the roles of the broadcasters and advertisers have been stable and even resistant to change. Interactive television, however, promises to dramatically transform the industry (see Figure 7.10) [Au: Throughout, check fig. and table cites and edit as needed.]].

$ In this chapter, we identify the key changes that need to take place in the industry, suggest how interactive television promises to change the players' roles and interactions, and examine the likely evolution of technology and offerings.

@h1:History of Interactive Television

@$:Since its inception, television has been a one-way broadcast medium. Television's search for interactivity with its audience, termed <I>interactive television<I> (iTV), has spanned several decades. By examining the history of iTV, we can gain an appreciation for all that has been learned in earlier trials, as well as understand some of the issues facing the iTV initiatives today and tomorrow.

The first truly interactive television program, <I>Winky Dink and You,<I> aired from 1953 to 1957. The interactive element of the children's show relied on special plastic sheets that children could attach to the television screen and draw on with crayons. At various times during the show, the children would be asked to draw items on the plastic screen, and the cartoon characters would react to the drawings. CBS eventually canceled the series because of parents' complaints that children were not using the sheets, but instead were drawing directly on the television screen.

In 1979, the English government offered Teletext, which allowed BBC viewers to trade text messages via the telephone. Teletext used the black vertical blanking interval (VBI) between lines of video to transmit data, which was displayed on the

screen as a page of text. The United Kingdom's Teletext model was adopted by more than a dozen countries. An attempt at U.S. adoption was unsuccessful largely because the FCC chose not to set U.S. Teletext standards. Without such standards, television manufacturers were unwilling to build Teletext functionality into television sets, and having consumers purchase separate hardware to provide the functionality was prohibitively expensive.

The first major iTV service in the United States was Warner Communications' Qube, which began in Columbus, Ohio, in 1977. Qube offered 30 channels of television divided equally between broadcast, pay-per-view, and original interactive channels. The viewer accessed Qube programming with a proprietary remote control that was connected by wire to the set-top box and was used to select channels, order pay-per-view movies, and respond to interactive programming. The interactive programming buttons could be assigned different meanings for different shows such as to poll the audience, respond to questions on live talk shows, answer questions on a quiz show, play interactive games, or purchase goods and services. Although Qube's innovative programming was popular, it was not a sustainable business model because of the high costs of its set-top boxes and other equipment.

In 1994, Time Warner tested the Full Service Network (FSN)--the world's most sophisticated and expensive interactive television service--in Orlando, Florida. FSN offered interactive shopping, games, sports, news, and an electronic program guide, as well as movies on demand. FSN was incredibly complex. File servers stored movies and other content in digital form, and ATM switches transferred the data to a set-top box at a speed of 30 pictures per second. The box itself had five times the computing power of a top-of-the-line PC. Although FSN had tremendous potential, three problems led to its demise. First, Time Warner attempted to do too much too fast and discovered that the complexity of integrating all the services was overwhelming. Second, the high overhead and infrastructure expenses surpassed the market opportunity. Third, the service predated customer demand.

Despite the apparent failure of previous iTV initiatives, they offer several important lessons. First, audiences should not be expected to change their media habits overnight. Television viewing has long been a passive entertainment, and producers of iTV content should be sensitive to this pattern. Second, the integration of iTV services is tremendously complex and requires coordination among several parties including content providers, advertisers, and cable/satellite companies. The costs and difficulty of such an undertaking must not be underestimated. Third, the costs of developing iTV cannot be greater than the value created for consumers. Providers must control the costs passed on to consumers directly through subscription fees. Fourth, producers must learn to be creative with the new medium. To win over the consumer and promote adoption, iTV must provide a compelling value proposition, as well as a killer application. Finally, the full adoption of iTV requires establishing standards because the lack of such standards will discourage the platform-specific investments that are key to providing the most promising services.

Despite the highly publicized iTV failures, companies such as AOL Time Warner, Microsoft, and OpenTV think they will finally make iTV a reality because the Internet experience has given viewers expectations for interactivity. In addition, it is now cheaper and more efficient to deploy iTV, as the existing digital infrastructure greatly reduces technology and hardware costs. For example, adding interactivity through a set-top box costs only 10 percent of what it did just six years ago. These two factors will be the key enablers for the success of iTV in the early twenty-first century.

@h1:Evolution of Interactive Television

@$:Before discussing the evolution of iTV, we must define it. For our purposes, iTV refers to the convergence of computing, communications, and entertainment on a television (see Figure 7.2).

Interactive television can offer many services including e-mail, games, shopping, video on demand, access to local community

information, and electronic programming guides. The interactivity of iTV can be further defined as simulated, delayed, or real time. In simulated interactivity, interactive functions are performed at consumers' homes without a return path. An example is an electronic program guide (EPG). Delayed interactivity relies on telephone lines to provide upstream paths from set-top boxes. Examples of services are online banking and e-mail. Finally, in real-time interactivity, a high-speed two-way connection between the television and the cable operators and programmers allows for greater manipulation of content. Multiplayer games and interactive programming are examples of real-time interactivities.

Three models for iTV have emerged. These models and others will determine the shape of iTV in the early twenty-first century.

@h2:Personal Video Recorder (PVR) Model

@$:The PVR model (Figure 7.3) is based on the theory that people do not want interactive television; what they want is more control over what they watch. Equipment and services would allow viewers to digitally record video content; to pause, rewind, and impose slow motion on live television; record favorite shows; skip commercials; and easily find programs via an EPG.

@h2:Multiple Service Operators (MSO) Model

@$:In the MSO model (Figure 7.4), two-way communications, and the ability to manipulate the information on a viewer's television screen, would be delivered to digital set-top boxes via a cable or satellite provider. This model creates the possibility of customized, targeted programming and advertising determined by viewers' individual preferences. It allows viewers to shop online, conduct online banking, receive targeted advertisements, watch video on demand, play interactive games, and send e-mails to other viewers. In addition to PVR functionality, it gives customers a taste of real interactivity but in a closed space ("walled garden").

@h2:Internet Model

@$:In the Internet model (Figure 7.5), content can be delivered via the Internet. This model includes the PVR and MSO model capabilities, as well as other functions, such as surfing the Web, playing real-time multiplayer games, and chatting with other viewers.

An example of the Internet Model is Yahoo! FinanceVision, with which a viewer can watch anchors read tech-stock stories, explore links to information applicable to the stories, monitor a personal portfolio, get stories for the stocks in the portfolio, trade stocks, and search the Web—all on one screen.

The models differ in their level of interactivity and functionality. Therefore, a convergence of functionality is likely as well as a movement toward the higher levels of interactivity that can be obtained via the Internet model (see Figure 7.6).

