

Interactive TV:

Reality & Opportunity

March 2002



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Welcome to eMarketer

Dear Reader:

The March 2002 *Interactive TV: Reality & Opportunity* is a comprehensive analysis of the developing interactive TV (iTV) sector throughout the world. The report focuses on the US sector, but also examines the current status of iTV in Europe as well as the potential market in Asia-Pacific and Latin America.

This report is targeted at advertisers, marketers, retailers, interactive service providers, TV broadcasters, cable companies and every business decision-maker associated with the interactive services industry. The report is unique in that it not only presents data from many analysts and experts from within the industry, but it also provides consumer survey data which indicates what consumers want from iTV, as well as presenting financial data from companies within the industry itself, so readers can get a thorough understanding of both the *reality* and *opportunity* within the sector. Some of the important questions this report answers are:

- What is interactive TV?
- What are the significant differences between the various digital TV distribution platforms?
- How many multichannel and digital TV households will there be in North America, Europe, Asia-Pacific and Latin America, and what are the prospects for iTV in these regions?
- How does the revenue potential on iTV compare with that on the PC?
- What are the prospects for iTV advertising, t-commerce and iTV subscription services?
- Will personal video recorders really destroy TV advertising models as we know them today?
- Will video-on-demand take-off as expected?
- What do consumers want from iTV, and who are these people who want their iTV?

And much more...

Ben Macklin
Senior Analyst

Written by Ben Macklin

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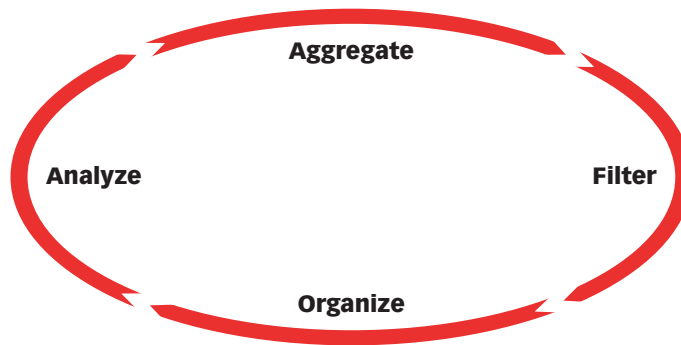
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eMarketer’s approach to market research is founded on a philosophy of aggregating data from as many different sources as possible. Why? Because there is no such thing as a perfect research study and no single research source can have all the answers. Moreover, a careful evaluation and weighting of multiple sources will inevitably yield a more accurate picture than any single source could possibly provide.

The eMarketer Difference

eMarketer does not conduct primary research. Neither a research firm nor a consultancy, eMarketer has no testing technique to defend, no research bias and no client contracts to protect.

eMarketer prepares each market report using a four-step process of aggregating, filtering, organizing and analyzing data from leading research sources worldwide.



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Using the internet and accessing a library of electronically-filed research reports and studies, the eMarketer research team first aggregates publicly available e-business data from hundreds of global research and consultancy firms. This comparative source information is then filtered and organized into tables, charts and graphs. Finally, eMarketer analysts provide concise and insightful analysis of the facts and figures along with their own estimates and projections. As a result, each set of findings reflects the collected wisdom of numerous research firms and industry analysts.

“I think eMarketer reports are extremely useful and set the highest standards for high quality, objective compilation of often wildly disparate sources of data. I rely on eMarketer’s research reports as a solid and trusted source.”

— Professor Donna L. Hoffman, Co-Director, eLab, Vanderbilt University

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The Benefits of eMarketer's Aggregation Approach

Objective: information is more objective than that provided by any single research source

Comprehensive: gathered from the world's leading research firms, consultancies and news organizations

Authoritative: quoted in leading news publications, academic studies and government reports

All in one place: easy to locate, evaluate and compare

Readily accessible: so you can make quick, better-informed business decisions

Above the hype: accurate projections that business people can use with confidence

Time saving: there's no faster way to find internet and e-business stats, online or off

Money saving: more information, for less, than any other source in the world

"Benchmarking" and Future-Based Projections

Until recently, anyone trying to determine which researcher was most accurate in predicting the future of any particular aspect of the internet did not have a definitive source with which to do this. For instance, over 10 firms predicted e-commerce revenues for the fourth quarter 1998 online holiday shopping season, and yet no single source could be identified after the fact as having the "correct" number. In the Spring of 1999, however, the US Commerce Department finally began measuring e-commerce B2C activity so business people and others could have a benchmark with which they could compare and evaluate projections.

eMarketer has adapted its methodology to recognize that certain government and other respected, impartial sources are beginning to provide reliable numbers that can be consistently tracked over time. Most of these established sources, however, only measure past results; typically, they do not make future-based predictions.

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Today, eMarketer formulates its Essential E-Business Numbers by first identifying the most established, reputable source for a given sector being measured and then adopting that organization's figures as *benchmarks* for the historical/current period. For instance, eMarketer's US internet user figures will be based on a combination of the most recent data from the US Census Bureau (August, 2000 survey) and the International Telecommunication Union (ITU). Using this data as the benchmark for 2000, eMarketer will make projections for subsequent years based on the following factors:

- a comparative analysis of user growth rates compiled from other research firms
- additional benchmark data from internet rating firms, e.g., Nielsen//NetRatings and Jupiter Media Metrix, which use panels to measure internet user activity on a weekly and monthly basis
- an analysis of broader economic, cultural and technological trends in the US

Similarly, US e-commerce revenues are being "benchmarked" using historical data from the US Department of Commerce, and broadband household and penetration rate forecasts are being built off baseline data from the Organization for Economic Cooperation and Development (OECD).

Through this benchmarking process, eMarketer will be holding itself – and our projections – accountable.

“When I need the latest trends and stats on e-business, I turn to eMarketer. eMarketer cuts through the hype and turns an overabundance of data into concise information that is sound and dependable.”

— Mark Selleck, Business Unit Executive, DISU e-business Solutions, IBM

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It is said that new technologies tend to be overestimated in the short term, and underestimated in the long-term. This principal may well apply to interactive TV, which has been hyped for years, but has never quite reached its potential...until now.

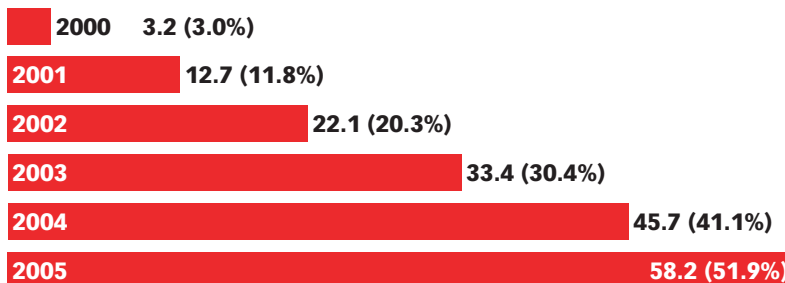
The interactive TV marketplace epitomizes the converging technological environment. Why? Because internet companies, broadcast networks, advertisers, retailers, telecommunications providers, content producers, application providers, device manufacturers and software providers all have a stake in the emerging iTV sector.

Interactive TV has been around for decades, but recent falling memory and processing costs, coupled with increasing digital technology distribution has put iTV high on the agenda for many consumer service providers.

Despite the increasingly fragmented audience across a multitude of interactive platforms, there are opportunities to be had for providers of consumer applications for iTV. International consulting firm McKinsey Consulting compared the value potential for selected interactive TV services and broadband PC services in the US in 2005. Their conclusion was that of the forecast \$32 billion in interactive services revenue across both platforms, iTV has the greater revenue potential.

eMarketer believes the number of US households with interactive TV will rise to over 58 million households in 2005, from 3.2 million in 2000.

US iTV Households, 2000-2004 (in millions and as a % of total households)



Source: eMarketer, 2002

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A. Interactive TV Advertising

Since digital satellite and cable services provide hundreds of additional channels, navigating through all these channels or reading the print copy of the TV Guide magazine, is cumbersome to say the least. The interactive program guide (IPG) solves this problem and has the opportunity to become something of a web portal on TV, where advertising and commerce can be conducted. Data from leading IPG provider, Gemstar, indicates that 30,000 IPGs are being installed in homes each day, and their revenue statements at the end of 2001 indicated they made approximately \$100 million in revenues from their IPG.

eMarketer believes the interactive program guide is where the majority of all interactive TV advertising will come from, but estimates from various research firms vary greatly.

Comparative Estimates: US iTV Advertising Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Myers Mediaenomics, May 2001	\$20	\$30	\$58	\$120	\$215
eMarketer, 2002	\$95.3	\$221	\$601	\$1,356	\$2,619
Forrester Research, 2001	\$127	\$290	\$739	\$1,487	\$2,622
Jupiter Media Metrix, June 2001	–	–	–	–	\$4,500
ABN-AMRO, 2002	\$106	\$348	\$1,888	\$3,934	\$8,270

Source: eMarketer, 2002; various, as noted, 2001 & 2002

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B. T-Commerce

Why would people purchase goods and services through the TV when they have become comfortable purchasing through the PC? eMarketer believes in the short term they will not use the TV, but in the longer term, purchasing goods through the TV will become as ordinary as purchasing on the PC. The fact is, US consumers are already using the TV to shop, spending over \$3.9 billion in 1999 on purchases through the cable shopping channels, QVC and Home Shopping Network. QVC's revenue alone in 2001 was \$3.9 billion.

In the UK, where iTV has been embraced by nearly 40% of households, Domino's Pizza recently reported interactive TV is now its largest e-commerce sales channel, representing 60% of all e-commerce sales and accounting for 2.5% of its total revenues.

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C. Interactive TV Services

eMarketer expects subscription services such as personal video recorder (PVR) functionality, video-on-demand, gaming, telephony, internet and messaging services, betting, music services and other subscription services to have the greatest iTV revenue potential in the short to medium term. The reality is, interactive TV revenues are already being made, and are growing. The leading UK iTV provider BSkyB, released its end of 2001 revenue statement which revealed they made £93 million in interactive TV services revenues for that financial year. Interestingly, over half of their iTV revenues, £49 million, were generated by betting via interactive television, the internet and the telephone.

D. Video-on-Demand

Video-on-demand (VOD) is often talked about as the Holy Grail of interactive TV services. Watching any movie or TV show, at any time of the day or night, with full VCR functionality, is undoubtedly an attractive proposition for most, but VOD is by no means a fait au compli. VOD in the US has serious competition, first and foremost from the existing home video market, which is not going away in a hurry, as 94% of TV households have a VCR; secondly from the growing DVD market, which the Consumer Electronics Association, reported was the fastest growing consumer electronics product sold in 2001; and thirdly, from PVRs which are allowing TV viewers to better utilize the 4 hours a day they spend in front of the box.

Despite VOD's promise, various research firms are still uncertain when, and how big, the sector will become. Estimates for US VOD revenues in 2005 range from as low as \$278 million to as high as \$3 billion.

Comparative Estimates: Video On Demand (VOD) Revenues in the US, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Kagan World Media, 2001	\$120	\$490	\$1,040	\$1,950	\$3,010
Yankee Group, June 2001	\$70	\$420	\$970	\$1,430	\$1,980
Cahners In-Stat*, 2001	\$86	-	-	-	\$1,750
Jupiter Media Metrix, December 2001	\$16	\$34	\$61	\$113	\$278

Note: *North America; **movies only

Source: eMarketer, 2002; various, as noted, 2001

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E. Personal Video Recorders

Consumer survey data indicates that PVRs, together with video-on-demand are the two interactive TV features consumers are most interested in. PVR's ability to skip ads is one function that the vast majority of consumers are interested in, but it is certainly not something advertisers would want to encourage.

“[We’re] laying down the foundation to destroy advertising models, and thus, TV as we know it today.” – CEO of SonicBlue, Ken Potashner

Despite the considerable hype associated with PVRs, there are currently only 1 million installed PVRs in US homes today, and estimates from various research firms about its future growth differs markedly. TV advertisers have no need to ‘throw in the towel’ just yet, but it would be foolish of them to ignore this new interactive medium, which presents as many opportunities as challenges for them.

eMarketer's *Interactive Television: Reality & Opportunity* report, is targeted at advertisers, marketers, retailers, interactive service providers, TV broadcasters, cable companies and every business decision maker associated with the interactive services industry. The report is unique in that it not only presents data from many analysts and experts from within the industry, but it also provides consumer survey data which indicates what consumers want from iTV, as well as presenting financial data from companies within the industry itself, so readers can get a thorough understanding of both the *reality* and *opportunity* within the sector. Some of the important questions this report answers are:

- What is interactive TV?
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Television pictures, the world over, are transmitted into homes by means of three main technologies: terrestrial, cable and satellite.

Terrestrial TV, also called over-the-air broadcasting, is transmitted through the air from a large antenna, usually situated at a high location, and received by an internal or external antenna in the home. TV became a mass medium in most countries during the 1950s by over-the-air broadcasting. Some of the problems that have been experienced with terrestrial TV transmission over the last fifty years have been that the spectrum, which is shared among broadcasters, limits the amount of channels that can be broadcast over the air in a given city, and obstructions and long distances can often degrade the TV signal.

Cable TV transmission receives, converts and transmits the TV signal along hybrid fiber/coaxial cable. Cable TV was developed to deliver TV signals to small isolated communities and later used to increase the number of channels available to viewers. Since cable TV provides a dedicated 'pipe', with more usable bandwidth than regulators allocate to terrestrial broadcasters, cable operators can offer subscribers many more TV channels, normally with clearer pictures. Cable networks, however cost a lot of time and money to build, but recent technological developments have also allowed cable TV operators to utilize the cable network to offer additional revenue generating services such as high-speed internet and telephony.

Satellite TV – also called direct-to-home (DTH) or Digital Broadcast Satellite (DBS) is the transmission of TV signals from orbiting satellites at about 35,000 feet, directly to small receiving dishes attached to a household. Anyone who can install a receiving dish and point it to the sky can receive satellite TV. Most DTH satellite systems are already digital, so they can offer a wider selection of channels than can analog cable.

The major difference between analog TV signals and digital TV signals is that digitizing the TV signal increases the capacity of the transmission technology, thereby allowing TV providers to offer a greater number of channels. A digital TV signal can be transmitted using any of the three distribution technologies, so digital TV is possible on cable, satellite and terrestrial platforms. Mobile phone operators around the world made a similar transition in the 1980s and 1990s when they moved from analog transmission to a digital transmission. This provided mobile phone users with better reception and functionality, but more importantly for the operator, they were able to better utilize their spectrum and service many more customers. Like mobile phone operators, however, cable, satellite and terrestrial operators need to upgrade their systems and networks in order to provide customers with digital TV.

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The other important element to digitizing the TV signal is that it provides operators with a viable opportunity of offering consumers high-definition TV (HDTV) - with double the resolution of standard TV, CD-quality sound and a wider picture - as well as interactive TV (iTV), which is the focus of this report.

Digital TV is already available in many markets around the world in conjunction with Analog TV. Many national governments, including Australia, the US and Taiwan have mandated that TV broadcasters cease transmission of analog TV at a certain date. When this occurs, TV viewers who are not currently subscribed to a digital TV service will only be able to receive a TV signal if they purchase a digital TV, or alternatively a set-top box that will translate the digital signal into viewable pictures on their existing analog TV.

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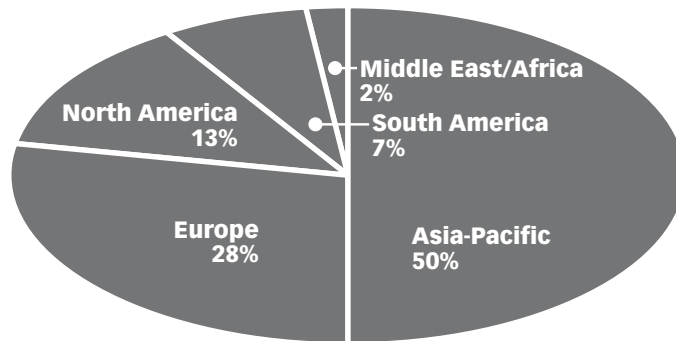
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A. TV Households Worldwide

There are over a billion TV households worldwide and at least 1.4 billion television sets, according to Baskerville Communications and Merrill Lynch. The United States represents less than 10% of worldwide TV households, while China boasts over 30%. Two of the leading interactive TV countries in Europe, France and the United Kingdom, represent less than 5% of worldwide TV households.

Geographic Distribution of TV Households Worldwide, 2000 (as a % of total households)



Source: Baskerville Communications, 2000

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According to research firm Cahners In-stat, since 1990, the number of worldwide cable TV subscribers has grown from 140 million to 280 million at the end of 2000.

Merrill Lynch however, estimates there were only 217 million worldwide cable TV subscribers in 2000. Merrill Lynch's data shows that only about 20% of worldwide TV households are cable TV households. With an already high cable penetration rate in many developed countries around the world, they only foresee a compound annual rate of growth between 2000 and 2005 of 5%. This lack of significant subscriber growth is one of the reasons cable companies are seeking additional revenues from their existing subscribers, by upgrading their networks to offer high-speed internet, telephony and interactive services.

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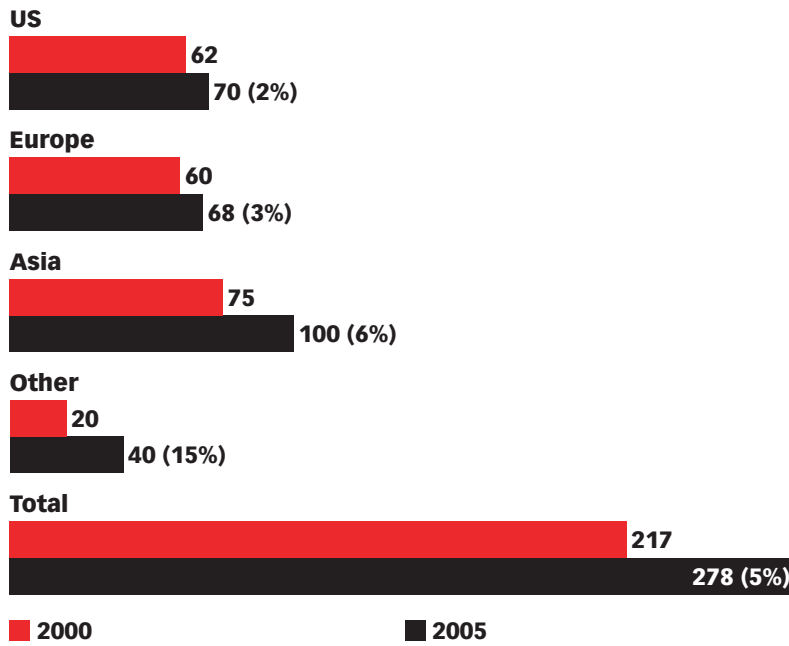
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Cable TV Subscribers Worldwide, by Region, 2000 & 2005 (in millions and CAGR)



Source: Merrill Lynch, February 2001

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B. Global Digital TV Projections

Comparative estimates from several sources indicate that in 2000, there were between 50 and 56 million households worldwide receiving digital TV. This is likely to rise to over 220 million households by 2005, although research firm Cahners In-stat is more conservative than the others. Ovum Research estimates 350 million digital TV households at the end of 2005

Comparative Estimates: Digital TV Households Worldwide, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
ABN-AMRO, May 2001	-	66.3	99.0	132.5	163.5	232.8
Strategy Analytics, February 2001	55.9	79.9	106.8	140.2	180.0	221.7
Morgan Stanley Dean Witter*, March 2001	46.8	70.1	93.0	115.9	135.1	156.2
Cahners In-Stat*, December 2000	47.7	-	-	-	143.0	-
Ovum, December 2000	-	61.0	-	-	-	350.0

Note: *Cable, DBS

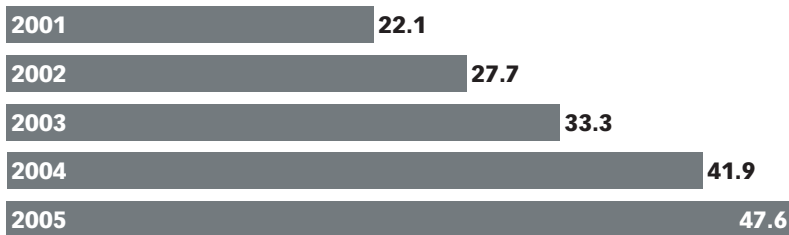
Source: eMarketer, 2002; various, as noted, 2000 & 2001

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Data from research firm Strategy Analytics, shows the increasing take-up of digital TV. They estimate that in 2002, there will be an additional 28 million digital TV subscribers worldwide. By 2005, they estimate there will be nearly 48 million new digital TV subscribers signing up the service in that year.

Annual New Digital TV Subscribers Worldwide, 2001-2005 (in millions)



Source: Strategy Analytics, 2001

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In 2001, the majority (56%) of new digital TV subscribers were satellite TV subscribers. Only 39% of new digital TV subscribers were cable and 4% digital terrestrial according to Strategy Analytics. However, they forecast that new digital cable TV subscribers will make up the majority of new subscribers in 2003 and beyond, with satellite TV subscribers only making up 35% of new digital subscribers in 2005, compared to cable's 58%.