@h2:Adoption Forecasts

@$:The adoption dynamics of iTV will likely follow an S-curve: The number of users will grow slowly during the launch, increase rapidly as positive feedback and network externalities kick in, and then taper off as the market nears saturation. At the beginning of 2001, the number of iTV users was approximately 1.7 million [[Au: Update?]]. However, many MSOs are currently conducting trials and digitizing their networks to allow for iTV. That number, therefore, is expected to reach 29.4 million users by 2004, represent 39.5 million users by 2005, and eventually approximate the number of households with television sets, which is nearly 100 percent in the United States. By early 2001, the adoption was in the launch phase: The market was growing slowly and service offerings were being developed. [[Au: Reword to update.]]. Prior to 2004, however, the iTV industry will face several challenges. How it addresses those challenges and adapts to the needs of users will determine the industry’s fate (see Figure 7.7).

First, current iTV users, the innovators and early adopters, are willing to endure bugs and glitches and are technically competent. Nevertheless, to win over the early majority of

consumers by 2004, iTV will need to provide a high level of support, compatibility, reliability, and integration. This positioning will require significant enhancements to the technology and significant investments in the support infrastructure. In addition, a killer app must be introduced to attract the early majority.

At this point, it appears as though the PVR could be such a killer app. Forrester Research estimated that 80 percent of U.S. households will have a PVR by 2009. However, the market is not developing as quickly as analysts' initial estimates. For example, they expected TiVo to have over 300,000 subscribers by the end of 1999, but as of the first quarter of 2001 it had only 153,000 subscribers [[Au: Update?]].

The primary reason for the slower-than-expected adoption of this technology is the cost of creating a mass market. Firms in the PVR industry need not only to build brand awareness, but also to educate the mass market on the features and benefits of its offering. In fact, TiVo spent more than $50 million in advertising in 2000, but the ads focused on branding and failed to communicate the features and benefits of the product. TiVo claims that branding [[Au: Ref. as meant?]] is central to its marketing strategy and subsequent ads will focus on functionality [[Au: Update?]].

The slow speed of adoption must be taken in context. The rate of adoption for the PVR is greater than the acceptance rate for comparable consumer electronics products such as the VCR and DVD player. As such, many analysts still view the PVR as the killer app of iTV, as indicated by the investments of several prominent companies. For example, AOL invested $200 million in TiVo in September 2000, and work is in progress to combine its TV-based Internet service, AOLTV, with a TiVo box. Also, in 2001 Microsoft began selling its own PVR, UltimateTV, which has essentially the same functionality as a TiVo box, except that it comes with two tuners allowing users to record two programs at the same time. These are positive developments for the industry. Even though TiVo is well financed, it does not alone have the

financial resources necessary to create the mass market. The industry will benefit both from the financial resources of AOL and Microsoft in educating the market on the product’s unique benefits and from these firms’ experience in marketing new and unproven products.

Second, the early majority of consumers will likely be technically less savvy than early adopters, so the iTV interface will need to be simple and intuitive. The task of making it so will be complicated by the users’ reliance on a remote control or a keyboard to interface with iTV.

Third, the early majority will be more price sensitive than the innovators and early adopters making it unlikely that the investments in technology and the support infrastructure can be fully passed through to consumers via subscription fees, thus requiring a new revenue model.

Finally, lack of a dominant standard will cause hesitation in adoption, as well as inefficient development efforts.

@h1:The Current State of Interactive Television

@cq:Interactive television is the dream of science-fiction writers, businesspeople, and engineers—but we are still not sure if anyone else wants it.

@cqa:—James Stewart, Edinburgh University

@h2:Value Propositions

@h3s:Incumbents.@h3:|em|Interactive television provides incumbents in the television industry, such as MSOs, software providers, hardware providers, content providers, and advertisers with a compelling value proposition. For multiple service operators, iTV can provide a competitive advantage by making it possible to deliver the relevant, personalized information viewers want, when they want it. In addition, it allows them to earn additional revenue through a percentage of sales conducted online. For software and hardware providers, it represents an opportunity to enter and potentially shape an emerging high-growth industry. Content providers have a new medium for enhancing traditional television storytelling techniques by giving viewers engaging detail not obtainable in traditional

programming. It also provides them with additional revenue opportunities such as product-placement advertising and commerce-revenue-sharing arrangements. Finally, advertisers may have an even more compelling value proposition. With interactive television, they can create richer advertisements and make it easier for consumers to purchase products online. In addition, advertisers can buy space in the interactive portion of the screen in the form of logos or graphics that can be on screen throughout a broadcast, not just in commercials. Most important, the data-collection and aggregation potential of middleware, set-top boxes, and servers could provide detailed demographic and behavioral data about viewers that would allow targeted advertising and more accurate assessment of advertising efforts. So it is obvious that businesspeople and engineers “want their iTV,” but whether consumers also want it is still an unanswered question (see Figure 7.8).

@$: From the viewer’s standpoint, iTV’s value proposition is a richer viewing experience. Viewers will have fewer, and presumably less expansive, choices than the Web offers, but the images will be easier to manage on a TV screen with a remote control. Interactive television will by nature be more passive than the Web: It will require less effort on a viewer’s part and will be better integrated with the viewing experience.

There may be differences in what viewers perceive as value added and what businesspeople and engineers view as value added. According to a <I>Jupiter<I> survey, the most preferred features correspond to existing PVR functionality. Functions such as Web surfing, e-mail, games, or online shopping are not desired, perhaps because people think that they already have them in their console game or computers. Although <I>Jupiter<I> considers video on demand (VOD) to be “not economically viable in near-term” for its high cost of implementation, users ranked VOD as the second-most-desired feature in the last Forrester survey [[Au: Date of survey? Are Jupiter and Forrester the same? Confusing as cited.]]. Even if interactivity would attract innovators and

early adopters, the iTV market will grow only if companies prove its benefits to the mass market. Therefore, companies will have to create the need for interactivity in the consumer’s mind.

@h2:Revenue Models

@$:According to <I>Jupiter,<I> iTV will generate $9.9 billion in <I>new<I> revenues in 2004. As cable and satellite companies compete and incorporate the new interactive service in their costs, commerce, advertising, and access will split the new revenues. Subscriptions and licensing are expected to generate little new revenue because users want interactivity without incurring extra cost (see Figure 7.9).

At present, television revenues come from access, which includes pay-per-view and subscription, advertising, program licensing, and shopping. The iTV revenue model will likely be similar, with some exceptions.

@h3s:Access (Subscriptions and Pay-per-View).@h3:|em|Some pure-play companies, like TiVo, charge a fee for interactivity features such as EPG. <I>Jupiter<I> reports this revenue model is not sustainable. Television operators will encourage penetration of interactive services and the revenue streams they provide (i.e., commerce, advertising) by offering interactive services at no additional charge to subscribers, even if a customer does not buy additional digital channels.