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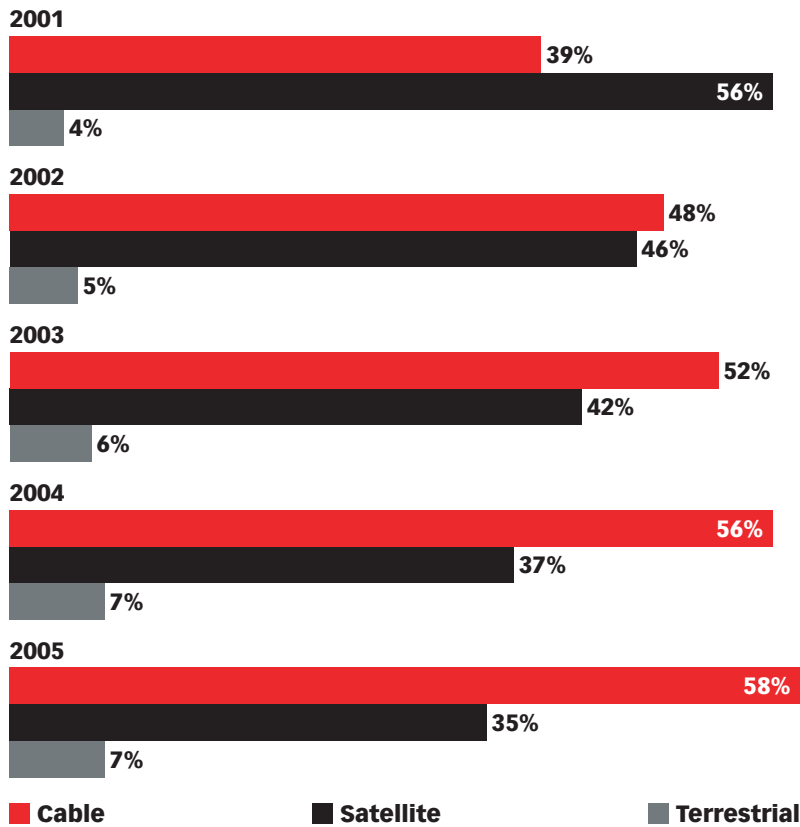
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Share of Annual New Digital TV Subscribers Worldwide, by Platform, 2001-2005



Source: Strategy Analytics, 2001

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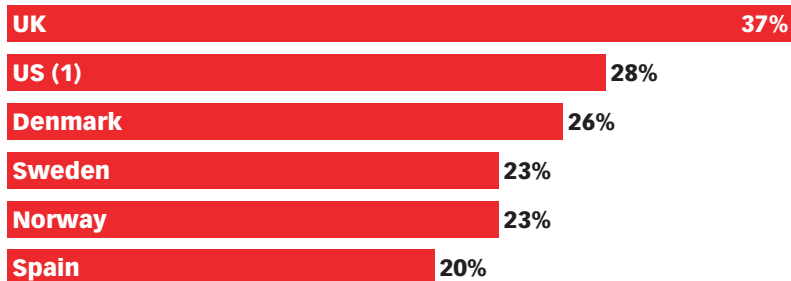
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Leading the charge in digital TV penetration worldwide, at nearly 40% of households, is the UK. TV viewers in that market have a choice of three or more digital TV products to choose from, with digital satellite, cable and terrestrial all having a significant number of subscribers. eMarketer estimates 28% of US households have digital TV and according to Strategy Analytics, Denmark, Sweden, Norway and Spain each have a digital TV penetration rate over 20%.

Leading Digital TV Countries Worldwide, Year-end 2001 (as a % of households)



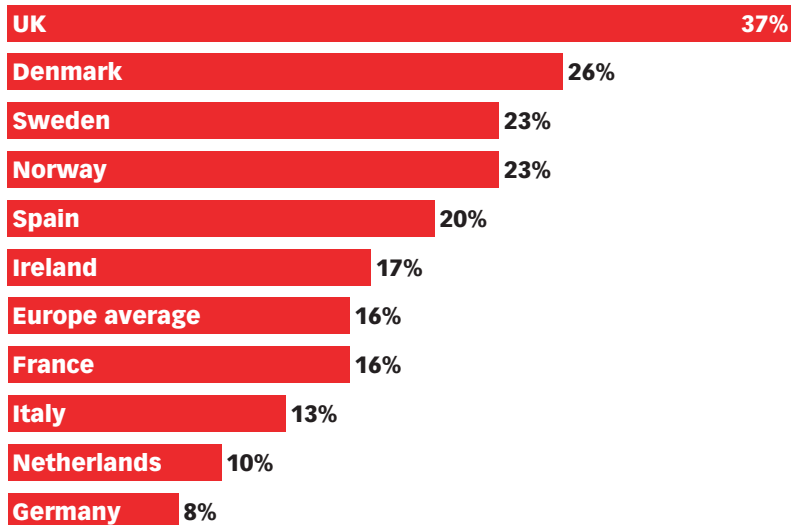
*Note: includes all platforms - satellite, cable, terrestrial, DSL
Source: Strategy Analytics, January 2002; (1) eMarketer, 2002*

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Digital TV penetration varies significantly across Europe. Strategy Analytics estimates, that overall, 16% of Western European households had digital TV at the end of 2001.

Leading European Digital TV Countries, Year-end 2001 (as a % of households)



*Note: includes all platforms: satellite, cable, terrestrial and DSL
Source: Strategy Analytics, January 2002*

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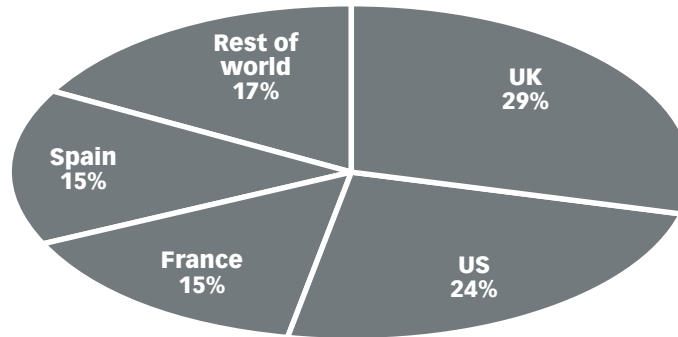
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While the number of TV households in the UK is roughly one fifth that of the US, Strategy Analytics indicates that at the end of 2000, the UK made up nearly 30% of the worlds digital TV households. The US made up 24%, while France and Spain each had 15% of the world market.

Leading Countries in Digital TV Adoption, 2000 (as a % of worldwide market)



Source: Strategy Analytics, 2000

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Digital Cable

Investment firms ABN AMRO and Morgan Stanley Dean Witter each estimate there were approximately 30 million digital cable households worldwide at the end of 2001. Their forecasts for 2005, however, differ markedly. ABN AMRO predicts nearly twice as many digital cable households in 2005 than does Morgan Staley Dean Witter.

Comparative Estimates: Digital Cable Households Worldwide, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
ABN-AMRO, May 2001	–	29	50.3	72.7	93.3	152.8
Morgan Stanley Dean Witter, March 2001	14.9	30.4	45.7	60.3	71.6	86.5
Cahners In-Stat, December 2000	11.7	–	–	–	48.0	–

Source: eMarketer, 2002; various, as noted, 2000 & 2001

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Digital Satellite

Correspondingly, ABN AMRO's and Morgan Staley's forecasts for digital broadcast satellite (DBS) subscribers also differ significantly. Morgan Stanley predicts over 160 million satellite TV subscribers worldwide in 2005, while ABN AMRO forecast half that amount. Cahners In-Stat's 2004 estimate is roughly within the middle of the two investment firms, which may be a more accurate prediction.

Comparative Estimates: Digital Broadcast Satellite (DBS) TV Households Worldwide, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
ABN-AMRO, May 2001	-	37.3	48.7	59.8	70.1	80
Morgan Stanley Dean Witter, March 2001	42.9	66.2	86.3	108.2	127.1	163.2
Cahners In-Stat, December 2000	36.0	-	-	-	95	-

Source: eMarketer, 2002; various, as noted, 2000 & 2001

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Morgan Stanley and ABN AMRO predict about the same number of digital TV households worldwide in 2005 (233 million & 250 million respectively), yet as previously discussed, they come to those figures from two different angles – one predicting digital cable will dominate, the other digital satellite.

Cahner's In-stat, like Morgan Stanley, is also of the view that digital satellite TV will be the dominant digital TV platform worldwide for a few reasons:

- DBS was much moving to digital technology
- In many parts of the world, cable infrastructure is limited
- DBS is easier to roll-out to remote areas and has no competition in most of the world where cable lines have not been deployed.

They further add that the North American and Western European satellite TV markets will be the largest in the digital pay TV industry, although growth rates are slowing in those areas. North America and Europe will account for the bulk of the growth in digital cable between now and 2004. Those two regions will have about 34 million subscribers out of more than 48 million worldwide in 2004 according to Cahners In-Stat.

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Digital Terrestrial Television (DTT)

While cable and satellite are currently the two dominant digital TV platforms, two others will also grow in prominence over the coming years – DTT and DSL.

Digital terrestrial television is coming, because many national government have said it is coming. Countries such as the US, Australia, Canada, Taiwan and others have already made the decision as to when they will be ceasing analog TV transmission.

Digital Terrestrial Television (DTT) Start and Analog Switch-Off Dates for Selected Countries, 1998-2010

	DTT Start	Analog switch-off
UK	1998	ND
US	1999	2006
Canada	1999	2007
New Zealand	1999	ND
Spain	1999	ND
Sweden	1999	ND
Singapore	2000	ND
China	2000	ND
Finland	2000	ND
France	2000	2010
Hong Kong	2000	ND
Ireland	2001	ND
Netherlands	2000	ND
Portugal	2000	ND
Australia	2001	2008
Korea	2001	ND
Taiwan	2001	2006
Japan	2003	2010

Note: ND refers to 'not determined'

Source: Screen Digest, October 1998

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In those countries where over-the-air broadcasting dominates and cable and satellite TV are not widely available, DTT TV will garner significant subscribers. When the analog TV signal stops, TV viewers won't be able to watch TV unless they purchase a new digital TV set or a set-top box that will translate the digital signal so TV is viewable on their analog TVs.

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In the UK, DTT provider ITV Digital (formerly ONDigital), was the first company in the world to launch digital terrestrial TV services, and as of the end of 2001, had 1.2 million subscribers to its digital service. They deliver multi-channel TV and interactive services through an ordinary TV aerial. In nearly all respects, they are competing in both service and price with satellite TV providers. The advantage they have over the competition is that subscribers don't need cable or a satellite dish to receive the service, but the subscriber does need a set-top box.

There is little publicly available data on the potential worldwide market for DTT services, but media research firm, Screen Digest, has estimated 31 million DTT households in the US, Europe and Australia by 2005. This is over one quarter (27%) of their total digital TV forecast for their surveyed countries.

Digital Terrestrial Television (DTT) Households in Europe, the US and Australia, 2005 (in millions)



Note: Countries included are: US, Australia, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and the UK

Source: Screen Digest, 2000

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It is within the largest TV markets in the world, in Asia-Pacific, that digital terrestrial is expected to be the dominant digital TV platform, however. In markets where the cable infrastructure is underdeveloped and pay-TV satellite services are only available in pockets, multi-channel digital terrestrial services will become very popular. Baskerville Communications predicts that by 2010 one third of the world's TV households (353 million) will be DTT homes.

Digital Terrestrial Television (DTT) Households Worldwide, 1999 & 2010 (in millions of households)



Source: Baskerville Communications Corporation, December 1999

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China is expected to be the largest market by 2010 with 100 million DTT homes. This, however, will only represent 28.1% of its total TV households, according to Baskerville. They further add that Europe will have the highest DTT penetration by 2010, at 44.3% of TV households, while North America will have a penetration of only 12.3%.

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Digital Subscriber Line (DSL) TV

Digital Subscriber Line (DSL) has been touted as the potential fourth platform for Digital TV, but it is unlikely this market will emerge as a true competitor to the other digital platforms, for some time. DSL is a broadband technology, which utilizes the existing phone line and provides bandwidth from 200kbps – 50+Mbps depending on the ‘flavor’ of DSL deployed. The service is predominately offered by telecommunications companies, so if digital TV over DSL is to become widespread, then telecom companies will need to work out how to be TV broadcasters as well. This may very well be the factor, which prevents digital TV over DSL from becoming widespread.

Strategy Analytics predicts 46 million homes worldwide will be watching digital TV over their phone lines by 2008. According to a September, 2001 report, commercial services that deliver TV to DSL subscribers have been available for some time from operators such as Qwest in the United States, and Kingston Communications and VideoNetworks in Britain, as well as TransACT in Australia. They predict annual sales of DSL DTV set-top boxes will rise to 10.7 million units by 2008, from 1 million in 2002.

Worldwide Sales of DTV over DSL Set-Top Boxes, 2002 & 2008 (in millions)

2002	1.0
2008	10.7

Source: Strategy Analytics, 2001

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Summary of Digital TV Platforms

Each digital platform has its advantages and disadvantages and each will be successful in different markets around the world. The main advantage digital cable and DSL have over satellite and terrestrial is the high-speed return path. This gives these companies the opportunity of offering telephony and as well as high-speed data and video. On the interactive TV front, it also provides these companies with the opportunity of providing video-on-demand and multi-user gaming, which are two potentially lucrative interactive TV services. The disadvantage with cable and DSL, however, is that it takes a long while and a great deal of investment to build out this wire-line network. Many less developed countries, particularly, do not currently have a well developed cable or telecommunications infrastructure, making cable or DSL TV an unlikely option in the future.

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The advantage of satellite is that anyone with access to the sky can receive its signal and most satellite services are already digital. The main disadvantage is that one has to buy a satellite dish, have it positioned correctly, and there is no high-speed return path, reducing the potential interactive services that will be offered.

The advantage of terrestrial is that theoretically, if a viewer is currently able to watch TV, then all they will need is a cheap set-top box to receive multi-channel and interactive television. The disadvantage, as with satellite, is that a high-speed return path is not available, and interactive TV viewers will have to utilize the existing phone line for their interactivity.

Digital TV Platform Characteristics, 2002

	Digital Cable	Digital Satellite	Digital Terrestrial	Digital Subscriber Line
Bandwidth per user	High	Low	Low	Medium/high
Return path	Real time/ high speed	Slow/none	Slow/none	Medium/high
Services	Voice/video/ data	Video/some data	Video/some data	Voice/video/ data
Time to build out	Long	Short	Medium	Long
Footprint	Local/ regional	National	Local/regional/ national	Local/regional/ national

Source: eMarketer, 2002

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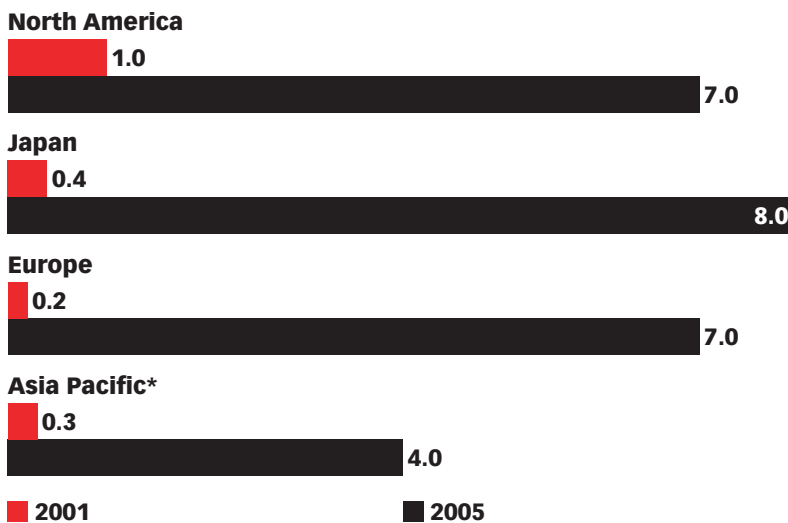
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C. Digital TV Sets

It is not necessary to have an actual digital television set in order to receive digital television, as a less expensive set-top box is able to translate the digital signal so it is viewable on an analogue TV set. However, with a growing amount of digital terrestrial content being broadcast, as well as increasing numbers of digital cable and satellite TV subscribers, there is a corresponding growing number of digital television sets being sold worldwide. As digital TVs are still extremely expensive compared to their analog counterparts however, the market is still very small.

Estimated Worldwide Digital TV Set Market Projections, 2001 & 2005 (in millions)



Note: *Korea, China, Taiwan and Australia

Source: Cahners In-Stat Group, 2001

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D. Digital TV Revenues

Revenues from the worldwide digital TV industry totaled over \$15 billion, in 2000 according to The Arc Group. They forecast this to rise to over \$290 billion by 2006. In 2000, the leading digital TV regions were Western Europe and North America. By 2006 however, the Asia-Pacific region will garner the greatest share of worldwide digital TV revenues.

Digital TV* Revenues Worldwide, by Region, 2000-2006 (in billions)

Region	2000	2001	2002	2003	2004	2005	2006
North America	\$5.76	\$9.61	\$14.31	\$21.19	\$28.96	\$41.91	\$60.76
South America	\$1.08	\$2.13	\$3.94	\$6.79	\$10.82	\$16.00	\$23.08
Western Europe	\$6.15	\$10.69	\$17.68	\$27.42	\$39.53	\$54.60	\$72.22
Far East	\$1.13	\$2.30	\$4.34	\$7.94	\$12.40	\$18.53	\$25.70
Asia-Pacific	\$0.904	\$3.10	\$8.64	\$18.61	\$33.40	\$56.82	\$89.22
EEMEA**	\$0.449	\$1.96	\$4.14	\$7.68	\$12.89	\$12.89	\$20.08
Total	\$15.42	\$28.60	\$50.87	\$86.09	\$132.77	\$200.77	\$291.03

Note: *Digital TV=homes with digital set-top box or integrated digital TV;

**EEMEA=Eastern Europe, Middle East & Africa

Source: ARC Group, 2001

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By way of comparison, The ARC Group projects revenues in the global broadband internet sector to be roughly 25% of the value of the global digital TV market in 2006.

Worldwide Broadband* Revenues, by Region, 2000-2006 (in billions)

Region	2000	2001	2002	2003	2004	2005	2006
North America	\$2.86	\$3.80	\$5.53	\$7.33	\$10.63	\$14.80	\$19.20
South America	\$0.014	\$0.121	\$0.490	\$1.13	\$1.93	\$2.80	\$3.80
Western Europe	\$0.571	\$1.50	\$3.28	\$6.11	\$9.68	\$15.07	\$21.30
Far East	\$2.38	\$4.31	\$5.57	\$7.13	\$8.63	\$10.52	\$12.19
Asia Pacific	\$0.034	\$0.199	\$0.768	\$1.90	\$3.50	\$5.67	\$8.56
EEMEA**	\$0.010	\$0.103	\$0.341	\$0.744	\$0.132	\$2.11	\$2.87
Total	\$5.86	\$9.93	\$15.97	\$24.35	\$35.70	\$50.88	\$67.88

Note: *Broadband=homes with cable-modems, ADSL, satellite or wireless internet access. **EEMEA=Eastern Europe, Middle East & Africa

Source: ARC Group, 2001

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Interactive television is not exclusively coupled to digital TV, as interactive TV services have been available for many years over an analog TV signal. The UK's Teletext service has been around for over 20 years. Digital TV however, considerably widens the opportunity for interactive services on the television and makes it a more viable and cost-effective opportunity for TV providers. With the growing demand for digital television around the world, and the fact that many national governments have mandated digital television in the next five years, a growing number of TV providers are offering interactive TV services.

But what is iTV? One of the main reasons why interactive TV, particularly in the US, has not been adopted as quickly as some may have hoped, is because there is a great deal of confusion about what exactly interactive TV is. If consumers don't know what it is, then it is certainly going to be difficult convincing them to buy.

“Viewers in the US can’t even define interactive television, much less demand it”

– Arthur Orduna, VP of Marketing, Canal Plus Technologies

The following dialogue highlights some of the challenges those within the iTV industry will need to face in order to better educate the public about iTV.

The Mystery of iTV

Consumer	iTV Expert
Is it the internet on TV?	It can be, sort of.
You can change camera angles while watching the football, right?	Sometimes.
Is it video-on-demand?	Yes, and no.
You can do email and instant messaging on the TV?	Maybe.
Is it like having multi-screens on your TV and being able to 'click-onto' some parts of it to get information?	It can be.
Is it playing games and shopping on the TV?	If you like.
It is like a new program guide where you can set preferences and record shows and fast forward ads?	Yes, but...
What has a garden got to do with it, and who put the wall around it?	Ummm....

Source: eMarketer, 2002

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“Interactive TV is, essentially, video programming which incorporates some style of interactivity – be it with data on video, graphics on video, video within video, or retrieving video programming and possibly recording it on a digital hard disk drive for further use.” – Tracy Swedlow, *President of Interactive TV Today, 2000*

The term interactive TV clearly covers a broad range of applications, services, and technologies but it is possible to group the variety of interactive TV elements into seven major categories.

Enhanced TV: is any type of content, whether it be text, graphics or video, which is overlaid on regularly displayed video content. In its simplest form, it may be the electronic program guide application which is displayed over the existing programming. Outside the US, enhanced TV may also be thought of as refined teletext. The enhanced content may be synchronized with the video, or it may be available on command, so a return path is not necessary. Some of the leading vendors in this space include Wink Communications, Gemstar-TV Guide and OpenTV.

Internet on TV: can allow viewers to browse the web, to read and write email and instant messaging and to carry out many, if not all the activities one can carry out accessing the internet on a personal computer (PC). Internet content is adjusted for TV's lower resolution and display capabilities and a return path is necessary, whether it be the phone line, cable, Digital Subscriber Line (DSL) or alternative. Leading vendors include MSN-TV, AOL-TV, Worldgate, Liberate and others.

Individualized TV: allows a viewer to modify a program such as changing camera angles at will, or guiding the plot in dramas or comedies or calling up instant replays in sports and live news. Initially developed for one-way broadcasting, it now can be two-way. The leading vendors in this space include ACTV and OpenTV.

Video-on-demand (VOD): allows TV viewers to access video content whenever they wish. This should not to be confused with near video-on-demand where video automatically runs at staggered and frequent times on multiple channels. The leading vendors include Concurrent, DIVA, Intertainer, nCUBE and SeaChange.

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Personal Video Recorder (PVR) functions: Also called Personal TV or Digital Video Recorder (DVR) functions. This allows users to record programming by title, timeslot, rating, actors, or theme. With full VCR functionality, the PVR can pause during a broadcast as content is cached on the disk, or skip over commercials. The latest models of PVRs also allow users to send video content from one PVR to another, whether it is in the same home or over a broadband network. Leading vendors include TiVo and ReplayTV.

Walled Garden: is a portal-like suite of interactive TV applications that usually includes communications, gaming, commercial and customer-care applications. Only the applications provided by the operator are available to the user, hence the wall around the garden. A walled garden iTV experience often is like another channel on the TV which the user can access with the press of a button, but the user has to be within the walled garden to access the available interactive applications. Leading vendors include OpenTV, Worldgate and many others.

Game Console: while game consoles are not normally included in the suite of iTV categories, the latest game consoles closely resemble interactive TV digital set-top-boxes and should be mentioned. Microsoft's X-Box and Sony's Playstation 2 consoles in particular, have significant processing power and storage capacity and have the potential to offer users more than just stand-alone gaming experiences.

Current iTV service providers are offering one or a combination of these iTV elements.

eMarketer defines iTV as two-way interactive services designed for the TV. Interactive services can be offered by any type of TV operator (eg., cable, satellite and terrestrial broadcast), but a return path is required, whether it is via cable, wireless, or dial-up.

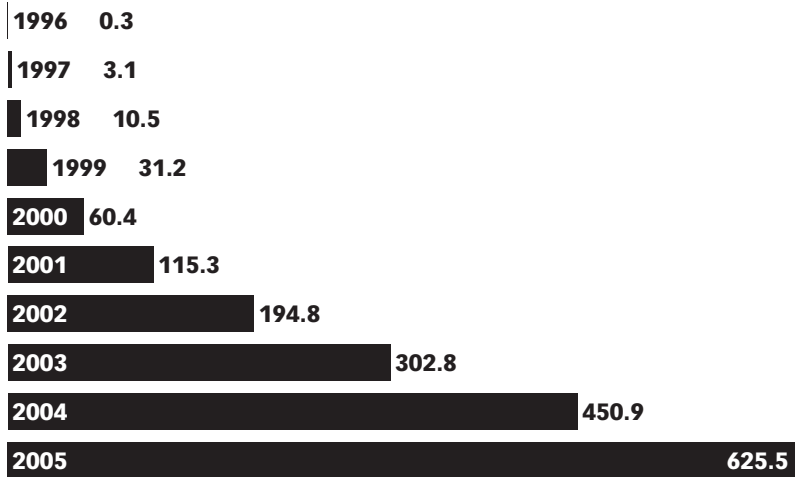
“What is still a broadcast, passive, linear, entertainment viewing experience for millions of people around the world, television is now becoming an on-demand, participatory, non-linear, infotainment, advertising targeted, broadband, two-way communications platform.”

– Tracy Swedlow, CEO Interactive TV Today, 2000

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The number of actual worldwide iTV viewers will reach 625 million in 2006, according to Strategy Analytics. While this is clearly a large number, what it does not indicate however, is that many people will have access to interactive TV services, but a lot less people will actually be active users or pay for iTV services.

iTV Viewers Worldwide, 1996-2005 (in millions)



Source: Strategy Analytics, February 2001

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Western Europe clearly dominates the iTV landscape at present with over 23 million iTV households at the end of 2001. North America had only 6.9 million iTV households at the same time according to Strategy Analytics. While the Asia-Pacific region will grow more slowly than North America and Western Europe through 2005, since this region contains half of the world's TV households, it will inevitably become the largest iTV region in the years to come.

iTV Households Worldwide, by Region, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
North America	6.9	16.1	28.2	43.2	58.3
Western Europe	23.6	32.9	43.3	55.4	69.7
Asia-Pacific	3.8	9.0	18.4	35.6	58.5
Latin America	0.4	1.0	2.1	3.5	5.2
Rest of World	3.8	5.9	8.9	12.6	16.8
Total worldwide	38.4	64.9	100.9	150.3	208.5

Source: Strategy Analytics, 2001

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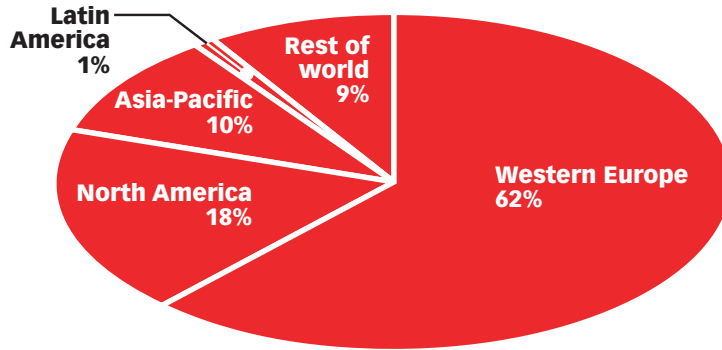
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In 2001, Western Europe had 62% of the world's iTV households, lead in large part by the UK.

Distribution of Worldwide Interactive TV Audience, by Region, 2001



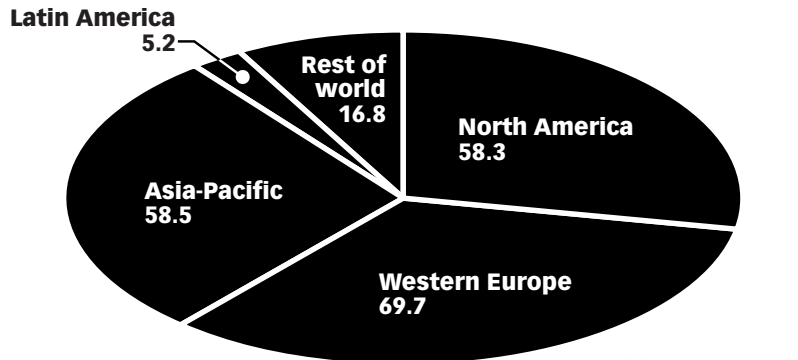
Source: Strategy Analytics, 2001

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By 2005 however, Strategy Analytics estimates, that Western Europe, North America and Asia-Pacific will each have about 30% of the world's iTV audience.

iTV Households Worldwide, by Region, 2005 (in millions)



Source: Strategy Analytics, January 2001

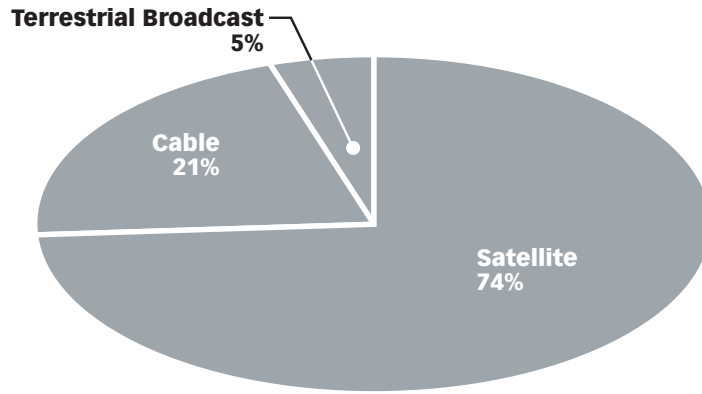
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The leading iTV platform in 2001, in numbers of households, was satellite, with 74% of the iTV market. This is predominately a result of leading UK satellite TV provider, British Sky Broadcasting (Sky), with 5.5 million iTV households at the end of 2001.

Global iTV Audience, by Service Type, 2001



Source: Strategy Analytics, 2001

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B. The iTV Market Segments

The worldwide interactive TV marketplace consists of many players at different levels of the process. In front of the TV, with remote control or keyboard in hand, is the iTV user. They have been suddenly transformed from couch potato to interactive jumping-bean and are playing games, calling-up videos, writing email, changing camera angles and surfing the web on their TVs. This transformation is possible because of the set-top box that sits on top of the user's TV.

The applications the user is accessing are provided by a multitude of service providers from firms such as Gemstar-TV Guide which may provide the interactive program guide, to ACTV which can allow the user to play games, to TiVo which may provide Personal Video Recorder functionality. Leading UK iTV operator, BskyB claims it has over 200 separate applications available on its Sky Active service.

The Major iTV Market Segments, 2002

Applications

messaging, web browsing, personal video recorder, program guides, games, commerce, advertising, interactive content, telephony, digital music, video-on-demand, directory, billing, security monitoring, etc. Companies such as - TiVo, Gemstar-TV Guide, Intertainer, SeaChange International, Wink Communications, nCUBE, ACTV, RespondTV, etc.

Middleware

Microsoft, OpenTV, Liberate, WorldGate, PowerTV, Canal+, Loudfire, Sun Microsystems

Operating system

Microsoft (Microsoft TV, CE), Scientific Atlanta (PowerTV), WindRiver (VXWorks, PSOSystem), Microware (OS-9)

Conditional Access

NDS, Kudelski, Irdeto, Canal+, France Telecom

Hardware/Set-Top-Boxes

e.g., Scientific Atlanta (Explorer), Motorola (DCT 5000), Phillips (DVB MTC8030), Sony (SAT -A55), and Pace (Customer Specific), Siemens, Panasonic

Network Operators

(Cable, Satellite, Terrestrial, Digital Subscriber Line) e.g., AT&T Broadband/Comcast, DirecTV, EchoStar, Sky, Time Warner Cable

Source: eMarketer, 2002; Banc of America Securities, 2001

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Below the application layer is the so-called middleware. The middleware layer ensures the variety of different applications are all compatible and function across different platforms. Often called the translation or conversion layer, the importance of the middleware layer is that those writing applications for iTV do not have to worry about the operating system or hardware platform that a network operator may have deployed. Technology Analyst, William Bao Bean describes the middleware layer as the glue that ties the applications to the variety of devices and network platforms together. OpenTV is currently the leading middleware provider in the world, announcing 23.5 million worldwide set-top box deployments in February 2002. There is however, no universal middleware standard at this stage and about six companies are battling it out for dominance.

“Middleware will serve as glue, tying devices and applications in the home together over a network and to support services.” – William Bao Bean, Technology

Analyst, Banc of America Securities, 2001

The Operating System within the set-top box manages the process, memory, movement and storage of data and communications within the network and interfaces with the middleware. In a PC environment, it is analogous to Microsoft Windows.

Conditional Access is the security system that network operators use to control what applications the end-user has access to. For example, it ensures no end-user can see a pay-per-view movie without paying for it.

The Hardware provider is the metaphorical movie producer, who puts all the elements together in one package.

The Network Operator provides the broadband network to deliver the television signal to the set-top box in the home. This can be delivered via a cable network, satellite, terrestrial, digital subscriber line (DSL) or other network technology.

The interactive TV marketplace epitomizes the converging technological environment with internet companies, broadcast networks, advertisers, retailers, telecommunications providers, content producers, application providers, device manufacturers and software providers all having a stake in the emerging iTV sector. While many players have been dabbling in the iTV sector for decades, falling memory and processing costs, coupled with increasing digital technology distribution have made iTV services a high agenda item for most TV providers.

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C. The Set-Top Box (STB)

The piece of hardware that transforms the TV into an interactive device is the set-top box (STB). (So-called, because it is a box that usually sits on top of your TV set). STBs could be described as computers as they have microprocessors, memory, and various inputs and outputs, but a typical STB does have significant differences between a PC. Putting the characteristics of an average digital STB next to that of a PC and the X-Box game console illustrates some of the differences and similarities between each device.

Characteristics of a PC, Digital Set-Top Box & X-Box Game Console in the US, 2002

	PC	Digital Set-top box	X-box game console
Average price	\$1,500	\$300	\$300
Processor	800 Mhz/500-1000 MIPS	125 Mhz/300 MIPS	733Mhz Pentium 3
Internet access	Can access the internet through a variety of technologies at speeds ranging from 14.4Kbps to over 1.5Mbps	Digital Cable system which handles speeds at 4,000 Mbps, or Digital Broadcast Satellite STB - 750Mbps-1,000 Mbps	Digital Cable modem speeds -350kbps - 1.5kbps
Local hard drive/storage	1GB -150GB	1-32Mbps of Flash Memory with limited Hard Disk Storage	8GB-10GB
Useful life	2-3 years	About 6 years	About 5 years
Paid for by	Consumer	Partially or fully subsidized by network operator	Consumer

Source: Morgan Stanley Dean Witter, May 2001; eMarketer, 2002

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The main difference between the PC and the majority of set-top boxes in homes today, is the processing power and the local storage capabilities. PCs typically have significantly more processing power, and more local or hard disk storage capabilities than a set-top box. This is essentially because the PC often functions as a stand-alone unit. Connectivity to the internet or other network does add functionality and perhaps processing power, but it is not necessary for the PC to productively operate. PCs have enough processing power and memory to run a variety of applications, while set-tops, generally have less processing power and are only capable of running a more limited set of applications.

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It is also interesting to note that the characteristics of the game console are remarkably similar to that of the digital set-top box. Both Microsoft and Sony are intricately involved in the development of digital set-top boxes in addition to their game consoles, so it will be interesting to see the strategy they employ for both products going forward.

Categories of Set-top Boxes

While the previous analysis put an average PC beside an average digital set-top box, there are a variety of different types of STBs which range from the low-end analog type which merely receives, tunes and un-scrambles incoming television signals, to advanced digital STBs which have high processing and enhanced storage capacities. The importance of the set-top box, and the strategy the various players are taking, are directly related to the possible interactive services and applications an iTV user will have available.

According to Senior Technology Strategist at Chorus, Gerard O'Driscoll, set-top boxes can be broadly classified into six major categories. The following table actually visually illustrates well, the so-called Fat versus Thin client strategy taking place within the set-top box industry. Those with 'thin' set-tops have limited memory and processing power and therefore offer limited functionality; 'fat set-tops have greater memory and processing power and greater functionality.

Categories of Set-Top Boxes (STBs) Worldwide, 2002

Analog set-top boxes	Perform the functions of receiving, tuning and de-scrambling incoming television signals
Dial-up set-top boxes	Allow subscribers to access the internet through their TV
Entry-level digital set-top boxes	Are capable of receiving broadcast digital television and complemented with a pay-per-view system and a very basic navigation tool. Usually low cost, limited memory and processing power
Mid-range set-top boxes	Include a return path for communication with the server at the head-end. Usually double the processing and storage capabilities of an entry-level STB
Advanced digital set-top boxes	Bear a close resemblance to a multimedia PC. Usually contain 10 times the processing power of low-level STBs and significantly more storage capabilities in conjunction with high-speed return path which allows advanced services such as video conferencing, IP telephony, video-on-demand and high definition television
Advanced digital set-top box with PVR functionality	These STBs include a hard disk drive which allows users full VCR functionality allowing recording of shows and skipping of ads, etc. as well as all the functionality associated with an advanced digital STB

Source: Chorus, 2001; eMarketer, 2002

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The thin-client strategy views the set-top box as an integral part of the network. The set-top is the client, while the server is the cable network with a central site called the head-end. All applications such as video-on-demand, email, chat, T-commerce, gaming etc will incorporate the STB as well as the network. A so-called ‘thin’ set-top box will have relatively low processing and local storage capabilities, but will be more affordable to manufacture, and more affordable for multiple service operators (MSOs) to subsidize.

The fat-client strategy puts a great deal of processing power and local storage within the local device. This gives it a considerable amount of functionality which may offer MSOs with a wider range of revenue generating applications and services. However, the increased functionality will inevitably raise the price of the set-top, which in turn may discourage users to adopt the service or if MSOs are subsidizing the box, it will make it very expensive for them.

Most of the interactive TV middleware players have developed both thick and thin devices which gives cable and satellite companies more flexibility in the interactive TV strategies and business models they employ. The variety of different middleware platforms however, does make it difficult and expensive for application service providers to develop services across all middleware platforms.

“The net effect of the different platforms is that applications must be written for each individual platform, a timely and inconvenient step for developers.” – Morgan Stanley Dean Witter, March 2001

The leading middleware provider is OpenTV, which recently announced 23 million set-tops have been deployed globally with its middleware.

iTV Middleware Providers Worldwide, Year-end 2001

Middleware Provider	Memory Requirements	Deployed set-top boxes (all models)
OpenTV	<2 Megabytes	23.5 million
Liberate	2-8 Megabytes	2 million
MicrosoftTV	32 Megabytes	0.5 million
Sony	32 Megabytes	Data unavailable
Power TV	<2 Megabytes	6 million
Canal+ Technologies	2-8 Megabytes	11.5 million
Worldgate	<2 Megabytes	0.4 million

Source: eMarketer (from company data), 2002

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“Over the next five years, we anticipate seeing an increase in the mid-range set top boxes that will enable network operators to initially deploy iTV services such as weather, email and horoscopes and then transition to more advanced services such as t-commerce and premium video games.”

– James Ackerman, CEO OpenTV Jan29, 2002

Cable Vs Satellite Vs Digital Terrestrial Set-tops

The major difference between cable, satellite and digital terrestrial set-tops is the greatly enhanced two-way capabilities of the cable network.

Upgraded cable networks can both send and receive real-time signals to the home, while satellite and digital terrestrial networks generally can only send signals one way to a subscriber. This is critical in services such as telephony and video-on-demand, but to date, this lack of a high-speed return path has not overly hampered the roll-out of interactive services from satellite or digital terrestrial TV providers. On the contrary, the fact remains that the most successful interactive TV provider, BskyB in the UK, with over 5.5 million subscribers, is a Satellite TV provider. Sky's interactive subscribers only have the phone line as a return path, yet their variety of interactive applications far outnumber any interactive service offerings from cable TV providers around the world.

“Interactive TV through digital broadcasting is slow because uploading — that would be the interactive part — goes through the phone line. This causes a noticeable delay that few channel surfers can tolerate. PC users are accustomed to annoying delays; TV viewers are not.”

– Steve Mollman, J@pan Inc Feb, 2001

The technological advantages of the cable network may give them an edge over satellite and digital terrestrial TV providers in the future provision of interactive services, but to date, this advantage has not been realized. What consumers are far more interested in, rather than arguments over which technological platform is the best now or in the future, is which companies are offering the most compelling bundle of entertainment and interactive services at an affordable price.

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Global Set-top Box Projections

Data from a number of sources shows there were between 70 and 99 million digital set-top boxes in households in 2001. This is likely to rise to between 200 and 300 million by 2004.

Comparative Estimates: Set-Top Box Households Worldwide, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
ABN-AMRO, May 2001	67.2	102.2	139.2	174.8	250.1
International Data Corporation (IDC)*, 2000	98.8	146.7	200.57	256.8	-
Morgan Stanley Dean Witter, March 2001	82.4	111.1	141.6	172.2	214.6

Note: *Cable, DSL, DTT, DBS

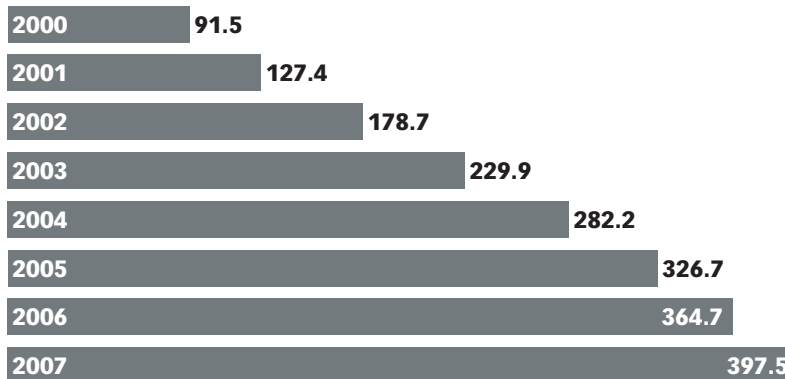
Source: eMarketer, 2002; various, as noted, 2000 & 2001

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Data from Jon Peddie Associates (JPA) suggests that growth in digital set top boxes will be steady through 2007, as the following graph illustrates. According to JPA, nearly 300 million digital set top boxes are expected to be installed by 2004.

Digital Set-Top Boxes Installed Worldwide, 2000-2007 (in millions)



Source: Jon Peddie Associates (JPA), 2001

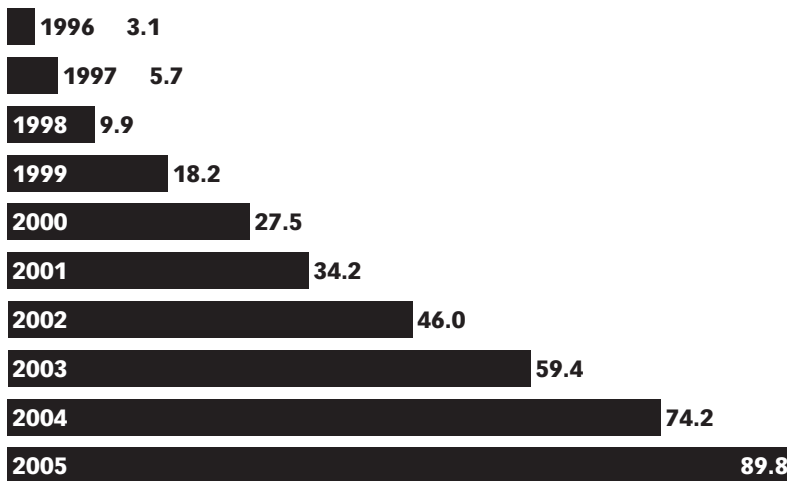
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According to IDC, shipments of digital TV set-top boxes will reach over 24 million in the US and nearly 70 million worldwide by 2004. IDC's estimate coincides with Strategy Analytic's estimate for set-top shipments in 2004. They estimate 74 million digital set-top boxes will be sold in 2004 and 90 million in 2005.