@h3s:Advertising.@h3:|em|Advertising has always been the main revenue source of broadcasting and represents 54 percent of television revenues today. Compared with traditional TV advertising, interactive advertising will offer better targeting opportunities. It will also inherit Web advertising techniques such as banners.

@$: According to <I>Jupiter,<I> the installed base of users will not reach the critical number necessary to attract mass advertising until 2003. Interactive advertising revenues will increase from $60,000 in 1999 to $1.6 billion in 2003 to $4 billion in 2004.

In the future, TV advertising will come from both infomercial (which currently represents $1 billion) and direct-

response advertising (now representing $20 billion). Traditional brand advertisers are very interested in iTV, and many industries like the automotive (e.g., Ford, DaimlerChrysler), financial services (e.g., Schwab, Wells Fargo), health (e.g., Pfizer), and consumer-packaged goods (e.g., Clorox) have begun testing interactive advertising on Wink. According to Forrester, advertising revenues will come mainly from enhanced broadcast (56 percent), EPG (29 percent), and Web on TV (15 percent).
@h3s: Program Licensing.@h3:|em|Program licensing today represents 9 percent of TV revenues. In the absence of standard iTV protocols, <I>Jupiter<I> expects that iTV programs will be specific to each platform or region and no new revenues will be created from licensing iTV programs.
@h3s:Hardware.@h3:|em|Consumers now buy set-top boxes for local interactivity. Cable and satellite companies will start to compete and subsidize the hardware in their set-top boxes. Therefore, interactivity will be included in the infrastructure provider’s costs and will not generate new revenues.
@h3s:T-Commerce.@h3:|em|Interactive television’s ubiquity and ease of use will enhance the shopping experience and increase t-commerce (or television-based e-commerce) revenues. It will also be a perfect medium for financial services. According to <I>TechTrends,<I> even among the consumers interested in banking and investing through iTV, only 6 percent are willing to pay more than $3 per month for the service. Three types of t-commerce will emerge.
@h4s:Push commerce.|em|@h4:Push commerce will make special offers through commercials or programs. For example, WebTV viewers in San Francisco were offered a 30 percent discount coupon for Melissa Etheridge CDs from CDNow. The interactive ad’s response rate was 22 percent, compared with the typical online response rate of less than 1 percent.
@h4s:Enhanced shopping channels.|em|@h4:Enhanced shopping channels will give consumers the opportunity to make purchases online. The channels are expected to increase impulse buying.

@h4s:Virtual mall.|em|@h4:The virtual mall will provide a catalog of products that viewers can access, browse, and order from at any time.

@$: Twenty percent of U.S. households made purchases from a home-shopping network in 1999. Judging by the evolution of Internet shopping, <I>Jupiter<I> estimates that iTV commerce will grow from $100,000 in 2001 to $2.2 billion in 2003 and to $5.7 billion in 2004 [[Au: Any update?]]. According to <I>TechTrends,<I> 46 percent of U.S. consumers are interested in t-commerce. In addition, <I>TechTrends<I> estimates that 80 percent of active home-shopping-network users are interested in t-commerce, and 27 percent are willing to pay a monthly fee for the service. The eventual revenue model of iTV is dependent on the model of iTV that evolves.

@h3s:PVR Model.@h3:|em|After Replay’s failure, TiVo is trying to prove that a revenue model based on selling hardware and subscriptions is possible. The subscription supports services such as EPG that make recording easier.

@$: The PVR model’s subscription-based revenue model is not viable for the long term, as firms will not be able to continue to charge a fee for providing a simple service. The industry has attempted to overcome this problem by enticing consumers to pay a one-time subscription fee, but this effort has met with limited success for several reasons. First, customers are not willing to pay for a long-life service if they do not know its worth. Second, customers value the flexibility to change from one service provider to another. Third, TiVo’s long-term viability, as well as the long-term viability of the embryonic PVR industry, is uncertain.

Another stream of revenues could be generated from advertising. As EPG is the portal to access the programs, advertising on EPG will reach every customer. But if customers do not like seeing advertising on a service they pay for, the PVR model may have difficulty drawing revenues from EPG advertising.

@h3s:MSO Model.@h3:|em|In the MSO model, new revenue streams are possible. First, VOD and interactive games will add pay-per-use

revenues to subscription fees. Services like banking, enhanced content, and interactive programming should increase subscription fees. Since access revenue is a mix of subscription and pay-per-use fees, it is unclear which one will be the main driver of revenues. Initially, consumers will pay for the interactivity, and the proportion of pay-per-use fees will increase. Then, competition will drive players to compete on an all-included fee, and a subscription fee will become the main access revenue.
@$: Second, advertising will become more targeted, resulting in a lower cost per target customer for advertisers and premium pricing for iTV companies. In this model, iTV advertising will be perceived as similar to TV advertising—an inconvenience to consumers yet necessary to finance these channels.

Third, the MSO model offers opportunities for higher shopping revenues. Using the same revenue streams as current shopping channels, but being easier to use and more convenient, the MSO model will increase the volume of users buying online.
@h3s:Internet Model.@h3:|em|The Internet model has mainly the same revenue streams as the MSO model. Additional revenues would come from Internet access and cross-media promotions. For example, the Internet model will allow iTV companies to charge customers higher subscription fees for Internet broadband access, while the click-through fees from cross-media promotion will generate extra advertising revenues (see Figure 7.10).
@h3s:Summary for Revenue Models.@h3:|em|Because the PVR revenue model is not sustainable, it will merge into the MSO model. The MSO model will evolve toward the Internet model as consumers demand more interactivity, and competition will push MSOs to compete on services rather than on price. As discussed, different players in the value chain favor each model, and their biases will likely affect the evolution of the iTV revenue model. It will evolve toward an increased proportion of t-commerce and advertising. Pay-per-use access fees will increase in the MSO model, whereas subscription fees will increase in the Internet model.

@$: Because of delays in adoption, analysts have cut forecasts for industry revenues dramatically. <I>eMarketer<I> estimates that by 2004 iTV revenues will reach $11.4 billion, a far cry from projections made earlier by research firms.
By comparison, Forrester Research cut its iTV forecasts from $20 billion in 2004 to $15.4 billion, and the Myers Group now projects iTV revenues to reach $13.7 billion for the same period (see Table 7.1).

The iTV value chain consists of five main segments, as shown in Figure 7.11.

@h3s:Infrastructure Providers (MSOs).@h3:|em|
@$:The main role of the MSOs is to provide “pipes,” or channels, to transfer data to a viewer’s home. The data may be in the form of video or sound. The MSOs also bundle the programming content so that the viewer receives all channels through a single pipe.
Key players.There are three key players in this space: cable providers, digital satellite providers, and telecommunications companies (see Figure 7.12).

Cable providers have been the traditional carriers of television, and for over three decades they have dominated the transmission of TV to homes. With the acceptance of the Internet, cable providers needed to provide higher bandwidth to increase data-transfer rates and to provide two-way communication capabilities. As a result, they invested, and are investing, in hybrid fiber coax (HFC) and two-way optical fibers.

In the past few years, the digital broadcast-satellite (DBS) providers have been increasing rapidly. In fact, the digital broadcast-satellite industry has over 14 million paying subscribers. DBS services grew quickly because the digital signal provided better picture quality, and satellite broadcasts could reach places where cable could not. DBS services, however, can provide only one-way interactivity and must partner with the telecom providers for two-way interactivity. The main DBS players in the United States are EchoStar and DirecTV, both of whom have

made EPGs available on their set-top receivers. They have also been aggressively building alliances through strategic technology and marketing partnerships with companies such as OpenTV, Microsoft’s WebTV, and TiVo.
@$:Telecommunications companies are providing broadband technologies like integrated-services digital network (ISDN) connections, xDSL (where the <I>x<I> stands for several variants, such as A,H,S,V), T-1 and T-3 pipes, and fiber.

Sensing a threat from DBS, the cable providers invested billions in their movement from analog systems toward digital cable. This enables them to supply more channels as well as a platform for interactivity. Players like AT&T, Insight, and Comcast are adding interactive applications such as video on demand on their digital cable network. These actions have led to strategic alliances between the cable companies, studios, and solution providers like DIVA, SeaChange, nCUBE, and Intertainer.

A major factor shaping the landscape of the iTV industry is the AOL Time Warner merger. It brings programmers and broadcasters together and gives them incentives to develop interactive content that will be carried over AOLTV’s service network. Thus, the AOLTV platform is fueling the rapid growth of the industry by developing new interactive programming and by expanding the reach of interactive offerings. AOLTV allows consumers to access popular AOL tools such as e-mail, instant messaging, and chat while watching regular television programming. AOL has also heavily invested in General Motors’ Hughes Electronics, which owns DirecTV, and has struck partnerships with iTV middleware providers such as Liberate and TiVo for the AOLTV platform. AOL and TiVo have announced a three-year strategic agreement in which TiVo will become an AOLTV programming partner, offering AOLTV subscribers access to features of TiVo’s Personal TV Service. Under the agreement AOL and TiVo will work together to develop a dual-purpose AOLTV-branded set-top box, and TiVo will become the exclusive provider of personal TV features on these boxes.

@h4s:Key issues.|em|@h4:Five major issues converge on the infrastructure arena:
@nls: 1. @nl:<I>Migration to digital.<I>|en|Whereas satellite companies already broadcast digital signals, cable companies will need to migrate from analog to digital platforms to offer interactive services. This will require an investment of billions of dollars and will take time to complete.
@nls: 2. @nl2i:<I>Pressure on profits.<I>|en|Since many players are competing for market share in the backbone infrastructure, the intense rivalry will fuel the need to keep costs down and simultaneously ensure better service. As infrastructure companies try to attract customers to spread their fixed costs, they will enter into a battle to add more and more features to their services or compete on price. Added features and lower prices will accelerate growth but will also drive the infrastructure providers’ profit down, perhaps limiting the investments they are willing to make.
@nls: 3. @nlfi:<I>Customer-service skills.<I>|en|The infrastructure providers currently charge the consumer for providing the basic service of data transfer. However, as interactivity and commerce via iTV grow, the MSOs will have to invest in billing systems and customer-service capabilities. They will have to provide support to their customers and continuously upgrade services to compete effectively.
@nls: 4. @nl2i:<I>Control of the consumer interface.<I>|en|As t-commerce grows, MSOs will compete with other segments of the value chain to control the consumer interface. This rivalry will be costly for all parties involved.
@nls: 5. @nl2i:<I>Strategic partnerships and mergers.<I>|en|As the need to provide greater interactive content increases, MSOs will have to form strategic alliances with content providers and software providers, who will ensure that the consumer receives seamless interactive content.
@h3s:Software Providers.@h3:|em|<I>Middleware<I> is a general term for any programming that serves to mediate, or “glue together,” two separate and usually already-existing programs.

Middleware in iTV manages the video display and other basic television functions; serves applications such as the EPG; accesses the Internet, e-mail, and interactive graphic walled-garden environments; provides video on demand, and enables services such as multicamera digital-video switching.
@h4s:Key players.|em|@h4:This industry is in its embryonic state: It is highly fragmented, and there are many competing technologies. Our discussion is limited to few prominent middleware platforms such as Liberate, OpenTV, and Microsoft TV.
@$: Liberate has a modular platform based on open Internet and international broadcast standards. To proliferate its platform, Liberate established programs to educate content and software developers. It also made strategic mergers with MoreCom (a complex, IP-over-cable middleware platform) and SourceMedia (middleware for thin set-top boxes--those with a small hardware footprint such as DCT-1200s and 2000s) and with iTV portals such as MetaTV to extend capabilities.

OpenTV has been successful in installing its proprietary middleware platform on DBS networks in Europe, Latin America, and now with DishNetwork in the United States. OpenTV merged with Spyglass (developer of small-footprint, IP-based middleware) to offer access to the Internet and to appliances such as set-top boxes and televisions.

On the other hand, Microsoft has developed a complete end-to-end iTV back-end architecture platform called Microsoft TV (MSTV), which incorporates Windows CE and WebTV software. WebTV introduced a stand-alone set-top box with an information and Internet service in 1996. It quickly grabbed media and consumers’ attention with low prices and ease of access. WebTV (purchased by Microsoft in 1997 for $400 million) has a subscriber base of over 1 million. It obtained space on several MSOs’ set tops in Europe and Japan, as well as on DishNetwork. MSTV offers services such as watching TV with the image of another channel reduced on screen (called “picture in picture,” or PIP), a walled garden, Javascript support, banking and bill-payment services, surveillance software, an EPG, and Web-page-building tools.

WebTV’s set-top products include Classic, Plus, and WebTV for Windows 98—the last two featuring two-way VBI broadcasting. To ensure deployment with a prominent cable operator, Microsoft paid AT&T $5 billion and has invested in networks around the world. In September 2000, however, Microsoft announced it was unable to deliver MSTV to AT&T or to UPC in full, causing both companies to sign with Liberate. Thus, it is not clear whether cable operators will truly buy into this Windows-based, resource-intensive system [[Au: Any Update?]].