Digital TV Set-top Box Sales Worldwide, 1996-2005 (in millions of units)



Source: Strategy Analytics, February 2001

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According to Morgan Stanley, 31 million of the 55 million cable and DBS installed set-tops in the world were in North America in 2000, with Europe, the next closest region with 15 million installed set-tops. By 2005 however, Morgan Stanley predict Asia will surpass Europe with over 60 million STBs.

Worldwide Cable and Digital Broadcast Satellite (DBS) Set-Top-Box Installed Base, by Region, 1999-2005 (in millions)

	1999	2000	2001	2002	2003	2004	2005
North America	19.7	30.6	43.3	55.0	65.9	77.3	92.2
Europe	9.2	15.2	22.0	28.8	35.1	40.6	48.2
Latin America	2.0	3.0	4.4	6.1	8.2	10.4	13.5
Asia	3.5	6.0	12.7	21.2	32.5	43.9	60.7
Worldwide total	34.5	54.8	82.4	111.1	141.6	172.2	214.6

Source: Morgan Stanley Dean Witter, March 2001

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There is still a great deal of uncertainty as to how the next generation of digital set-top boxes will develop. Many commentators have suggested that it will evolve into a residential gateway and become the primary access point for subscribers connecting to the internet. The increasing processing power and local storage capabilities of the new digital set-top boxes, have led some to believe that the TV/digital set-top box combination will make the PC less relevant than it has been in the past.

Others believe that with growing broadband adoption, and home-networking possibilities, the PC will become the center of the future digital home. Many broadband PC users are already able to access video of a quality higher than that of their current analog TVs and the interactive possibilities are far superior on this device than on a TV.

“The only thing left on PCs are Office and games.”

– Larry Ellison, Oracle

And there are those with a vested interest:

“It’s really a big, digital universe and if you look at the center of that universe, it’s the PC.”

– Intel’s CEO, Craig Barret

“We don’t think the PC is dying at all — just evolving” – Steve Jobs, Apple

“The PC is going to be the place where you store the information and really the center of control.”

– Bill Gates, Microsoft

It would seem that the technological development of both the TV and the PC are inevitably heading in the same direction – into a multi-purpose, multi-channel, interactive super-box that is able to network all devices in the home, providing entertainment and utility services where and when they are required. That is the fantasy for the future; the reality for now is that advertisers, e-commerce providers, investors and business decision makers need to know where to invest their time and money in order to receive the greatest return.

There is no doubt the PC and the interactive TV will live happily side-by-side for some time, as they currently serve different needs, have significantly different functionality and most importantly are two completely different user experiences. The PC is a ‘lean forward’ experience, where users conduct a variety of interactive activities including word processing and web surfing, while the TV is essentially a “lean back” and social experience where users are happy to be entertained in a passive way.

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In a recent Jupiter Media Metrix survey, only 11% of consumers said that they were interested in viewing movies online through their PC, for example and 31% of consumers said that the Internet was too slow to allow them to watch video.

“..direct-to-consumer VOD strategies that focus on delivering movies to a PC are destined to fizzle out before they begin.” – *Jupiter Media Metrix, 2001*

Jon Florsheim, the Managing Director of the interactive arm of leading iTV company BSKyB, summed up what iTV is really all about when he said:

“TV is first and foremost an entertainment medium. We are not competing with the PC or mobile phones. We are competing for a slice of the four hours a day that people sit down in front of the box to be entertained. Interactivity has to be an integral part of that viewing experience. It’s not just something that people do furtively late at night after they’ve finished watching the test card.”

– *Jon Florsheim, Managing Director, BSKyB*

This may be very true, but the fact remains, that these two platforms – the PC and the TV - will be increasingly competing for the limited advertising and e-commerce dollars that are out there now and in the future.

Veronis, Suhler & Associates indicate that the amount of time US consumers are spending watching broadcast television is declining and the amount of time US consumers are spending on the internet is increasing. However, watching TV in 2005(broadcast, cable and satellite) will still make up nearly half of the time (4hrs 26 minutes per day) US consumers spend on media consumption. In contrast, consumers will only spend 5% of their media consumption time on the internet in 2005.

Looking at some key indicators of the current penetration of interactive devices in a selection of countries will provide some guidance as to where to place the best bets.

eMarketer’s projections clearly indicate that one platform is not going to dominate the world over, but rather different interactive platforms are developing at different speeds, in different countries. The US is currently very PC-internet centric, the UK is moving toward being very iTV-centric and Japan continues to be very mobile-internet centric.

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Interactive Device Penetration in the US, the UK and Japan, 2001 & 2004 (as a % of total households)

	US		UK		Japan	
	2001	2004	2001	2004	2001	2004
iTV	12%	41%	40%	80%	1%	45%
PC internet	60%	70%	37%	63%	43%	65%
Broadband internet	11%	31%	2%	20%	5%	25%
Internet phone/ Handheld* subscribers	3%	23%	3%	35%	39%	70%

*Note: *subscribers to a mobile internet service as percent of total population*

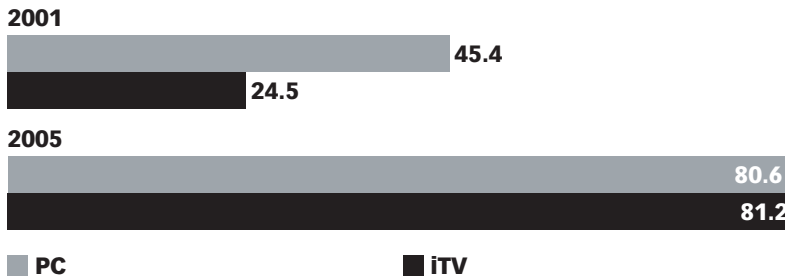
Source: eMarketer, 2002

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The Yankee Group, in March 2001, estimated that by 2005, there will be more interactive TV households in Europe than PC internet households.

Households in Western Europe Accessing the Internet by PC and iTV, 2001 & 2005 (in millions)



Source: Yankee Group, 2001

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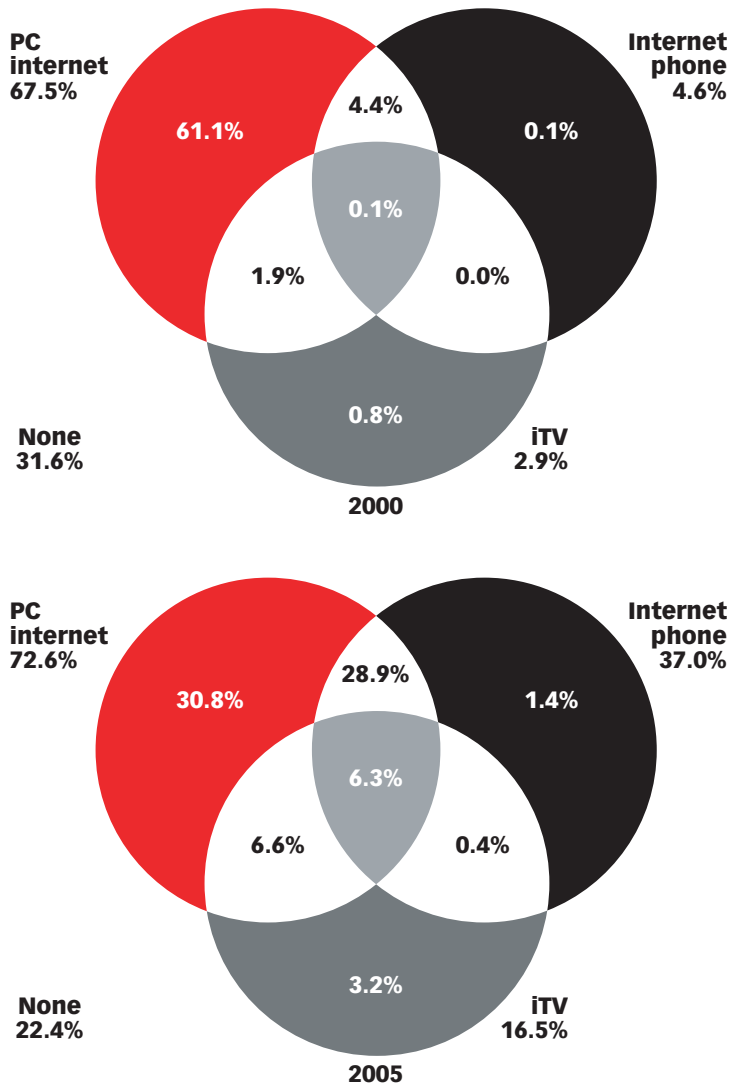
“We don’t believe the broad middle market of [European] internet consumers in the next five to seven years will want to hassle with ISPs, PC configuration and cost, and an open Web-surfing experience when they can effectively have a walled garden that allows shopping, banking, and entertainment services from familiar names, at a low cost, without having to do much more than allow their set-top box provider to push them new services,”

– Andy Greenman of Yankee Group’s Internet Strategies Europe (ISE) Group

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The US, in contrast to Europe, will remain very much PC-internet centric for the next three years according to Gartner. In 2000, they indicate that 4.6% of the US population used an internet phone and only 2.9% interactive TV, compared to 67.5% who used the PC-internet. Gartner predicts both mobile internet and iTV users to grow significantly by 2005, and that 42% of US e-commerce buyers will regularly use multiple platforms. As each platform has its particular characteristics and users, service providers need to tailor their offering appropriately.

US Interactive Platform Penetration, 2000 & 2005 (as a % of total population)



Source: GartnerG2, August 2001

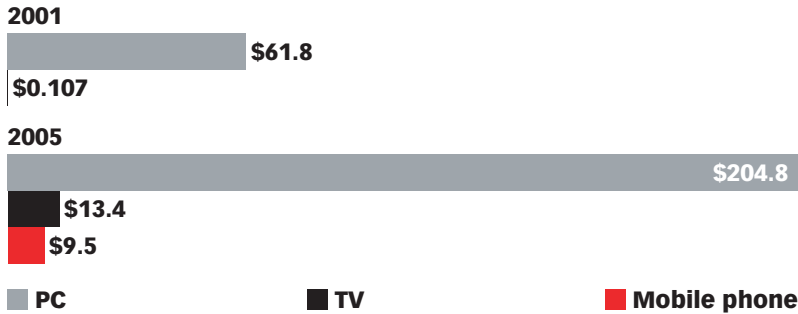
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Gartner’s research does indicate however, that while an increasing number of Americans will be accessing alternative interactive platforms to the PC in the coming years, when it comes to e-commerce revenues, 90% will come from the PC in 2005.

US B2C E-Commerce Revenue, by Transaction Platform, 2001 & 2005 (in billions)



Source: GartnerG2, November 2001

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One of the statistics that is often cited when looking at the potential of interactive TV is the fact that growing numbers of internet users actually watch TV while surfing the internet. The logic is that if users are creating their own multi-media experience by using the internet and watching TV at the same time, then they will inevitably be willing to do the same thing on the one device. Pricewaterhouse Coopers suggests that in 2000, 25 million people in the US were using the internet while watching TV, up from 18 million in 1999.

Number of People Using the Internet While Watching the TV in the US, 1999 & 2000 (in millions)



Source: Showtime Networks as cited in PricewaterhouseCoopers (PwC), May 2001

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“Interactive Television will finally gain a foothold over the next five years as a companion, not a competitor, to traditional programming.”

– PricewaterhouseCoopers, *Global Media & Entertainment Outlook, 2001-2005*, May, 2001

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In a survey of 1000 adults in November 2000, Cyber Dialogue determined that US adults watch 6.2 hours of TV per week while also online.

Internet and TV Usage among US Adults Online, 2000 (in average weekly hours)

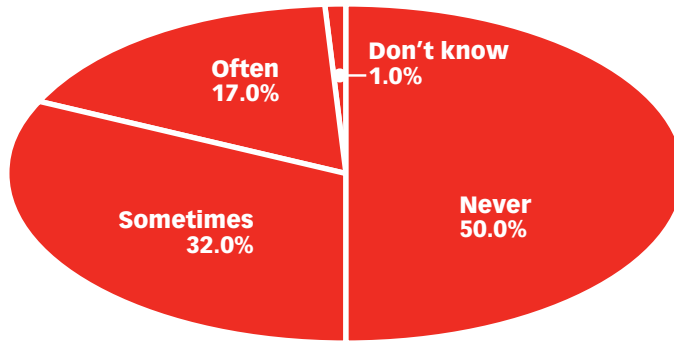
Watching TV	14.1
Online	11.5
Watching TV while online	6.2

*Note: based on a survey of 1,000 US adults
Source: Cyber Dialogue, November 2000*

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In a more recent survey by Jupiter Media Metrix they showed that 32% of people sometimes watch TV while online and 17% often do, but 50% never do.

Percent of People Watching TV While Online in the US, 2001 (as a % of respondents)



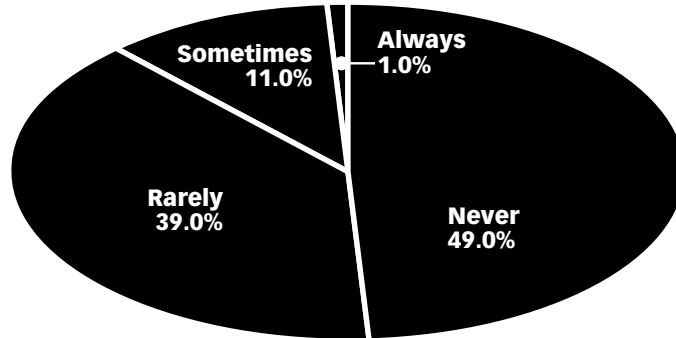
Source: Jupiter Media Metrix, 2001; as cited in NAPTE TV trends, Q2 2001

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The logic that just because people watch TV and are online at the same time means they will embrace iTV does not necessarily add up. Jupiter Media Metrix reveals that 88% of their survey respondents indicated that their online activity never or rarely had anything to do with the TV show they were watching.

Percent of People Watching TV While Conducting Related Online Activity in the US, 2001 (as a % of respondents)



Note: Includes households with PCs equipped to receive DTT signals
Source: Jupiter Media Metrix, 2001; as cited in NAPTE TV trends, Q2 2001

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Despite the increasingly fragmented audience across a multitude of interactive platforms, there are opportunities to be had for providers of consumer applications for iTV. International consulting firm McKinsey Consulting, examined the value potential for selected interactive TV services vs broadband PC services in the US in 2005. Their conclusion was that of the forecast \$32 billion in interactive services revenue across both platforms, iTV has the greater revenue potential.

Value Potential for iTV Applications vs Broadband PC Application Revenues in the US, 2005 (in billions)

iTV applications	Revenues	Broadband PC applications (1)	Revenues
Electronic program guide	\$1.7	Unified messaging	\$1.1
Internet on TV	\$2.3	PC Gaming	\$2.8
Movies on demand	\$3.5	Rich-media advertising	\$3.5
Walled garden	\$3.9	Streaming (2)	\$7.5
Enhanced broadcast	\$6.1	-	-
Total	\$17.5	Total	\$14.9

Note: (1) Includes \$1.3 billion from commissions allocated to the individual applications. (2) Includes \$740 million from e-commerce commissions that result directly from related transactions
 Source: McKinsey Quarterly, No. 3, 2001

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There is also considerable revenue potential for advertisers on the iTV platform according to Deutsche Banc Alex Brown. Their comparison of advertising on the internet vs advertising on an interactive program guide (IPG) on TV shows that revenue per household per year is 50% greater on the iTV platform, than that of advertising on the internet.

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iTV vs. Internet Advertising Potential in the US, 2001

Interactive Program Guide (IPG)		Internet	
TV (hours/day/household)	7	Internet sessions/month	19
Guide visits/hour	4	Page views/session	35
Pages (views/visit)	3	Users/household	2
Days/month	30		
Page views/month	2,555	Page views/month	1,330
Ads/page	3	Ads/page	1.5
Months/year	12	Months/year	12
Total ads/year/household	91,980	Total ads/year/households	23,940
Utilization	27%	Utilization	27%
Ads sold	24,835	Ads sold	6,464
CPM	\$6.00	CPM	\$15.00
\$/households/year	\$149	\$/households/year	\$97

Source: Deutsche Banc Alex. Brown, July 2001

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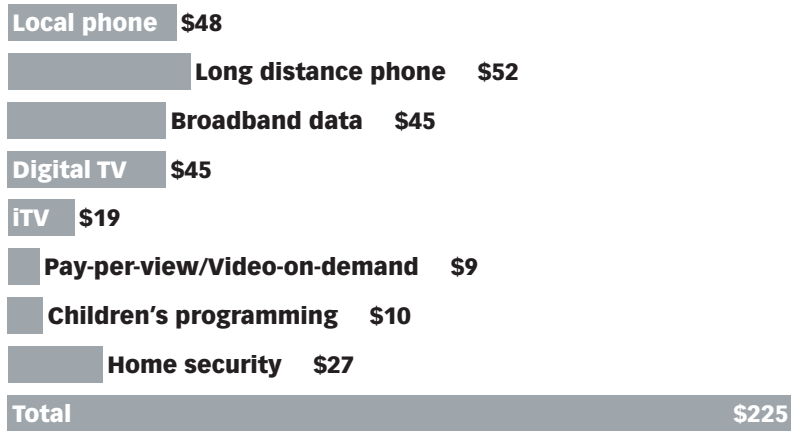
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As a cross check, Deutsche Banc also did a calculation on the advertising potential of AOL, the biggest brand on the Web. AOL is expected to generate \$14 per subscriber per month in advertising/commerce revenue by 2002, up from \$9.50 in 2000. Assuming 80% is derived from advertising, Deutsche Banc estimates that the average subscriber would generate \$134 in ad revenue per year, which is not dissimilar to their interactive program guide ad forecasts.

William Bao Bean, in his role as technology analyst for Banc of America, speculated on some of the other revenue making opportunities that will present themselves to digital network operators as well as service providers in the coming years. According to Mr Bean, the future digital home could be worth as much as \$225 per month per household, with subscription revenues coming from telephony, video-on-demand, broadband data, specialized programming and more. Interactive TV is one of a suite of products and services multiple service operators such as AOL Time Warner, DirecTV and Comcast will be offering consumers in the coming years. As has been discussed previously, the high-speed return path of cable companies provides them with a greater opportunity of offering 'real-time' services such as telephony, video-on-demand and other applications that satellite TV providers may not be able to offer.

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Multiple Service Operator (MSO) Opportunity in the US, 2001 (in monthly per-subscriber revenues)



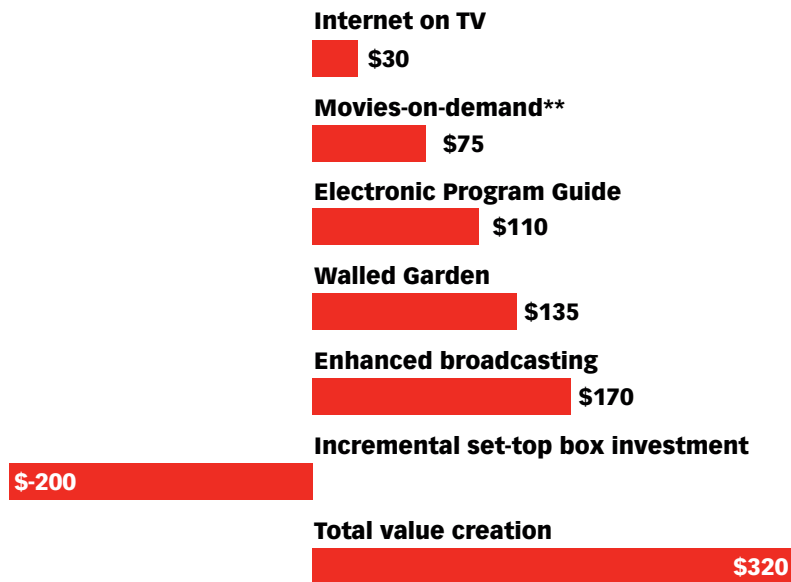
Source: Banc of America Securities, April 2001

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Examining the potential value of interactive TV services for a US cable company, analysis from McKinsey Consulting suggests that the potential net value per household per year could be an additional \$320 over and above pay-TV subscriptions.

Potential Net Value for US Cable Operator* Deploying iTV Services, 2001 (in \$ per household per year)



Note: *assumes a weighted average cost of capital of 10% and corporate tax rate of 25%; **can be delivered via digital video channels and do not require an incremental set-top box investment
 Source: McKinsey Quarterly, No. 3, 2001

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The evidence presented above suggests that industry analysts and many within the sector think iTV is indeed a compelling proposition, but what do consumers think about the idea?

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Much of the following data is related to the US sector, but many of the findings are also relevant to other international markets.

A. General interest in iTV

A survey of 558 US adults conducted by E-Poll in December, 2001 showed that 28% of them were strongly of the view that they would like enhanced TV features allowing them to access additional information about a TV show. A further 49% were somewhat interested. The survey further revealed that over 60% said they will probably only use their TV for watching TV, videos and digital video disk (DVD). Instant messaging was attractive to 19% of the respondents and important for iTV advocates only 30% of respondents think iTV will not be widely accepted by consumers.