@h3s:Data-Enhancement Broadcasting Services.@h3:|em|Data enhancements appear as graphic and information elements on the overlaying screen. They may be opaquely colored and cover the broadcast in part or may be transparent or semitransparent. Elements like icons, banners, labels, menus, interface structures, open text fields in which the viewer can insert his or her e-mail address, forms to fill out to buy a product, or commands to retrieve and manage video streams and graphics on a relevant Web page are most common. Enhancements can be part of the television program or may be irrelevant to the current programming, such as news, stocks, scores, weather, and so on.

@h4s:Key players.|em|@h4:This space is also in its embryonic state and has many competitors. We focus on prominent players such as Gemstar’s TV Guide, Wink Communications, TiVo, WorldGate, RespondTV, and Mixed Signals.

@$: The most commonly used example of enhancement is EPG, widely available on digital cable and DBS systems. An EPG appears interactively when one calls it to view by pushing a button on the remote control or by some other method. Once it displays, the EPG allows the viewer to easily navigate or search for programming by time, theme, channel, and so on. The Gemstar TV Guide merger is leading the development of EPGs. Because EPGs are the portal application to the new television experience, many companies are trying to develop their own versions of the EPG out of Gemstar’s purview. Software providers like MetaTV are offering software solutions that enable the networks to create their own portals across different middleware platforms and set-top boxes.

This allows network operators to scale their interactive content and programs rather than customize for each set-top-box platform. The idea of a cable-network-branded portal is very appealing to the network operators, but the resolution of EPG patent issues concerning Gemstar remain to be seen. Gemstar controls many of the patents surrounding this technology and is vigorously pursuing patent-infringement litigation.

TiVo leads the deployment of EPGs by coupling an online data-service broadcast through the phone line to a set-top box with a recordable digital-video hard-disk drive. These units influence how the average person becomes familiar with the availability of such video-based interactive services.

Another player, Replay TV, was also involved in the deployment of EPGs through PVRs. However, Replay TV's business model was very expensive because it manufactured and sold its PVRs without charging a subscription fee. In October 2000, Replay changed its business model from manufacturing and selling PVRs to licensing its technology to MSOs. In January 2001, it was acquired by SonicBlue, and in addition to licensing, the company is now trying again to sell high-end PVRs to early adopters as its ReplayTV 4000 product line [[Au: Update?]].

More examples of iTV-like video programming include the data boxes, or elements that appear in the corner of the TV screen during music videos on MTV or when a game player sets up a Nintendo, PlayStation, or Sega console. Here the player navigates graphic or text elements with a keyboard or joystick to select the difficulties of the game or learn about its rules. One of the major players behind technology for enhancement software is Wink Communications. Wink's services include downloadable software to a set top, a proprietary and Advanced Television Enhancement Forum (ATVEF)-compliant data-enhancement broadcasting service, and a special back-end tracking and billing environment called the Wink Response Network. Wink has established many partnerships with prominent media companies such as MSNBC, the Discovery Channel, the Weather Channel, E! Entertainment Television, DirecTV, and others. It also received multimillion-dollar

investments from Microsoft and Paul Allen’s Vulcan Ventures. Wink tries to provide a limited, yet interactive, choice to the viewer. When the icon<I> i<I> is presented on a WebTV screen, for example, [[Au: Cx. okay? Unclear]] the viewer can click on it to bring up the interactive enhancement from an advertiser or content provider. In a Wink environment, it might be a simple query to ask if the viewer wants more information on a product from the advertiser or data from a content provider such as the Weather Channel.

Another competitor in this space, WorldGate, delivers a URL trigger within network broadcasts that viewers can click with the remote. Called Channel Hyperlinking, WorldGate’s system is proprietary, although it has announced support for ATVEF.

Two other companies focus on iTV broadcasting-infrastructure technologies and services, RespondTV and Mixed Signals. RespondTV and Mixed Signals pride themselves on their broadcast servers and enabling technologies, which permit them to send out full ATVEF-compliant data broadcasts wherever the VBI and, eventually, digital signal will carry them. RespondTV has had much success signing advertisers and content providers to its services (e.g., Bloomberg, HGTV, MSNBC, Domino’s, Purina). Mixed Signals has a special arrangement with Sony’s Columbia Tri-Star and Game Show Network to present the iTV version of various game shows.

@h4s:Key Issues

@bl: • <I>Lack of standards.<I>|en|The software market of iTV is rich with new players and technologies. In fact, this link of the iTV value chain has the highest number of new players and technologies. The reason may be that the space is still evolving and is at the innovator/early adopter stage, which means that no single software provider has enough power to make its technology the software standard. So a standards battle will erupt in iTV just as it did in the high-definition-TV industry.

@bl2i: • <I>Many languages.<I>|en|Three main languages are used in the software for iTV: Windows CE, Java, and HTML. It is unclear which language will emerge as the standard.

<I>Alliances and partnerships.<I>|en|Problems in the software space are compounded by uncertainty and by the lack of standards, killer applications, and compatible software. The situation is forcing many alliances and partnerships between software providers and players up and down the value chain.
@h3:Hardware Providers—Set-top Box Manufacturers and PVRs @$:The main role of the hardware providers is to provide hardware that will enable existing television sets to interact with the Internet and to receive and decode television broadcasts. The hardware also needs to provide PC-like functions such as memory, processing, and storage of data. The hardware market consists of strong incumbents as well as new entrants. The incumbents focus on products like set-top boxes, which have been in use for some time, whereas new players are introducing new hardware platforms.
@h4s:Key Players.@h4:|em|The main manufacturers of set-top boxes are Motorola (which acquired General Instruments in early 2000), Scientific Atlanta, Pace Micro, Mitsubishi, Sony, and Thomson. Their boxes contain video and audio microprocessors, memory, conditional-access technology, a cable modem, middleware to control or to enhance their capabilities, and other technologies.
@$:For the other piece of hardware, the PVR, the market leader is TiVo, which contracts out the manufacturing of its boxes to firms such as Sony and Philips. As of December 31, 2000, TiVo’s installed subscriber base was 136,000, a growth of 86 percent over the previous year [[Au: Update?]]. Forrester projects that sales of PVRs should increase to 53 million by 2005. Constraints on the adoption of this technology include the complication of setting up the units and their expense. Deals by TiVo, such as the one with AOLTV, may encourage the diffusion of TiVo’s technology.
@h3s:Key Issues@h3:|em|
@bl: • <I>Lack of standards.<I>|en|Standards issues plague this segment of the value chain as well. Current standards increase the power of incumbents. If interoperability increases with open standards, however, power may shift from the incumbents to innovative new entrants.