US Consumer Attitudes Towards iTV, December 2001 (as a % of respondents*)

I would enjoy accessing additional information about TV shows, movies, etc. while watching TV



I doubt I will use my TV for anything other than watching TV, videos/DVDs or video games



I would enjoy Instant Messaging while watching TV



I don't expect iTV to be widely accepted by consumers



■ Agree strongly ■ Agree somewhat

Note: *n=558 adults 18+
Source: E-Poll, December 2001

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An earlier survey by Cyber Dialogue recorded a resounding negative for internet access on the TV and interest in iTV in general.

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US Adult Interest in iTV, 2000

Not interested in internet access via TV	73%
Not interested in using interactive TV	70%
Interested in using interactive TV	30%
Interested in internet access via TV	27%

*Note: based on a survey of 1,000 US adults
Source: Cyber Dialogue, November 2000*

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This finding was re-enforced by Statistical Research, in August 2001, when they reported 72% of survey respondents were not interested in interacting with television programs. The study did indicate that customers are willing to pay for certain TV services, however, such as pay-per-view (PPV) movies and sporting events.

A survey conducted by DDB Optimum in 2000 showed that the feature respondents most wanted from iTV was additional news information, followed by additional show information. This poll indicated that only 16% of respondents wish to chat with other TV viewers.

Features US Adults Would Like from iTV , 2000

Get additional news information

67%

Get additional show information

49%

Vote in viewer polls or surveys

45%

Play along with game shows

42%

Get additional sports information

32%

Get additional product information

25%

Make purchases

17%

Chat with other viewers

16%

*Note: based on a survey of 400 online adults
Source: DDB Optimum, November 2000*

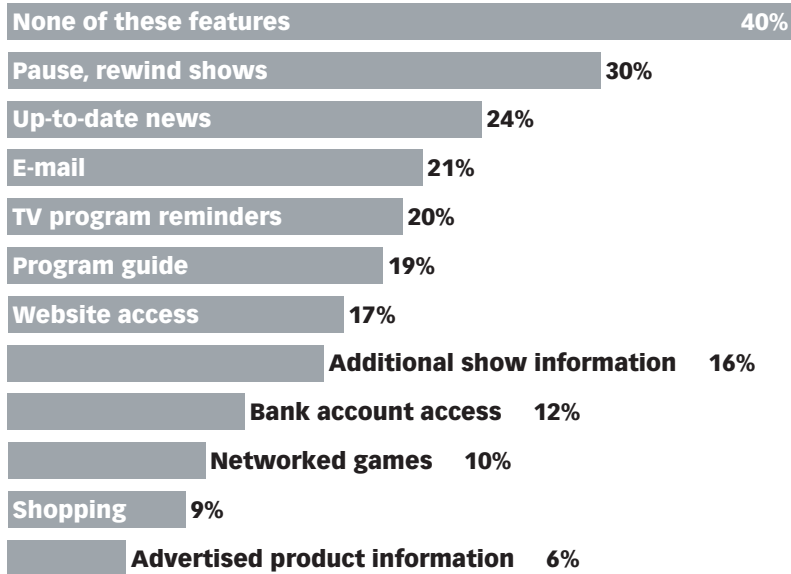
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A study conducted by Jupiter Research in August 2000 revealed that 40% of respondents didn't like any of the iTV features being offered. The feature most respondents liked, and it was only 30%, was pausing and rewinding shows – such as PVRs. Only 21% liked e-mail on the TV and 17% liked the idea of internet on the TV.

Features US Offline Households Would Like from iTV, August 2000

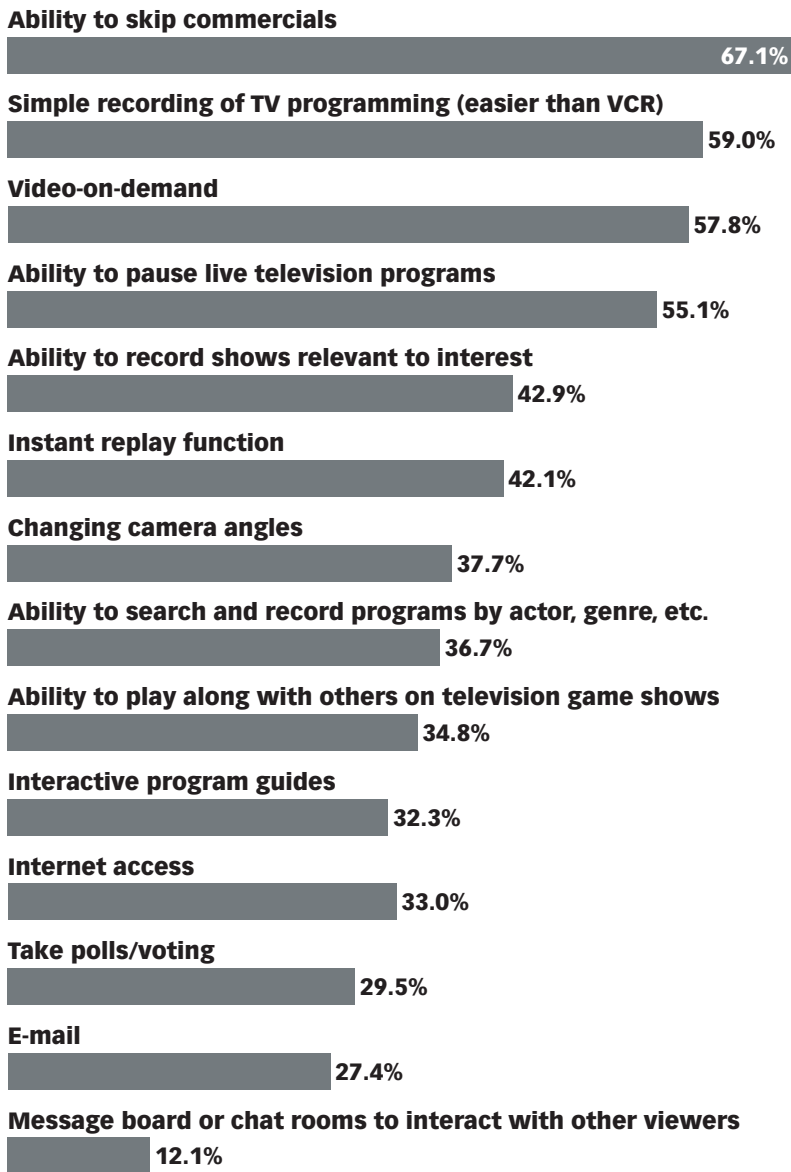


*Note: based on a survey of 944 offline consumers
Source: Jupiter Research, August 2000*

E-Poll's more recent survey did reveal a little more enthusiasm for iTV services, which may indicate that consumers are beginning to become more aware of the possibilities of iTV and are better educated of the benefits. The survey indicates that personal video recorder functions, i.e., the ability to skip commercials and record shows easily, are the services consumers are "very interested" in. Over two thirds of respondents want the ability to skip commercials. Video-on-demand was a very interesting prospect for 58% of respondents. Only 33% of respondents were 'very interested' in internet access on the TV and 27% in email on the TV.

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US Consumers "Very Interested" in Selected iTV Services, December 2001 (as a % of respondents*)



Note: *n=558 adults 18+
Source: E-Poll, December 2001

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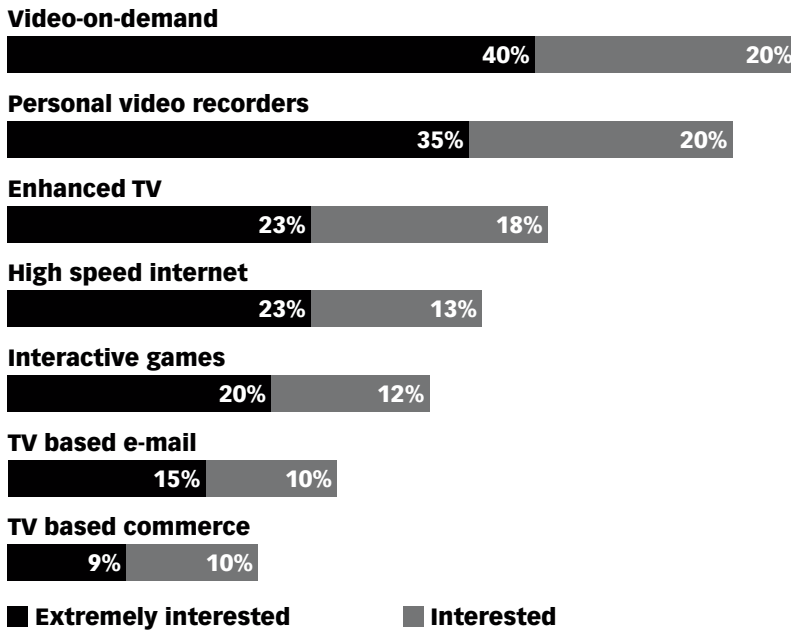
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A similar survey conducted by consulting firm Accenture also revealed that video-on-demand and PVR functions are the most interesting iTV feature to people. The top three interactive TV services are more interesting to people than high-speed internet according to the survey results. Only 19% of respondents were interested at all in TV based commerce.

US Consumers' Interest in Selected iTV Services, 2001 (as a % of respondents)



Note: n=700
Source: Accenture, 2001

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B. iTV interest by Race & Age

According to Horowitz Associates, Black and Asian Americans are far more interested in premium content and internet on the TV than are Hispanic or White Americans. What is more, they would be likely to subscribe at \$15 per month for the service. The survey reveals that Black Americans are particularly interested in internet on the TV. This may be due to the fact that PC and internet penetration among this racial group is well below White and Asian Americans, according to the Department of Commerce's recent demographic study – *A Nation Online*.

Percent of US Cable Customers that Want Advanced Television Services, by Race, February 2001

	Digital TV	Premium channels	Want internet on TV*
White	16%	64%	14%
Black	21%	86%	27%
Hispanic	17%	79%	18%
Asian	18%	80%	22%
Overall	36%	70%	18%

Note: *Percent that have internet on television or who say that they would be likely to subscribe at \$15/month
 Source: Horowitz Associates, 2001

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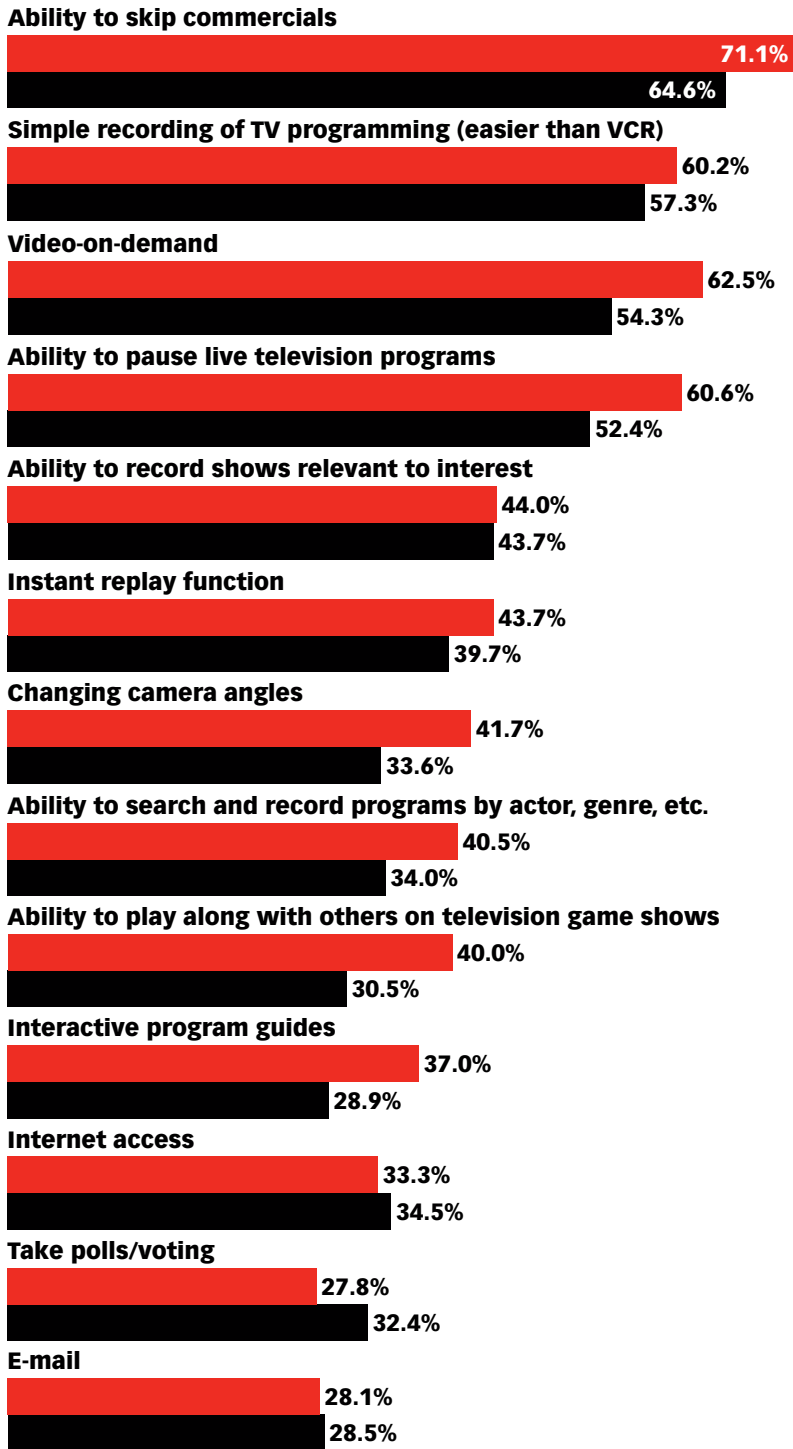
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According to a survey of British adults conducted in March 2001 by Market & Opinion Research International (MORI), interactive television is being adopted faster by lower socioeconomic classes than the internet, and may be an important channel to working class individuals who are less likely to buy a computer. The MORI survey found that for social groups AB and C1 (representing wealthy educated), internet access outweighs digital television ownership, but for social groups C2 and DE (less wealthy and well educated), twice as many households have digital TV as have internet access.

E-Poll's December 2001 survey shows that 18-34 year olds are more interested in iTV services than those aged 35-54. Interestingly, the only interactive TV feature that those between 35-54 are more interested in than the younger age group is internet, email access and taking polls/voting on the TV.

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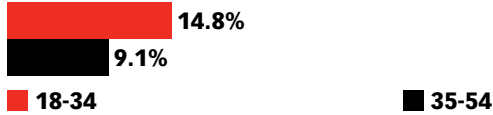
US Consumers "Very Interested" in Selected iTV Services, by Age Group, December 2001 (as a % of respondents*)



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Message board or chat rooms to interact with other viewers



*Note: *n=558 adults 18+
Source: E-Poll, December 2001*

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Accenture's survey of almost 700 satellite and cable households in 2001, identified five main socio-demographic segments. They suggest that the first three segments are the most vulnerable to switching to iTV services – particularly video-on-demand, PVRs and gaming services.

The three segments they identified as most likely to embrace iTV were:

- **Early adoptors** – Typically male, these consumer thrive on new technology and look for features over price. They are comfortable with self-installing new products. They value functionality and are image conscious. Their retention depends on continual new product development.
- **Utilitarian skeptics** – These consumers are knowledgeable about technology and are willing to pay for specific features that meet their needs. They value utility, time and relative simplicity. And while they are the group most reluctant to spend on entertainment in general, they are willing to pay for the iTV services they believe will be particularly useful to them. They require highly targeted marketing to emphasize product functionality.
- **Only if its easy** – consumers. These consumer appreciate technology and are most concerned with convenience and ease of use. They want to keep up with technology but aren't prepared to invest a lot of time and effort to do so. As a result they are willing to pay for customer service levels that make using the products and services simple. Marketing messages need to emphasize value and eliminate perceived complexity.

Accenture indicates that Early Adopters, unsurprisingly, are the most interested in iTV services, of the consumer segments. Importantly the survey reveals that between 48% - 58% of these consumer segments were willing to pay a \$1.50 - \$3.00 premium over video store rentals for video-on-demand. Between 46% and 63% of this segment said they were interested in PVR functions and would be prepared to pay sufficiently high prices for the service to be profitable in less than 15-20 months according to Accenture.

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Yankee Group reports in February 2002 that 59% of US boys age 16 to 17 express an interest in purchasing video-on-demand (VOD). Yankee finds that only 15% of girls in the same age range express the same interest in VOD. In terms of those people between the ages of 18 and 34, 39% of men in the age range and 29% of women in the age range say they are interested in VOD. Finally 29% of women between the ages of 35 and 49 and 30% of men in the same bracket report being “very” or “somewhat” likely to buy a VOD movie. Yankee also found that 31% of cable and satellite subscribers say they are very or somewhat likely to order a VOD movie for \$3.95.

Interest in Future iTV Services in the US, 2001 (as a % of respondents within segment)

Video-on-demand



Personal video recorders



Enhanced TV



High speed internet



Interactive games



TV based e-mail



TV based commerce



■ Early adapters ■ Only if it is easy ■ Utilitarian skeptics

Source: *Accenture, 2001*

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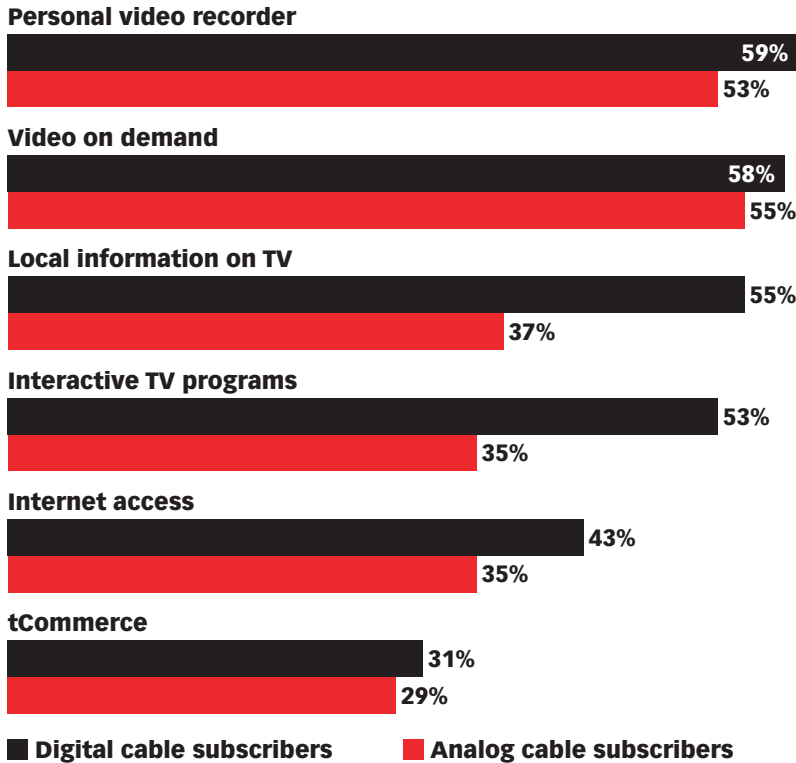
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According to a recent Jupiter Consumer Survey, 28% of US online consumers are interested in buying VOD-type services from their satellite or cable company. However, while consumers may have expressed demand for additional services, the findings indicate that fulfillment of that desire remains modest. The Jupiter survey also shows that while 45% of total online users rent a video at least once a month, only 6% order a pay-per-view movie or event in the same time period.

C. Interest Among Digital Vs Analog Cable Customers

Not surprisingly, digital cable customers are more interested in iTV features than analog cable customers. The category that brings the greatest disparity between analog and digital customers is local information on TV and interactive program guides. Digital TV customers want these features, while analog customers are less interested.

Most Appealing Features of Interactive Television for Digital and Analog Cable Customers, 2000 (as a % of digital and analog subscribers)



Source: Cable & Telecommunications Association for Marketing, 2001

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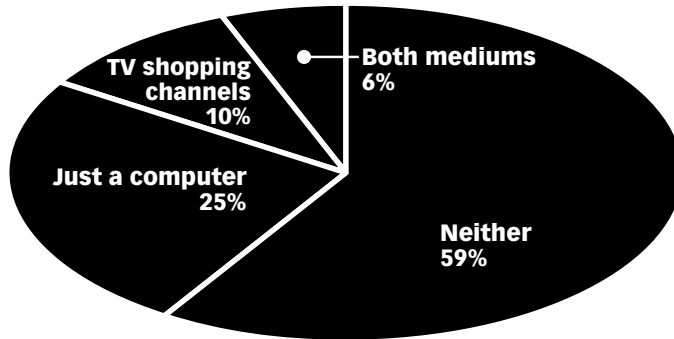
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D. Interest in T-Commerce & Shopping

Online shopping, using a PC, is now an internet activity that 70 million US internet users feel comfortable with. Will consumers feel equally comfortable purchasing through their TV? Pace Miro's survey in 2000 indicates that 25% of consumers have purchased goods or services using a PC, 10% of consumers have purchased via the TV shopping channels and 6% have used both mediums.