@bl2i: • <I>Manufacturing capabilities.<I>|en|The hardware market is expected to show rapid growth, in tune with the overall industry, although uncertainty in adoption rates will cause challenges in planning manufacturing scale.
@h3:Content Providers and Advertisers
@$:Content determines the popularity of programs and channels—it is the main offering to the end consumer. Thus, it is essential that as iTV evolves, the content increases interactivity with audiences. Content providers and advertisers have a symbiotic relationship. Content drives audiences, and advertisers are attracted to audiences driving revenues of content.
@h4s:Key Players.@h4:|em| The key content players are TV studios--Paramount TV, Universal Studios, Sony Entertainment, Columbia Tristar, CNBC, and CNN. Content providers also include firms in the film industry such as Walt Disney, DreamWorks, Fox Movies, New Line Cinema, and Paramount. The advertisers are companies that create advertising and manage the media monies of their clients. Their major clients include the automobile manufacturers, the packaged-goods manufacturers, and services. Even in these early stages, certain types of iTV programming are beginning to thrive in the commercial setting. They include EPGs, synchronized TV applications, and integrated iTV programming such as interactive news, sports, 3-D games and game shows (like MTV’s <I>WebRiot<I>, Columbia-Tristar’s <I>Jeopardy<I> on WebTV, and ABC’s enhanced <I>Monday Night Football<I>), home shopping, court programs, weather channels, educational documentaries, and advertising.
@h4s:Key issues
@bl: • <I>Lack of standards.<I>|en|There are no standard formats for making content. Because of the inefficiencies in enhancing content for multiple platforms, there will be a need for common standards as iTV evolves, to make formats transferable across content providers.
@bl2i: • <I>Greater customization.<I>|en|Those producing iTV shows and applications need to customize their offerings more and more on an interest-group level, each with a different

perspective, agenda, and style of communication. This will ultimately evolve to highly personalized content, maybe even on an individual basis.

- <I>Need to increase production budgets.<I>|en|A producer now spends between $70,000 and $3 million developing interactive content. These budgets need to increase as technology improves and audiences demand more choice and functionality.
- <I>New sources of revenues.<I>|en|Revenues may come from the viewers through tiered subscriptions or through revenue-sharing agreements with other providers in the value chain. Additional revenues will come from interactive and/or targeted advertising. Viewers may enjoy the accessibility of products relevant to the programming.
- <I>Change in programming approach.<I>|en|Creators of content presently follow a linear/script-driven approach. For iTV to become a reality, the programming must be more interactive; and to achieve that, content providers and advertisers will have to change the way they make content or ads. The iTV landscape is summarized in Table 7.2.

@h1:The Future of Interactive Television

@$:No user watches television in an unalterable way. Sometimes viewers want to relax and let producers and schedulers control the flow of the narrative and the programming. Other times, viewers are looking for information, trying to learn, or sharing time with friends. In the future, ITV will reflect these multiple uses. Personal computers will not take over television, nor will interactive television take over the PC. And the question is not whether the PVR model, MSO model, or Internet model will dominate--it is how these very different services and models, each with its own distinct advantages and disadvantages, will converge to increase value to the consumer.

@h2:Consumer-Centric Approach to Functionality

@$:The fundamental shift just described will focus on key benefits that will provide utility for viewers. These benefits include convenience and productivity, enhanced entertainment, and social interaction. To achieve these benefits, television will be

transformed from a broadcast, passive, linear, entertainment experience to an on-demand, two-way communications platform. It will be broadband, participatory, and nonlinear; and it will feature infotainment and targeted-advertising (see Figure 7.13). @h3s:Convenience and Productivity.@h3:|em|The key benefits that iTV will provide are convenience and productivity. As people continue to become more time starved, they will increasingly look for convenience and timesaving services as key sources of value. The functionality of iTV will develop with this consumer benefit in mind. The industry will accomplish this in several ways. @$: First, iTV will allow users to exercise more control over their viewing experience and will permit them to do so at their own leisure. Examples exist today in products such as PVRs and EPGs. The evolution of convenience offerings will likely be much more robust in the future. No longer will viewers need to program a device to record shows for later viewing, but they will be able to access distributed recordings of shows to watch at will. There will be less reliance on broadcasting, and more of a “library model” will develop, whereby viewers download programs, much like they borrow books or rent videos today. This will likely evolve from a system that digitally stores content on large servers and sends it to viewers on request to a peer-to-peer system in which individuals store and serve programming that can be shared with the world.

Evolution will likely mirror the current evolution in the distribution of other types of media, such as music files, but will take place much more slowly because of the enormous storage and bandwidth requirements for audio and visual media. Privacy and intellectual-property restrictions also will hamper development.

Second, iTV will allow individuals to tailor content to their needs. This evolution is being observed on Internet services such as MyYahoo! which allows users to tailor content such as news and weather to their liking. In the world of iTV, this tailoring will be much more robust. Viewers will be able to tailor not only the type of news content that they watch (local,

business, international, etc.) but also the source of the content in an à la carte manner (CNN for breaking news, ESPN for sports, Financial Times for international news, etc.). In addition, viewers will be able to specify the level of detail, the medium used (video, text, photo), and how they are notified (e.g., breaking news is automatically pushed to the viewer, whereas the viewer must pull less critical news). Intelligence built into the software will automatically suggest content of interest to the viewer.

Third, advertisers will be able to narrowly target users and deliver the right advertising to the right person. However, users will have more control over this (such as being able to choose which ads to watch) and will be able to extract value for their time via arrangements such as allowing the iTV company to use their personal data for targeted advertising in return for lower subscription fees.

Fourth, many services that are currently offered via the Internet, such as home banking and shopping, will become available via iTV. Interactive television will provide an easy-to-use and convenient way to shop at home. It will evolve from an online catalog model to a much more open model in which consumers can retrieve additional information, make product comparisons, virtually try on clothing, and purchase items at the click of a button. The goods that are advertised, placed in programming, or shown in the virtual malls will be adjusted to the individuals' tastes and preferences on the basis of demographic data, individual profiles, or past behavior. Other services also will evolve. For example, telemedicine may help to provide people in rural areas with access to specialists. It could also spare patients with chronic illnesses the inconvenience of having to repeatedly visit a clinic for testing.

Finally, iTV promises to provide a rich medium for on-demand, interactive educational services. Educators do not anticipate that iTV will take over the classroom, which provides students with important behavioral and social learning experiences, but they believe it can supplement the classroom.

This is especially desirable for continuing professional education classes, where geography and logistics are a barrier, and for rural or poor communities that lack the resources to provide broad educational opportunities.
@h3s:Enhanced Entertainment.@h3:|em|Interactive television promises to provide users with richer, personalized entertainment. No longer will consumers receive only mass-broadcast static content—they will be able to interact and control the content. In the short term, the enhanced entertainment will include individualized tailoring of content; games on demand; polling; and interactive game shows, talk shows, and children's programming. In the long term, more interesting possibilities emerge.
@$: Viewers will be able to control the content of programming and even be part of it. Examples include "be-your-own director," multithreaded programs, "thinkies," virtual reality, and smart characters. In be-your-own-director programming, the viewer would have control over camera angles, camera placement, and the action of the characters. Stories could unfold in different ways according to the viewers' decisions. Likewise, a multithreaded program would allow the audience, either in aggregate or individually, to make choices throughout the program that would result in different situations and different outcomes. This style of programming is analogous to the "choose-your-own-adventure" children's books. Finally, thinkies would allow the viewer to take the role of a character in a nonlinear program and to interact with "smart characters" with built-in behavior patterns. This type of entertainment experience would be unlike anything available today because it would not be based on a script or set of outcomes. The viewer would actually control the entertainment experience on an individual level.

The advent of virtual reality will take these experiences one step further. Similar entertainment experiences will be available, but the viewer will be able to experience the entertainment in a multidimensional, multisensory fashion. The

technology will also offer viewers additional entertainment experiences such as virtual vacations.

@h3s:Social Interaction.@h3:|em|Interactive television will evolve toward a new level of social interaction. In a first step, interaction will be between users at home and a group of users in a studio [[Au: As meant? Unclear]]. For example, users at home could answer questions during a show and if their responses were correct, they could participate live (which presupposes that iTV users would have a camera and two-way video-network access at home). In the future, there is likely to be more social interaction between users. Audio/visual chat will allow users to discuss a program and to virtually come together in social situations. Multiplayer games will give users opportunities to play championships and interact with each other. Another type of one-to-one interaction includes videoconferencing (see Figure 7.14).

@h2:Migration to the Network Model

@$:To imagine the evolution of iTV in the long-term future, we examined trends affecting the Internet (tailored information and convergence of data, sounds, and video), current technologies (LCD, digital light projection, synchronization and convergence of devices, improvement of remote control, image and sound quality, wireless-communications infrastructure). We then projected the evolution of those technologies in terms of consumer needs and wants.

@$:The three distinct models of iTV described earlier will not survive into the long-term future. Each has certain benefits that consumers will value, but each also has certain limitations such as lack of mobility and the device-centric nature of the models. These three models will converge and evolve into what we term the “network model” of iTV. It will contain the best features of each model, such as the control functionality of the PVR model, the enhanced-entertainment and convenience aspects of the MSO model, and the communications and rich media capabilities of the Internet model. The primary differences of the network model are that intelligence and content will be distributed to the network,

iTV will become increasingly mobile, and multiple technologies and media will converge in one device or be built into many different single devices. No longer will iTV be device centric, as it is today, but it will become network centric and an increasingly inseparable part of our lives (Figure 7.15).
@h3s:Cross-Media Enhancements.@h3:|em|Cross-media enhancements refer to the convergence of media such as broadcast, video on demand, program on demand, multiplayer games, Internet and videoconferencing, and mobile communications, linked with an enhanced experience of watching television.
@$: New technologies will improve the interaction between users and devices. The old-style remote control or keyboard will be improved to fit new functions such as games, Web surfing, participation in shows, or communications with people. In the long term, there will be new and more intuitive interfaces, such as voice recognition or other biometric controls. Through these new interfaces, users will benefit from enhanced functionality, simplicity, and ease of use.

Thanks to the improvement of screens and the quality of high-fidelity systems, iTV will enrich the user experience. Better imaging and sound clarity will help users to experience a more virtual and entertaining experience. Digital-image projection and LCD screens suggest what iTV will look like. The television set of today will give way to flat, pliable screens and digital projection. People will be able to project images on any support or even in the air. Interactive television will conveniently migrate to any place where an image is visible and could be an easy way to decorate a house or an office. Experiments on digital glasses, 3-D, and holograms are the first step toward virtual television.

As mentioned, some features, such as interactive games and the programming-on-demand features of the cross-media model, will need high bandwidth and storage capacity. As computers and servers move toward more processing power and storage capacity, networks will evolve toward higher bandwidths. Within 20 years, a large portion of the U.S. population will be connected to

networks through fiber to the home, which will have a dramatic effect on the services and content that iTV can offer.
@h3s:Mobility Enhancements.@h3:|em|In the PDA industry, Palm accomplished a breakthrough with a device that complements, rather than substitutes for, the personal computer. In the same way, iTV will develop toward devices that complement, rather than substitute for, television. A portable iTV will not be the transposition of iTV onto a wireless device. To be viable, it will have to complement iTV and create new customer benefits.
@$: Mobility enhancements presuppose that hardware will converge toward a lightweight and connected device that will allow consumers to use it anywhere. Miniaturization is the enabling technology of mobile iTV.

As ISP and portals give people space to store data or create their own pages, iTV will evolve toward a distributed storage device for personal video, music, and information on servers that users will be able to retrieve from anywhere. Mobility also suggests that many devices will share data, which assumes a function of automatic synchronization.
@h2:Impact on the Players' Landscape
@$:The long-term emergence of the network model will radically affect the iTV players' landscape.
@h3s:New Networks.@h3:|em|New networks that are not now a part of the iTV landscape will start interacting with the current iTV network as defined in Figure 7.11. The following three additions are likely:
@nls: 1. @nl:A financial network consisting of billing systems, credit-card companies, and credit providers.
@nls: 2. @nl2i:A mobile communications network consisting of an entire m-commerce value chain from devices to content providers.
@nls: 3. @nl2i:A supply/demand chain consisting of networks of all firms participating in t-commerce. It will include their manufacturing, distribution, and logistics systems, as well as the systems of their suppliers (see Figure 7.16).

@h3s:Peer-to-Peer Networking.@h3:|em|Another change will be that peer-to-peer (P2P) networking will develop among consumers. Thus, the networks of one consumer will interact with the networks of other consumers, and consumers will share services such as a library of programs with each other (see Figure 7.17).
@h3s:Value in the Networked Landscape.@h3:|em|Our final predictions for the industry landscape are based primarily on a framework developed by Mohanbir Sawhney and Dave Parikh in “Where Value Lives in a Networked World,” which appeared in the January 2001 issue of the <I>Harvard Business Review<I>. The section on the iTV value chain earlier in this chapter provides a detailed discussion of the key issues (see Table 7.3).
@h4s:Network externalities through partnerships.|em|@h4:We predict a huge increase in alliance and partnering activities across value chains to maximize the externalities of different networks. New business models that reflect complex revenue-sharing arrangements among producers, set-top-box vendors, software providers, MSOs, shopping vendors, ISPs, advertisers, and billing vendors will be developed. These arrangements will require partnerships and increased interaction among the members of the value chain.
@h4s:Value remaining at the core.|em|@h4:The current subscription or access monies for infrastructure players may dry up. Set-top boxes may become free, and consumers will not have to pay subscription fees, as the revenue model will be focused on t-commerce and advertising. As the shift happens toward t-commerce, greater centralization, scaling, and increased robustness of infrastructure will be necessary. These activities will create value at the core that infrastructure providers will capture as utility or service suppliers to the rest of the value chain.
@h4s:Value migrating to the periphery.|em|@h4:As the industry evolves and standards are established in content, software, and hardware, many new players employing common standards will emerge, and fragmentation will increase in the content, devices, and software networks. Those firms that are best able to adapt to the fluidity of the industry architecture will reap the rewards.