US Consumers Who Have Ever Purchased Goods or Services through the PC or TV, 2000 (as a % of respondents)



Note: n=1,000

Source: Pace Micro/The Gallup Organization, 2001

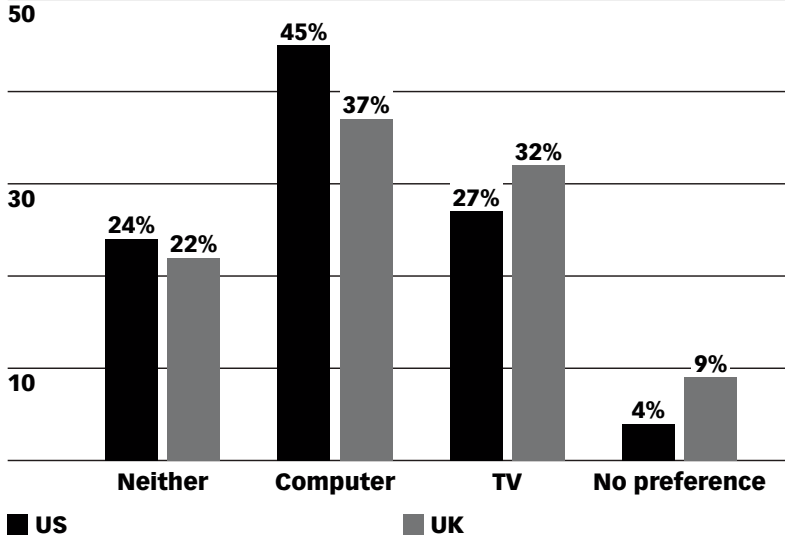
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Pace Micro conducted a survey comparing the shopping preferences of US and UK residents. The survey shows that 45% of Americans prefer to shop at home on their computer compared to 37% of UK respondents. As shopping on your TV has been available to UK residents for some time now, it is not surprising to see that a great percentage of UK survey respondents prefer to shop from their TV, than US respondents.

US and UK Consumers' Preference for Home Shopping - PC or TV, 2000 (as a % of respondents)



Note: n=1,000
 Source: Pace Micro/The Gallup Organization, 2001

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The T-Commerce categories that interested the most respondents of E-Poll's survey were restaurant meal home delivery, followed by shopping for videos, DVDs and CDs. Department store shopping was a category of interest to 34% of respondents.

US Consumers "Interested" in Selected T-Commerce Features, December 2001 (as a % of respondents*)

Restaurant meal home-delivery

39.0%

Video/DVD/CD shopping

35.0%

Department store shopping

34.0%

Buying products seen on TV shows

32.4%

Grocery shopping

28.6%

Banking/investing

21.1%

Buying episodes of programs just seen

19.7%

None of the above

30.0%

*Note: multiple responses allowed; *n=558 adults 18+
Source: E-Poll, December 2001*

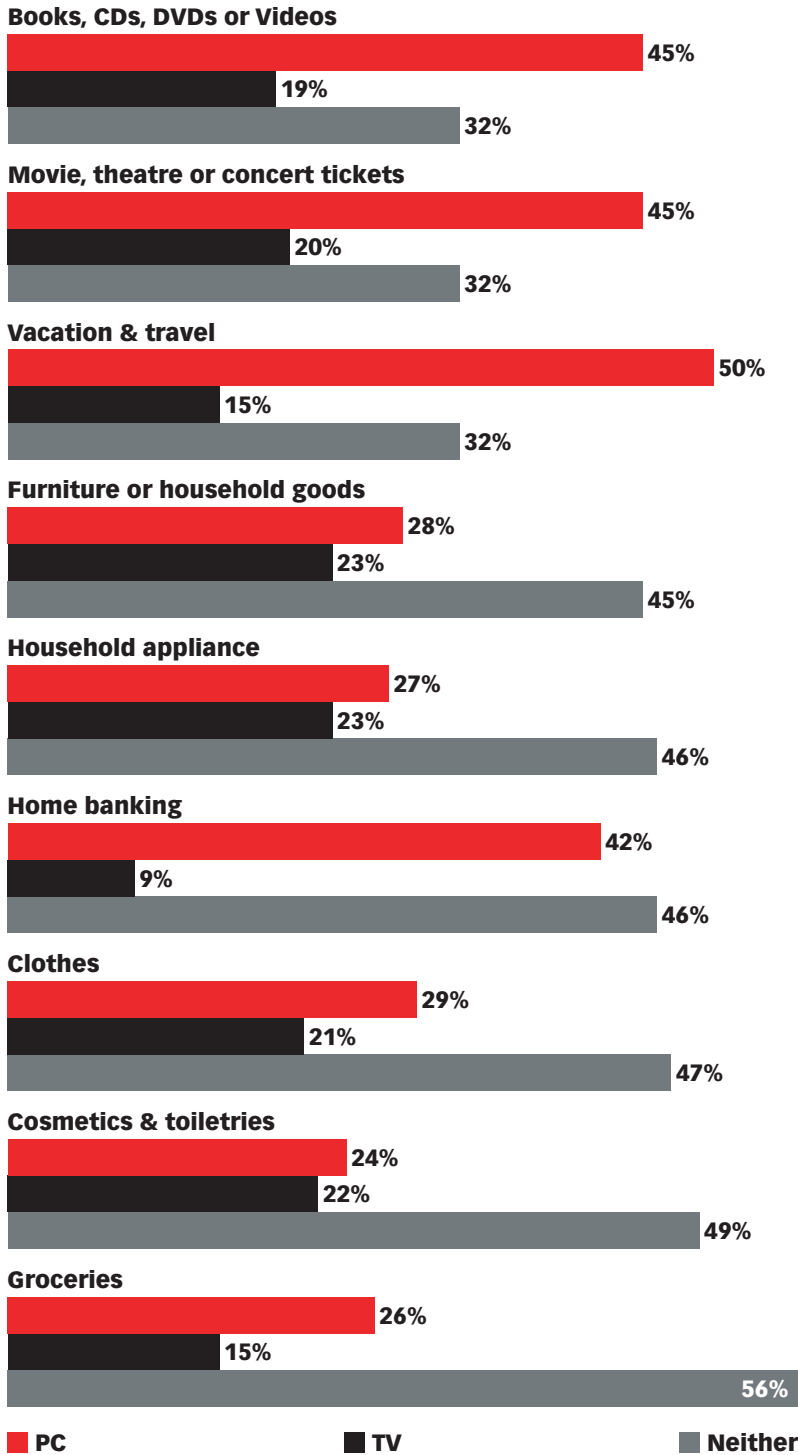
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With such a high penetration of internet PCs and the increasing familiarity with buying online, US consumers would much prefer to use their PC to shop at home than the TV.

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US Consumers' Preference for Home Shopping via PC or TV, by Type of Good or Service, 2000 (as a % of respondents)

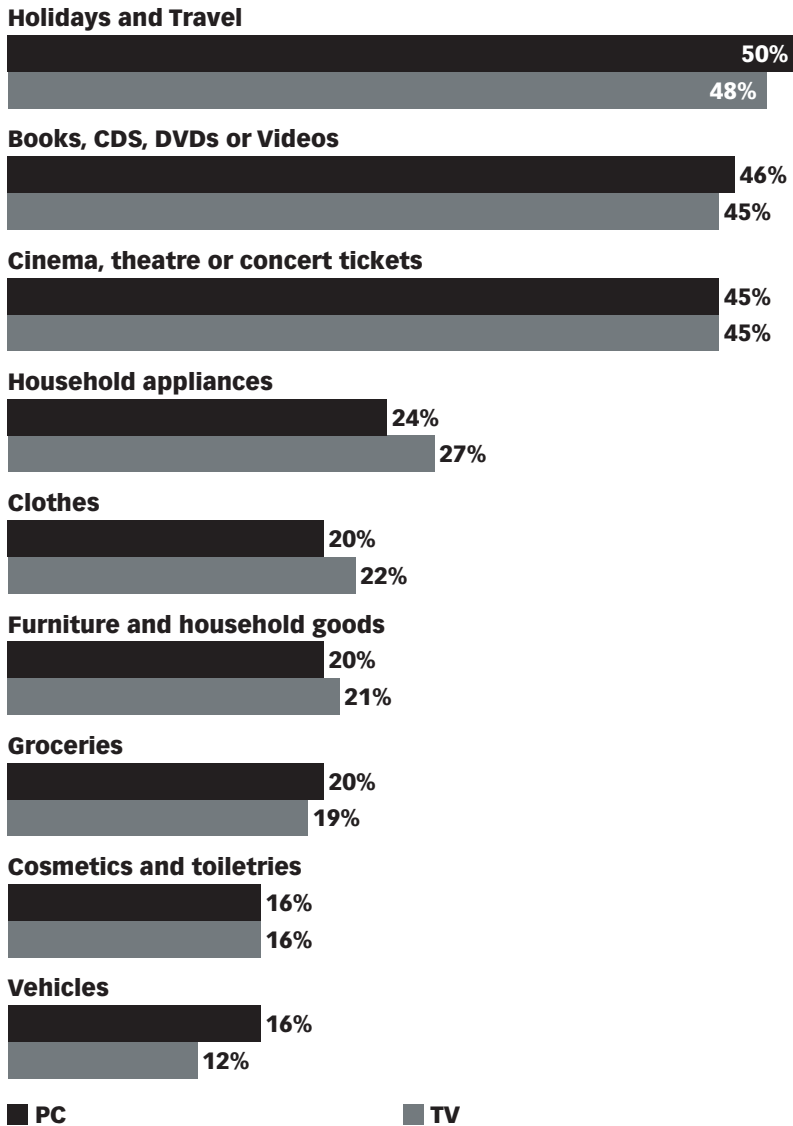


Note: n=1,000
 Source: Pace Micro/The Gallup Organization, 2001

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Looking at the more advanced iTV market in the UK shows that UK respondents are almost equally as comfortable shopping on the PC as the TV for various categories of items. It is important to point out that the question asked of UK respondents was not exactly the same as that asked of the US respondents in the previous chart, so a direct comparison is not possible. The US respondents were asked which platform they prefer, while the UK respondents were asked what items would they be interested in purchasing via PC and TV. It is quite likely that UK respondents may actually prefer the PC if they were given the choice. Likewise, US respondents may be equally as interested in purchasing via the TV as the PC.

Goods or Services UK Consumers Would Be Interested in Purchasing via PC or TV, 2000 (as a % of respondents)



Source: Pace Micro/The Gallup Organization, 2001

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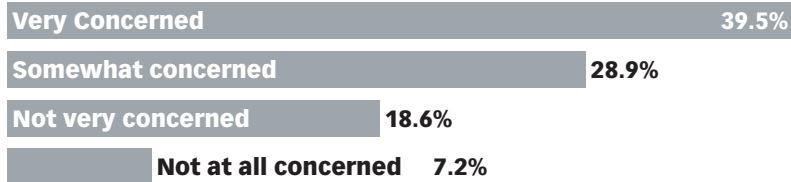
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E. Privacy Concerns

Interactive TV set-top boxes have the ability to track an iTV user's activity. This is one of the great advantages for advertisers, because they can get detailed information about consumer usage patterns. Consumers however, have concerns about privacy. Nearly 70% of Americans are somewhat or very concerned with their privacy while using interactive TV, according to an E-Poll survey conducted in December 2001.

US Consumers' Level of Concern for Protection of Privacy While Using iTV, December 2001 (as a % of respondents*)



Note: *n=558 adults 18+
Source: E-Poll, December 2001

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A. Digital TV

According to investment firm Morgan Stanley Dean Witter, North America contained almost half of worldwide digital TV households in 2000. In 2005, however, they indicate that North America's share will be less than 25%, due to the growth in Western Europe and Asia Pacific.

North American Share of Worldwide Digital TV Subscribers, 2000 & 2005 (in millions of households)



Source: Morgan Stanley Dean Witter, March 2001

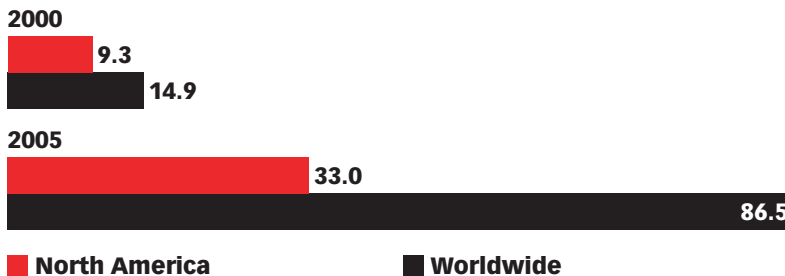
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Digital Cable

With the most advanced cable networks in the world, North America has transitioned to digital cable quicker than in other parts of the world. Morgan Stanley estimates that, in 2000, 9.3 million of the 14.9 million digital cable households worldwide were in North America. As countries outside North America begin to upgrade their networks for digital cable, North America's share of worldwide digital cable households is sure to fall.

North American Share of Worldwide Digital Cable TV Subscribers, 2000 & 2005 (in millions of households)



Source: Morgan Stanley Dean Witter, March 2001

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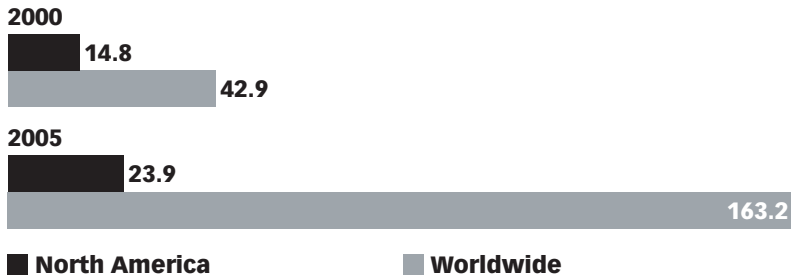
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Satellite

Despite North America's high cable penetration, it is by far the largest market for satellite TV in the world, containing 35% of worldwide digital broadcast satellite (DBS) households in 2000. Morgan Stanley predicts rapid growth in this sector outside North America in the coming years, as multi-channel TV via satellite is a far more viable proposition in countries where the fixed-line infrastructure is underdeveloped.

North American Share of Worldwide Direct Broadcast Satellite (DBS) TV Subscribers, 2000 & 2005 (in millions of households)



Source: Morgan Stanley Dean Witter, March 2001

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B. Set-top Boxes

Advanced set-top boxes, which provide internet access through the TV, are forecast to grow extremely rapidly over the coming years, reaching 74 million set-tops in North America in 2005, from 6.9 million in 2000 according to Cahners In-stat.

Internet Set-Top Box Forecast for North America, 2000 & 2005 (in millions of units)



Note: Internet STB, digital cable, DBS STBs and Game consoles with internet capability
 Source: Cahners In-Stat, October 2001

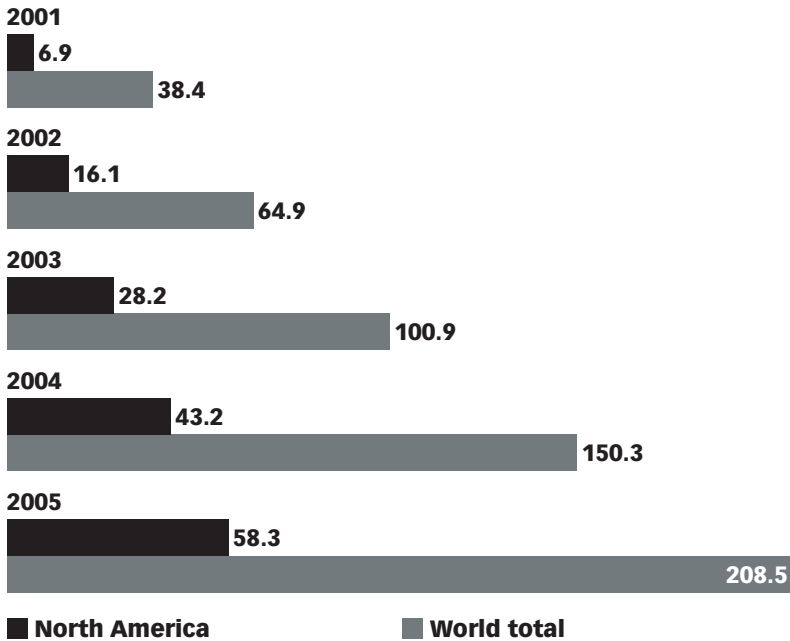
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C. iTV

According to Strategy Analytics, North America contained approximately 18% of worldwide interactive TV households in 2001. They forecast this to rise to nearly 30% by 2005.

iTV Households in North America, 2001-2005 (in millions)



Source: Strategy Analytics, 2001

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Like the US, Canada has a very high penetration of multi-channel television. Of the 11.7 million households in Canada in 2000, 9.5 million had multi-channel TV according to Paul Kagan. With Canada's high broadband internet penetration of over 20% of households, and an internet-savvy population, it is likely that sophisticated interactive TV services will be attractive to many Canadians.

Multichannel TV Households in Canada, by Type, 2000-2005 (in millions)

	1999	2000	2001	2002	2003	2004	2005
Analog cable	8.3	8.0	7.7	7.4	7.1	6.6	6.2
Digital cable	0.2	0.5	0.8	1.4	2.0	2.7	3.2
All cable	8.5	8.5	8.5	8.8	9.1	9.3	9.4
DBS	0.6	1.0	1.1	1.2	1.4	1.6	1.8
Total	9.1	9.5	9.6	10.0	10.5	10.9	11.2

Source: Paul Kagan Associates as cited in PricewaterhouseCoopers (PWC), May 2001

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As the leading cable companies upgrade their networks to allow for digital cable, iTV services are sure to follow. According to Deutsche Banc Alex Brown, in 2001 there were only 855,000 digital cable subscribers of the 8.5 million basic cable subscribers in Canada. Decima Publishing estimate the number of cable TV subscribers receiving digital service will top 1 million at the end of 2001.

“According to our research, about 20 Canadian cable operators have deployed digital cable service to date to better compete with all-digital alternatives such as satellite TV and wireless cable, with a handful more planning launches in the coming month.” – Mario Mota, Publisher & Editor-in-Chief of Decima Publishing, December 2001

Leading cable companies Shaw Communications and Rogers currently offer basic interactive TV features such as internet on the TV, but have largely concentrated on offering high-speed data and premium content rather than sophisticated interactive TV services. Rogers Communications, however, recently announced that it has begun rolling out Canada's first commercial VOD service. According to iTV Today, the service will initially be provided to a selected group of 1,000 customers in Toronto, and should be available in a number of Toronto neighborhoods by the end of the year. Rogers says that 90% of its customers in Ontario will be able to access the head-end-driven service by the end of 2003.

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Digital Cable Subscribers in Canada, by Major Company, 2000-2006 (in thousands)

	2000	2001	2002	2003	2004	2005	2006
Cogeco	93	150	218	283	359	390	429
Rogers	172	265	384	500	599	689	758
Shaw	148	260	377	490	588	676	744
Videotron	75	165	239	311	373	429	472
CCSA	0	15	22	28	34	39	43
Total Canada	488	855	1,240	1,612	1,934	2,224	2,447

Source: Deutsche Banc Alex. Brown, July 2001

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Television in America is ubiquitous. According to the National Cable & Telecommunications Association, 98% (105 million) of all US households had a TV and Nielsen Media Research indicates there are 76.8 million US households with multiple TVs.

Multiple TV Set Households in the US, 1990 & 2001 (in millions and as a % of all households)

1990	60.1 (65.30%)
2001	76.8 (75.10%)

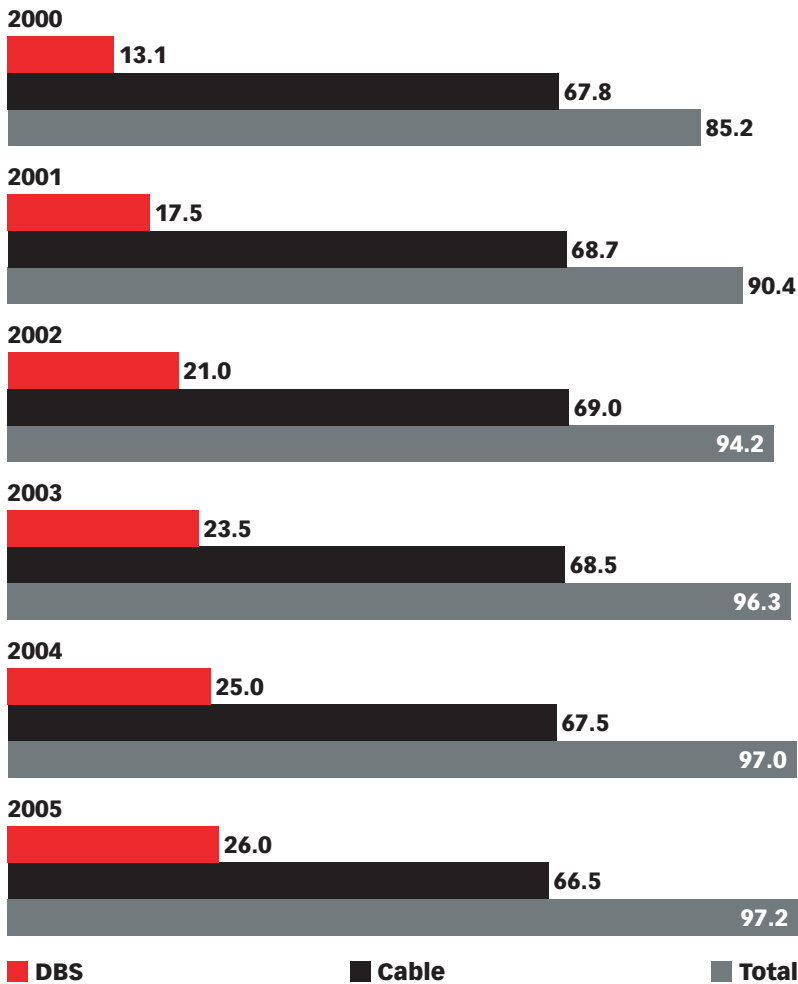
*Note: Numbers are for January of each year
Source: Nielsen Media Research, Television Bureau of Advertising; as cited in PricewaterhouseCoopers, May 2001*

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Of the all TV households in 2001, 68.7 million have cable TV, 17.5 million have satellite TV and the remaining 14 million TV households receive terrestrial broadcasts received through an aerial. PricewaterhouseCoopers forecasts the number of cable and satellite TV households to rise to over 97 million by 2005, from 85.2 million in 2000.

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US Pay-TV Subscribers, by Cable & Direct Broadcast Satellite (DBS), 2000-2005 (in millions)



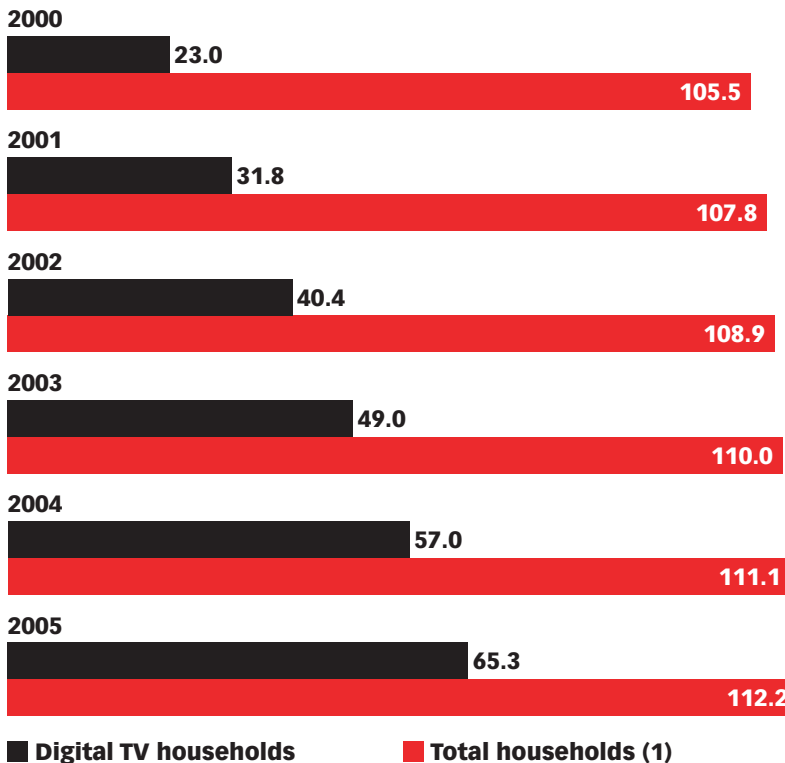
Source: PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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A. Digital TV

eMarketer forecasts the number of digital TV households to reach 65.3 million in 2005 from 23 million in 2000. This equates to a rise in digital TV penetration from 21.8% of all households in 2000 to 58.2% in 2005. The growth in interactive TV services correlates closely to the growth of digital TV. As the larger cable companies begin to reach 30% digital penetration of their cable subscribers, there will be a great incentive to offer a variety of interactive and content services to increase revenues per subscriber and reduce churn. If they don't, dissatisfied digital cable customers will move to the digital satellite alternative.

Digital TV Households in the US, 2000-2005 (in millions)



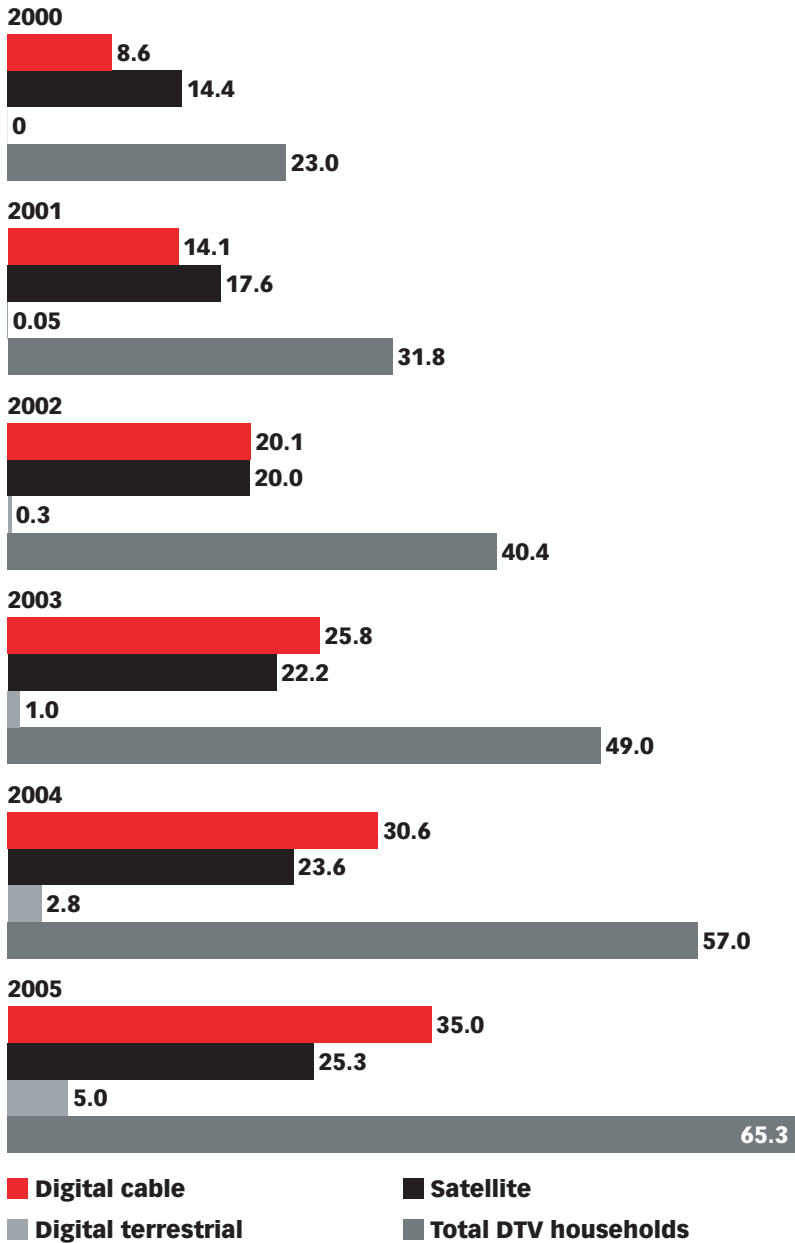
Note: (1) based on 2000 census bureau data projected forward.
Source: eMarketer, 2002

While digital broadcast satellite has a head start over digital cable, this lead will be whittled down over the next 12 months as the digital footprint of cable companies continues to expand. With such a high penetration of cable and satellite TV in the US, the prospects for digital terrestrial and other technologies competing with the two major digital TV platforms does not look promising in the short to medium term. Nevertheless, the US government has mandated that, in 2006, all terrestrial television

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transmission will be digital, so if TV viewers want to watch television and they don't want to pay for cable or satellite TV, then they will need to purchase a new digital TV set or set-top box capable of translating the new digital signal.

Digital TV Households in the US, by TV Platform, 2000-2005 (in millions)



Source: eMarketer, 2002

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There is a reasonable amount of consensus among forecasters for digital TV in the US. The more recent estimates indicate that by 2005 there will be between 57 and 68 million digital TV households in the US.

Comparative Estimates: Digital TV Households in the US, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
iTVMarketer, 2001	-	33.7	-	-	-	-
Screen Digest, February 2000	21.4	26.9	32.6	37.5	42.0	46.0
Morgan Stanley, March 2001 (1) (2)	24.1	33.4	41.0	47.1	52.3	56.9
eMarketer, 2002	23.0	31.8	40.4	49.0	57.0	65.3
Deutsche Banc Alex. Brown, July 2001 (1)	23.6	33.1	43.2	52.4	60.8	67.9
Pricewaterhouse Coopers, May 2001 (1)	20.8	29.8	41.2	54.0	61.0	68.0

Note: (1) DBS & Digital cable only; (2) North America
 Source: eMarketer, 2002; various, as noted, 2000 & 2001

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Cable TV

Recent data from the National Cable and Telecommunications Association (NCTA) indicate there were nearly 73 million cable TV households, or 69.2% of all TV households, in the US at the end of 2001. In November 2001, there were 13.7 million digital cable households out of the total 73 million, or 18.8% digital penetration.

US Cable Industry Statistics, Year-end 2001

Basic cable households*	72.69 million
US television households*	105.4 million
Cable penetration of TV Households*	69.2%
Homes passed by cable*	98.6 million
Homes passed as a % of TV Households*	96.70%
Basic cable/homes passed*	69.90%
Digital Cable Subscribers (November 2001)	13.7 million
Homes passed by cable modem service (November 2001)	70.0 million
Cable modem subscribers (eMarketer, Year-end 2001)	6.8 million
Cable telephony subscribers (August 2001)	1.5 million
Annual cable revenue	\$48.2 billion

Note: *December 2001

Source: eMarketer; National Cable & Telecommunications Association (NCTA), 2001

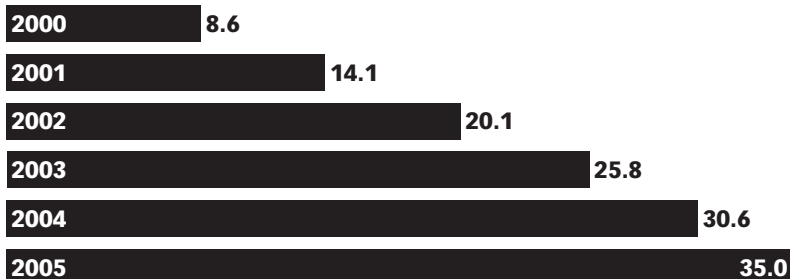
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eMarketer forecasts there to be 35 million digital cable subscribers in the US in 2005, rising from 14.1 million at the end of 2001.

Digital Cable Households in the US, 2000-2005 (in millions)



Source: eMarketer, 2002

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There is a particularly high level of consensus among firms forecasting digital cable households in the US. Screen Digest's figures were published earlier than the others and would explain why their figures are considerably lower than the rest.

Comparative Estimates: US Digital Cable Households, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Yankee Group, 2001	8.9	14.9	20.0	24.7	28.9	32.9
The Strategis Group, May 2001	9.3	15.3	21.3	27.7	35.0	42.4
Forrester Research, 2001	-	15.1	22.6	27.9	31.6	34.8
Adams Media Research, 2001	9.2	13.9	18.2	22.4	26.0	29.5
eMarketer, 2002	8.6	14.1	20.1	25.8	30.6	35.0
PricewaterhouseCoopers (PwC), 2001	7.7	12.3	20.2	30.5	36.0	42.0
Morgan Stanley Dean Witter*, March 2001	9.3	15.6	21.1	25.7	29.6	33.0
Deutsche Banc Alex. Brown, July 2001	8.8	15.4	22.8	29.8	36.2	41.6
Digital Technology Consulting/Screen Digest, 2000	7.0	10.4	14.2	17.9	21.1	23.6

Note: *North America

Source: eMarketer, 2002; various, as noted, 2000 & 2001

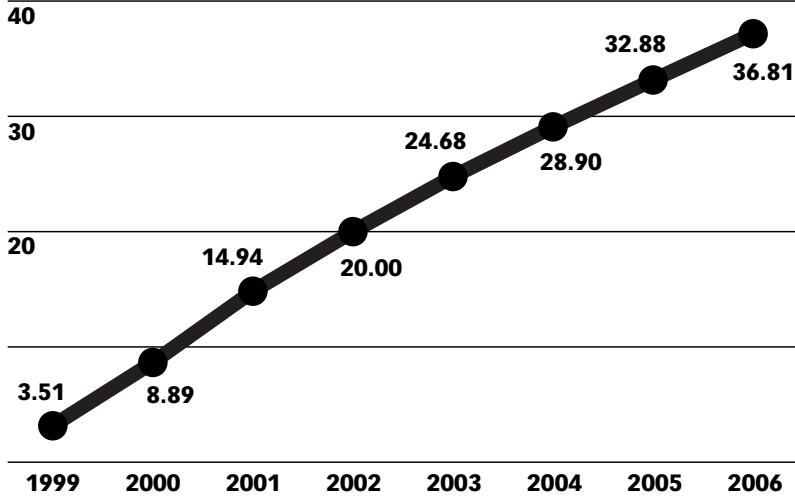
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The Yankee Group's recent projections illustrate the strong growth in the sector in the coming years. To a certain extent, cable companies have been forced to upgrade their networks to offer consumers digital TV, because of the increasing competition from DBS companies, DirecTV and EchoStar. In the last few years, millions of disgruntled cable customers have shifted to DBS for their multi-channel TV.

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Digital Cable Subscribers in the US, 1999-2006 (in millions)



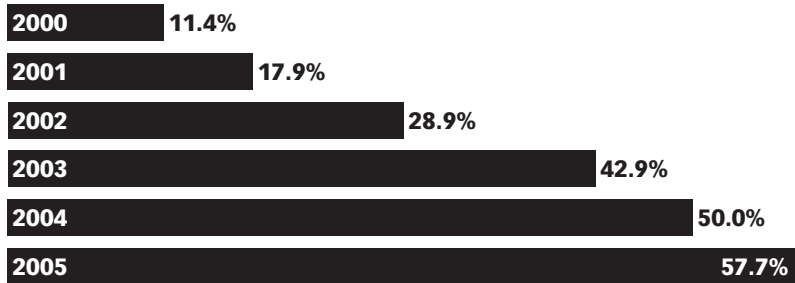
Source: Yankee Group, December 2001

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PricewaterhouseCoopers and NCTA both indicate that at the end of 2000 approximately 18% of all cable households were digital cable households. PricewaterhouseCoopers expects 50% of cable households to have digital by 2004, and almost 60% by 2005.

Digital Cable Penetration of Cable Households in the US, 2000-2005



Source: PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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Forrester Research predicts 38 million digital cable households in 2006, and of these, 24.4 million will have advanced set-top boxes which allow a high-speed return path using a cable modem. This will allow cable companies to offer such services as multi-user gaming and other advanced interactive services which take advantage of the high-speed return path.

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	2001	2002	2003	2004	2005	2006
Satellite	18.1	19.7	20.7	21.3	21.9	22.4
Analog cable	53.3	46.0	41.8	38.7	36.2	33.7
Basic digital	15.0	20.7	21.7	18.8	16.0	13.6
Advanced STB*	0.1	2.0	6.1	12.8	18.8	24.4
Total digital cable (millions)	15.1	22.6	27.9	31.6	34.8	38.0

Note: *advanced set-top box is STB with cable modem

Source: Forrester Research, 2001

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The leading cable company in the US is AT&T Broadband with 13.75 million subscribers, as of September 2001. Third-ranked Comcast Communications recently made a bid to acquire AT&T Broadband and, if approved, will bring the combined company's subscriber numbers to over 22 million. Time Warner Cable is ranked second with 12.6 million cable subscribers.

Importantly, the penetration of digital subscribers varies significantly among the top 10 companies, reflecting the different strategies each company is employing. Insight Communications is the clear US leader in digital penetration of its subscribers at nearly 60%. This has allowed Insight to offer a variety of sophisticated interactive services including video-on-demand and cable telephony among others advanced services. Other companies such as AT&T Broadband and Cox Communications are focusing on the so-called 'triple play' of video, high-speed data and telephony, rather than interactive TV services.

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Top 10 US Cable Companies, Basic and Digital Subscribers, September 2001 (in millions)

	Basic subscribers	Digital subscribers
1. AT&T Broadband	13.8	3.2
2. Time Warner Cable	12.7	3.3
3. Comcast Cable Communications	8.4	2.3
4. Charter Communications	7.0	1.6
5. Cox Communications	6.2	1.2
6. Adelphia Communications	5.7	1.7
7. Cablevision Systems Corporation	3.0	0.02
8. Mediacom LLC	1.6	0.3
9. Insight Communications	1.4	0.8
10. CableOne	0.8	0.1

Source: National Cable & Telecommunications Association (NCTA), January 2002

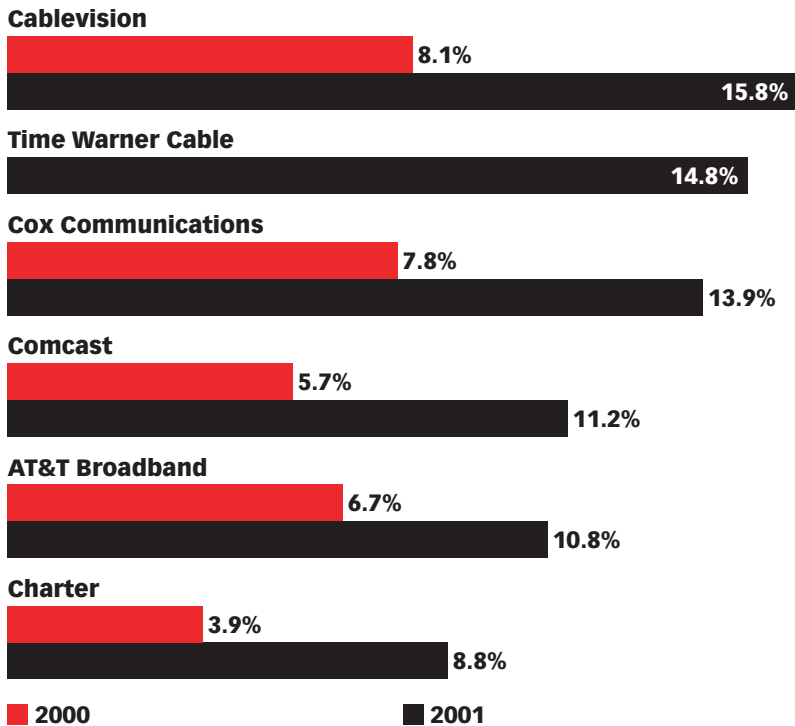
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Time Warner Cable recently announced it had approximately 1.9 million high-speed data subscribers across its Road Runner service. It leads the other major cable companies at the end of 2001 in terms of numbers of broadband subscribers, but, according to Lehman Brothers, Cablevision has a higher penetration of high-speed data subscribers to its basic cable subscribers than the other major cable companies.

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Penetration of High Speed Data Subscribers, by Major US Cable Company, 2000 & 2001 (as a % of basic cable subscribers)



Source: Lehman Brothers, company data, February 2002

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Satellite

eMarketer projects there will be 25.3 million digital broadcast satellite households in the US in 2005, from 14.4 million in 2000. While DBS captured early digital TV subscribers with compelling content offerings, this growth is likely to slow as cable companies begin to match, then exceed, the service offerings of their satellite counterparts. One of the reasons why growth in the DBS sector has slowed in the last twelve months is the fact that DBS providers cannot always offer customers local channels relevant to their region. Some subscribers have to subscribe to both DBS and cable. According to Charlie Ergen, CEO of EchoStar, approximately 42 million TV households do not have the option to receive local channels via satellite, and as such, have no choice but to subscribe to cable. With the launch of a new satellite in the next few months, and the possible merger or partnership of the two major satellite TV companies, this problem may be being addressed.

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US Satellite TV (DBS) Households, 2000-2005 (in millions)



Source: eMarketer, 2002

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All of the comparative estimates indicate that DBS households will continue to grow, but at a slower rate going forward to 2005. Screen Digest even suggests that in 2004, DBS will peak, and then lose subscribers to alternative platforms in the following years.

Comparative Estimates: US Satellite TV (DBS) Households, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Morgan Stanley Dean Witter*, March 2001	14.8	17.8	19.9	21.4	22.7	23.9
Merrill Lynch, January 2001	15.1	18.2	-	-	-	-
eMarketer, 2002	14.4	17.6	20.0	22.2	23.6	25.3
Pricewaterhouse Coopers, May 2001	13.1	17.5	21.0	23.5	25.0	26.0
Deutsche Banc Alex. Brown, July 2001	14.8	17.7	20.4	22.6	24.6	26.3
Digital Technology Consulting/Screen Digest, 2000	14.4	16.3	17.7	18.1	18.2	18.0

Note: *North America

Source: eMarketer, 2002; various, as noted, 2000 & 2001

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There were two major DBS companies in the US in 2001 – DirecTV and EchoStar. In the latter half of 2001, EchoStar sought to acquire DirecTV and if the acquisition is successful, it will create a company with over 18 million subscribers.

US Direct Broadcast Satellite (DBS) Subscribers, by Operator, 1999-2001 & 2007 (in millions and as a % of total US households)

	1999	2000	2001	2007
DiracTV	8	9.8	11.4	14.3
EchoStar	3.4	5.3	6.8	9.9
Total	11.4	15.1	18.2	24.2
% of total TV households	11.4%	14.8%	17.6%	21.6%

Source: Merrill Lynch Research, 2000

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Putting the two US DBS operators into a global perspective one can see that only BSkyB in the UK is remotely near the size of the two US firms.