@h2:Challenges and Considerations
@h3s:Privacy.@h3:|em|As iTV becomes an increasingly digital environment, privacy takes on significance. The risk is that servers, middleware, and databases will potentially be able to track viewer behavior and preferences and will share the information with third parties such as advertisers. Efforts at regulating this space have so far been unsuccessful. California state senator Debra Bowen introduced a bill to regulate privacy standards, but it was defeated by strong pressure from ISPs, Microsoft, and AOL. However, as t-commerce becomes more significant, the pressure will intensify for either industry self-regulation or legal regulation.
@h3s:Standards.@h3:|em|The lack of uniform technological standards could prove the biggest obstacle to widespread use of ITV in the near future. It affects the industry in many ways. Without standards, MSOs are understandably hesitant to invest millions of dollars in upgrading their plants and equipment because those costs would be sunk, should an MSO choose a format that does not emerge as the standard,. Also, a lack of standards causes unnecessary duplication of effort in the creation of enhanced programming and restricts the content because the costs of enhancing a program are the same whether the program is shown in five cities or fifty.
@$: Common specifications will accelerate the creation and distribution of enhanced television programs and allow viewers to enjoy such programs cost-effectively and conveniently, no matter which transport or broadcast receiver they use. Such a specification would also allow content providers and distributors to choose from several enhanced-television business models and delivery methods.

The two primary organizations shaping iTV standards in the United States are the ATVEF and CableLabs’ OpenCable project. AVTEF has defined protocols for television programming enhanced with data such as Internet content. Its goal is to allow content creators to design enhanced programming for delivery over any form of transport (analog or digital TV, cable, or satellite) to

all types of broadcast receivers. The founders of AVTEF are among the most prominent companies in the broadcast and cable industry, the consumer electronics industry, and the computer and software industries. They include CableLabs; CNN; DIRECTV, Inc.; Discovery Communications, Inc. (DCI); Walt Disney Company; Intel Corporation; Microsoft Corporation/WebTV Networks, Inc.; NBC Multimedia, Inc.; Network Computer, Inc. (NCI); NDTC Technology; Public Broadcasting Service (PBS); Sony Corporation; Tribune Company; and Warner Brothers. Over 130 companies have adopted the AVTEF standards.

CableLabs is a nonprofit research and development consortium of cable-television-system operators representing North and South America. Its members, such as ALLTELL, AT&T Broadband, CableOne, and Time Warner Cable, serve more than 85 percent of cable subscribers in North and South America. CableLabs' OpenCable project is an interoperability initiative supported by more than 400 cable-television companies, software-technology companies, and hardware manufacturers. Its goal is to attain interoperable standards for digital set-top boxes and other advanced digital devices manufactured by multiple vendors. OpenCable reached its initial goal--a standard for a common hardware platform for digital cable-television set-top boxes and other digital devices deployed by North American cable operators--in mid-2000 with the availability of interoperable point-of-deployment (POD), or removable security, modules. Since then, it has been working on setting standards for middleware. In March 2001, CableLabs released for comment the OpenCable Application Platform (OCAP), or middleware, specifications. The specification has two major components: An execution engine (EE) will provide a programmable environment; and a presentation engine (PE), similar to a Web browser, will support the creation and use of the Web's standardized markup and scripting languages--HTML and ECMAScript. Although OCAP is a separate effort from the ATVEF's content specification, it calls for support and extension of ATVEF as a part of the PE requirements.

@h3s:Intellectual Property.@h3:|em|The future of iTV is content and technology. As iTV becomes more distributed, and the supporting infrastructure for efficiently transferring content is developed, intellectual-property rights will become a critical issue. The two types of intellectual-property protection that will be important are copyrights and patents.

@$: Copyrights protect “works of authorship” from unencumbered copying and dissemination. Interactive television content such as programming will fall under this category. Cases such as <I>RIAA v. MP3.com<I> provide insight into how network technology can dramatically affect information and digital-content businesses and disrupt every element of the value chain. Because of the difficulty of enforcing copyright in a distributed network, technologies to protect iTV content from piracy, such as digital-rights management, will become critically important.

Patents, which provide legal monopoly rights to the inventor of a useful, nonobvious machine; article of manufacture; or composition of matter are a second significant source of intellectual-property protection. As a result of the <I>State Street Bank v. Signature Financial<I> and the <I>AT&T v. Excel Federated<I> court rulings, software and business processes embedded in software are now considered patentable. Because of the industry is still adolescent, many innovations are appearing in iTV technologies (middleware, hardware, data enhancement), and new business models are likely to emerge. Therefore, the ownership of intellectual property with respect to innovations will be a critical enabler of sustainable competitive advantage. It will provide inimitability and give firms possessing the property advantages in the standards battle and in locking in consumers. An example of this phenomenon is Gemstar, which controls many of the patents relating to EPG technology and vigorously litigates for infringement.

@h1:Conclusion

@$:The future of television is not a broadcast, passive, linear entertainment experience: It is an on-demand, participatory, nonlinear, infotainment, targeted-advertising, broadband, two-way

communications platform. The concept of television as a device in the living room with the family seated in front of it will soon seem as archaic as the days when families huddled around a radio. Interactive television will become a more ingrained piece of our everyday lives. It will be something we can access at any time, from any place, for most every use. Not only will it provide us with entertainment, but also it will make us more productive, provide us with information and education, and encourage social interaction.

The radical changes that iTV will bring will be disruptive not only to television viewers, but also to the incumbents of the television industry. Interactive television promises to radically change the revenue models and the balance of power among infrastructure providers, hardware providers, software providers, and content providers. Infrastructure providers can retain some value in this new architecture by being a utility service for the other players in the value chain. However, a significant unbundling will occur in other areas of the value chain as firms compete in a fluid, modular, decentralized arena.

What will iTV look like in the future? The only limitations are the needs and wants of the consumer.

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