Top 20 Satellite TV Companies Worldwide, by Direct-to-Home (DTH) Subscriber Numbers, January 2002

		Subscribers (in millions)
1. DIRECTV	US	10.7 (January 2002)
2. EchoStar's DISH Network	US	6.43 (October 2001)
3. BSKyB	UK/Ireland	5.49 DTH, 10.1 DTH/cable (October 2001)
4. SkyPerfecTV	Japan	2.94 (January 2002)
5. Premiere World	Germany	2.4 (May 2001)
6. CanalSatellite	France	1.75 (June 2001)
7. DIRECTV Latin America	Latin America	1.61 (January 2002)
8. SKY Latin America	Latin America	1.5 (August 2001)
9. TelePiu	Italy	1.5 DTH (May 2000)
10. Canal Satellite Digital	Spain	1.11 (August 2001)
11. TPS	France	1.02 (year-end 2000)
12. Bell ExpressVu	Canada	1.0 (November 2001)
13. Stream	Italy	0.800 (May 2001)
14. Via Digital	Spain	0.633 (year-end 2000)
15. Star Choice	Canada	0.629 (October 2001)
16. Viasat	Scandinavia	0.486 (July 2001)
17. Telenor/Canal Digital	Scandinavia	0.450 (July 2001)
18. Austar	Australia	0.434 (November 2001)
19. Sky Television	New Zealand	0.430 (July 2001)
20. Wizja TV	Poland	0.388 (March 2001)

Source: SkyReport, 2002

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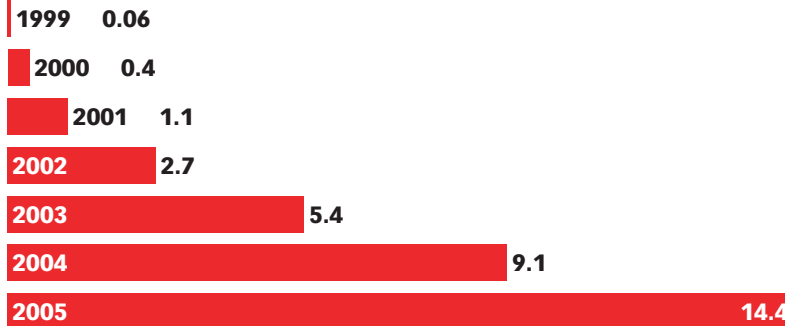
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Digital Terrestrial Television

It is unclear what sort of demand digital terrestrial television will muster in the coming years in the US, but logic suggests that after 2006, when the analog TV signal has been 'switched-off', those people who don't want or can't afford cable or satellite TV will have to work with the digital terrestrial signal. Screen Digest is rather optimistic about the prospects for digital terrestrial, forecasting over 14 million DTT households in 2005 from virtually none in 1999. They have forecast that over 2 million people will access digital terrestrial television through their PC by 2005. International research firm Baskerville Communications forecast that, by 2010, only 12.5% of North American digital TV households will be digital terrestrial.

US Digital Terrestrial Television (DTT) Households, 1999-2005 (in millions)



Note: 2000-2005 includes households with PCs equipped to receive digital terrestrial signals
Source: Screen Digest, 2000

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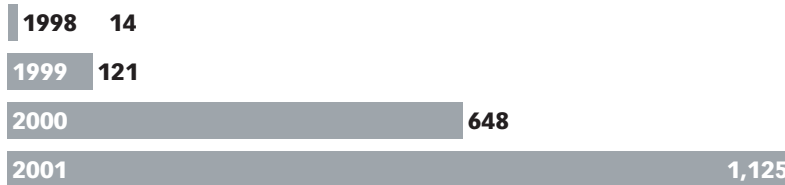
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Digital TV Sets

One indicator of the relatively low current demand for digital terrestrial television is the low number of sales of digital TVs. Despite the fact that digital terrestrial television has been available since 1999, the US Consumer Electronics Association (CEA) recorded only 1.1 million digital TVs sold in 2001. Considering that over 20 million TVs are sold each year, this is a very small number. This digital TV figure should also be qualified, as it indicates TV sales to dealers and not necessarily to the public. The high price of DTVs compared to analog alternatives, to this point, has been the main reason for the slow sales.

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US Digital TV* Sales to Dealers, 1998-2001 (in thousands)



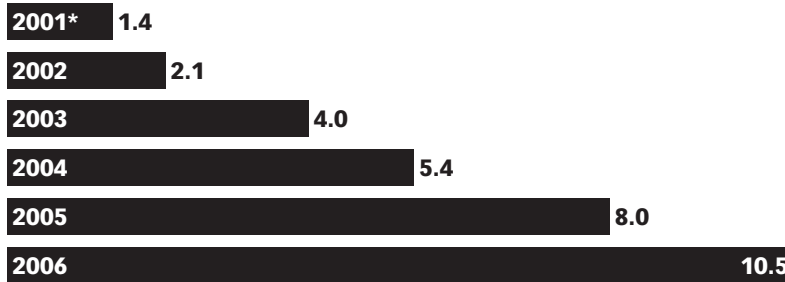
*Note: *includes direct-view and projection digital TVs with integrated digital decoders and stand-alone digital TV displays*
Source: CEA Market Research, January 2001

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The CEA does predict a growing market, however, reaching 10.5 million DTV set sales to dealers by 2006.

Digital Televisions and DTV-ready Monitor Sales in the US, 2001-2006 (in millions of units)



*Note: *actual sales between factory and dealers*
Source: Consumer Electronics Association, 2002

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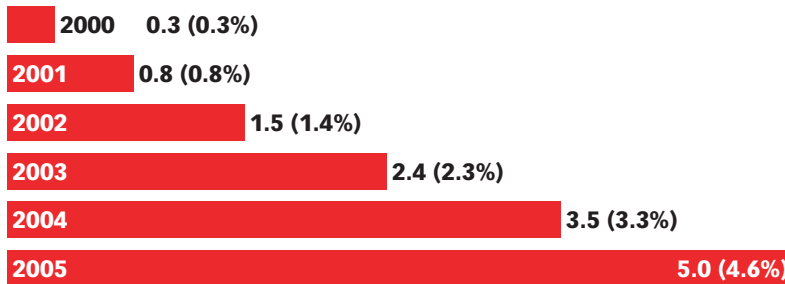
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High Definition Television

There are currently about one million High Definition Television (HDTV) households in the US, according to PricewaterhouseCoopers. The international consulting firm predicts this to rise to only five million by 2005. HDTV greatly enhances the picture and audio quality of the TV signal if a viewer has the high-definition equipment to take advantage of it. Satellite TV provider DirecTV was the first to offer the public HDTV service and others have followed, but a lack of content and high equipment costs prevent all but the very wealthy from experiencing HDTV. The cost to broadcasters of provisioning content for HDTV is also high, and many of the smaller local broadcasters will be unable, or unwilling to provide HDTV content in the future, which may hamper the long term growth of the sector.

Number of High Definition TV (HDTV) Households in the US, 2000-2005 (in millions and as a % of households)



Source: PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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B. iTV

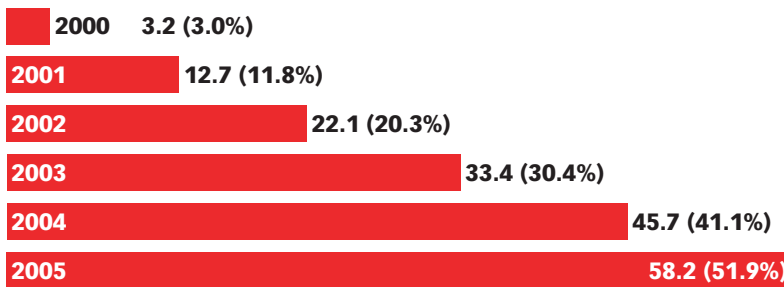
eMarketer's definition of an interactive TV household is one that is receiving two-way interactive services designed for the TV.

eMarketer's forecasts include stand-alone personal video recorders and web/internet TV services as well as interactive program guide services which utilize a back channel. The new generation game consoles are not included in our iTV forecast, but will be mentioned later in the report.

iTV Projections

There were 12.7 million iTV households in the US at the end of 2001. This will rise to nearly 60 million households by 2005, which equates to over half of all households in the US.

US iTV Households, 2000-2004 (in millions and as a % of total households)



Source: eMarketer, 2002

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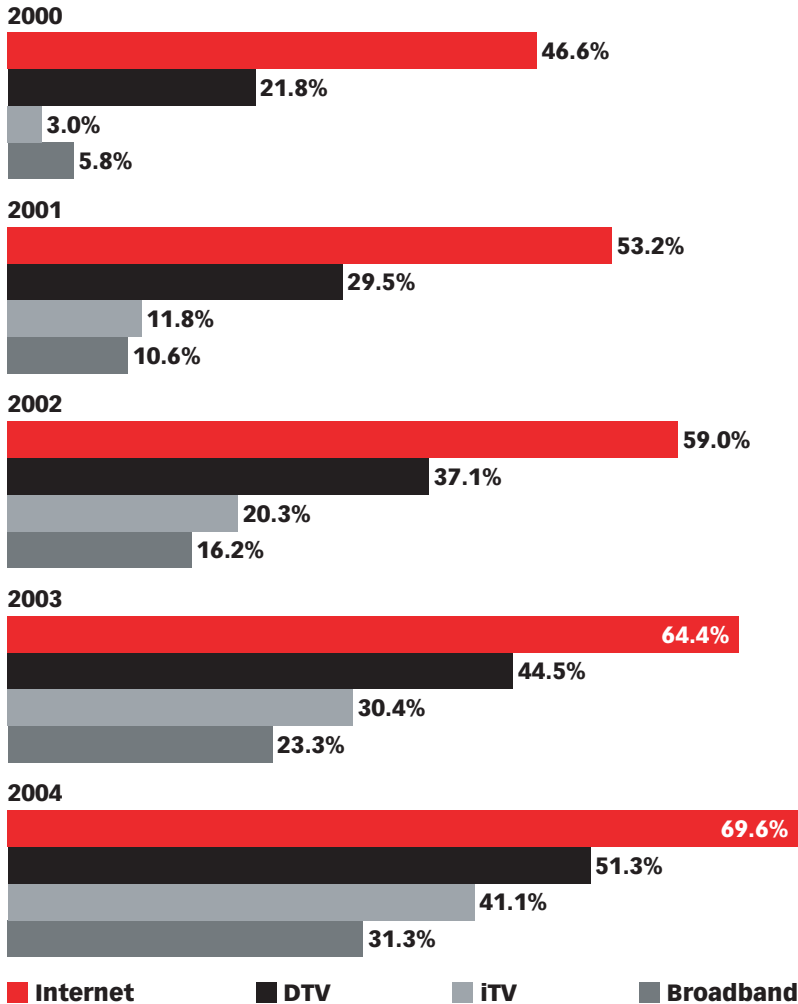
This forecast is based on three main assumptions:

- the growth of iTV households directly correlates with the growth of digital TV households, particularly digital cable services
- the demand for premium digital content and a corresponding demand for interactive program guide & personal video recorder functionality will drive digital TV and iTV services
- the economic necessity for cable companies to offer additional interactive services in order to raise the average revenue per subscriber and prevent churn to satellite TV providers. Since basic cable penetration has almost reached saturation point, growth in the future will only come from additional services such as high-speed data, telephony and interactive TV services.

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Putting eMarketer's iTV forecast in context, the chart following shows that by 2004 70% of households will be online, 51% will have digital TV, 41% will be interacting with their TV, and 31% of households will have a high-speed connection. The chart clearly illustrates that iTV will grow much more rapidly than high-speed internet.

Internet, Broadband, Digital TV & iTV Household Penetration in the US, 2000-2004 (as a % of total households)



Source: eMarketer, 2002

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Comparative Estimates: iTV Households in the US

There is a great deal of disparity among research firms in their forecasts for iTV. In 2001 the estimates range from 400,000 to 14.5 million households. In 2004 the estimates range from 4.7 million to 45.7 million. The outlier among the bunch is PricewaterhouseCoopers. This is due to the fact that their definition of iTV households only includes web-based services such as AOL TV rather than server-based services which are normally also included within the definition.

Comparative Estimates: US iTV Households, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
International Data Corporation (IDC), 2001	6.5	14.5	23.6	33.5	43.6	-
Jupiter Research, 2001	2.2	7.9	18.4	30.3	39.1	45.5
Strategis Group*, 2001	1.0	5.2	11.6	19.9	29.8	41.1
eMarketer, 2002	3.2	12.7	22.1	33.4	45.7	58.2
Yankee Group*, 2001	1.4	5.0	11.0	18.0	24.0	-
PricewaterhouseCoopers (PWC)***	-	0.4	1.4	3.0	4.7	7.0
Strategy Analytics**, 2001	-	6.9	16.1	28.2	43.2	58.3
Gartner, 2001	-	-	-	20.0	-	-
Cable World, 2000	2.5	-	-	-	-	27.3

Note: *excludes WebTV; **North America; ***PWC iTV estimate is for web-based services only (e.g., AOL TV)

Source: eMarketer, 2002; various, as noted, 2000 & 2001

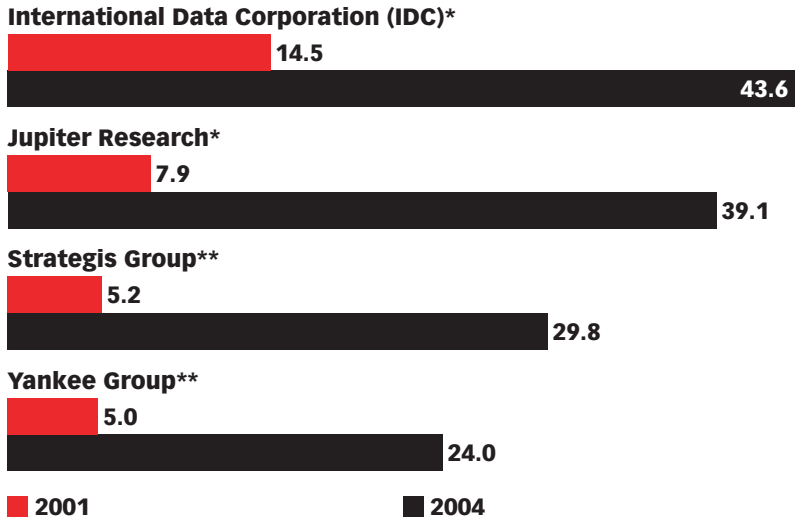
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IDC is more bullish than most when it comes to iTV, predicting 43.6 million iTV households in 2004.

Comparative Estimates: US iTV Households, 2001 & 2004 (in millions)



Note: *includes digital cable, PVRs, DBS and WebTV services; **excludes WebTV but includes digital cable and PVRs
 Source: eMarketer; various, as noted, 2001

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“US iTV home penetration will reach 17 % in 2002, which usually signals critical mass.”

– Lydia Loizides, Senior Analyst, Jupiter Research, March 2001

Jupiter Research breaks its forecast down by access technology. They forecast 39 million iTV households in 2004, made up of 22 million cable, 13 million satellite, 2.5 million stand-alone personal video recorders (also called DVRs), 330,000 digital terrestrial TV households and 1.3 million Web TV-type households.

Total Number of iTV Households by Delivery/Access Technology in the US, 2000-2004 (in millions)

	2000	2001	2002	2003	2004
Cable	0.98	3.84	10.06	17.03	21.95
Satellite	0.30	2.21	5.54	9.66	13.06
DVR	0.32	0.87	1.59	2.22	2.47
DTT	0.00	0.01	0.05	0.15	0.33
Net-Top	0.64	0.95	1.16	1.28	1.29
Total iTV households	2.24	7.88	18.40	30.34	39.10

Source: Jupiter Research, 2001

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US iTV Revenues

eMarketer estimates revenues from the US iTV sector totaled \$468 million in 2001 and will reach over \$11.6 billion by 2005. eMarketer believes that nearly half of all iTV revenues will be derived from subscription services such as personal video recorder (PVR) services, video-on-demand, gaming, telephony, email and internet on the TV, instant messaging and SMS on the TV, digital music services, and betting, as well as a host of other services yet to be imagined.

iTV advertising, particularly through the interactive program guide (IPG), has great potential and will be the source of most iTV advertising revenues. Other enhanced TV services, such as that provided by Wink and others, where iTV users click on parts of the screen in order to receive further information, or to conduct a poll, are also potential advertising opportunities, but have less potential than the IPG.

Television commerce (T-Commerce) is unlikely to have a great impact, at least for the next few years. With such a high PC internet penetration, eMarketer believes that iTV users will have little incentive to use this new and unfamiliar platform to purchase goods and services when they have become used to the PC for online transactions. After 2005, however, when retailers have become familiar with the medium and have better targeted their services to the platform, t-commerce should grow to eventually outpace even subscription revenues.

US iTV Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
T-Commerce	\$12.5	\$69.1	\$292.3	\$1,029.0	\$3,928.5
Interactive Advertising	\$95.3	\$221.0	\$601.0	\$1,356.0	\$2,619.0
Subscription	\$360.0	\$858.0	\$1,747.0	\$3,204.0	\$5,022.0
Total	\$467.8	\$1,148.10	\$2,640.30	\$5,589.00	\$11,569.50

Source: eMarketer, 2002

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The comparative estimates for iTV revenues vary widely for this nascent industry. One of the leading commentators on the US television sector, Myers Mediaenomics, forecast in May 2001 that total iTV revenues will only reach \$4.46 billion in 2005, from \$378 million in 2001. eMarketer's forecast is more than twice this estimate at \$11.6 billion in 2005, which we still consider conservative. Consulting firm McKinsey & Company and investment firm ABN AMRO predict US iTV revenues will grow to \$17.5 billion and \$20 billion respectively, in 2005.

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Comparative Estimates: US iTV Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Myers Mediaonomics, May 2001	\$378.0	\$588.0	\$1,068.0	\$2,390.0	\$4,456.0
eMarketer, February 2002	\$467.8	\$1,148.1	\$2,640.3	\$5,589.0	\$11,569.5
McKinsey Consulting, September 2001	–	–	–	–	\$17,500.0
ABN-AMRO, 2001	\$359.5	\$1,259.9	\$4,805.7	\$10,554.4	\$20,038.1

Source: eMarketer, 2002; various, as noted, 2001

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Myers's numbers stand out because they are so low compared to other forecasters. It is interesting to note that Myers originally formulated global household iTV projections back in June, 2000 which certainly indicated a worldwide iTV sector with plenty of growth potential. Their June 2000 estimates, based on Forrester Research's 1999 figures, indicated that by 2005 total iTV revenue worldwide would exceed \$20.7 billion.

iTV Revenue Worldwide, 1999-2006 (in millions)

	Advertising	E-Commerce	Subscription	Total
1999 (1)	\$94	\$168	\$403	\$665
2000	\$180	\$260	\$480	\$920
2001	\$350	\$506	\$770	\$1,680
2002	\$960	\$1,400	\$1,680	\$4,040
2003	\$2,190	\$2,760	\$2,350	\$7,300
2004	\$4,900	\$5,600	\$3,150	\$13,650
2005	\$7,400	\$8,200	\$5,100	\$20,700
2006	\$11,500	\$13,400	\$7,200	\$32,100

Source: (1) Forrester Research, 2000; The Myers Group, June 2000

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“It is dangerous and irresponsible to project aggressively before we have actual marketplace experiences that validate basic business models....Over-enthusiastic analysts became swept up in a whirlwind of technological hoopla.”

– Jack Myers, May 2001

Suffice is to say, Myers is currently less than optimistic about the future of the iTV industry in the US, at least until 2006. Beyond 2006, however, Myers does foresee the US iTV sector growing to a \$30 billion industry in 2010.

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US iTV Revenues, 2000–2006 (in millions)

	2000	2001	2002	2003	2004	2005	2006
Advertising & IPG*	\$14	\$20	\$30	\$58	\$120	\$215	\$400
T-commerce**	\$8	\$18	\$28	\$60	\$120	\$250	\$500
Subscription	\$280	\$340	\$530	\$950	\$2,150	\$4,000	\$6,800
Total	\$302	\$378	\$588	\$1,068	\$2,390	\$4,465	\$7,700

*Note: *Interactive Program Guide; **e-commerce over TV and web transactions instigated by TV commercials*
 Source: Myers Mediaenomics, May 2001

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ABN AMRO, on the other hand, is more optimistic about the sector in the short to medium term.

US iTV Revenue, 2001-2005 (in billions)

	2001	2002	2003	2004	2005	2006
T-commerce	\$0.04	\$0.27	\$1.21	\$3.41	\$6.21	\$9.76
Interactive advertising	\$0.11	\$0.35	\$1.89	\$3.93	\$8.27	\$10.85
Subscription	\$0.21	\$0.64	\$1.70	\$3.21	\$5.56	\$8.11
Total	\$0.36	\$1.26	\$4.81	\$10.55	\$20.04	\$28.72

Source: ABN-AMRO, 2001

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In 2001, ABN AMRO estimated that 58.6% of all iTV revenue came from subscription services, 29.4% iTV advertising and 12% t-commerce. By 2006, they foresee a different revenue mix, as t-commerce will make up 34% of total revenue and iTV advertising nearly 38%. The subscription portion of total iTV revenues will be reduced to 28.2%. While eMarketer agrees with ABN AMRO that t-commerce will begin to make up a larger share of total iTV revenues in the coming years, we don't agree that it will happen this quickly. Entrenched use of PCs for e-commerce will delay the growth of t-commerce for some years.

iTV Revenue Mix in the US, 2001-2006 (as a % of total iTV market revenue)

	2001	2002	2003	2004	2005	2006
T-commerce	12.0%	21.6%	25.3%	32.3%	31.0%	34.0%
Interactive advertising	29.4%	27.6%	39.3%	37.3%	41.3%	37.8%
Subscription	58.6%	50.8%	35.5%	30.5%	27.7%	28.2%

Source: ABN-AMRO, 2002

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Jupiter Media Metrix predicts iTV advertising and shopping to be worth a collective \$8.8 billion in 2005.

US iTV Revenue Forecasts, 2005 (in billions)

Shopping	\$4.3
Advertising	\$4.5

Source: Jupiter Media Metrix, 2001

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“...the rollout of iTV offerings will not make a meaningful contribution to average revenue per user (ARPU) any time in the foreseeable future. The value of iTV is more likely to be realized in enhanced customer stickiness and reduced churn than in any material boost to near term revenue growth.” – ING Barings, Feb 23 2001

In a report examining the impact of interactive TV on the digital broadcast satellite (DBS) industry in the US, ING Barings sees very little revenue potential for interactive services in the short to medium term. They estimated the three largest satellite TV companies in the US will only earn \$389.2 million in iTV revenue in 2005, from \$24.5 million in 2001. Looking at these estimates in a wider context, if one surmises that if DBS makes up 38% of digital TV households in 2005, (as eMarketer predicts) and 38% of iTV revenues will come from DBS providers, then total interactive TV revenues across all of the digital sector would only add up to approximately \$1 billion in 2005.

However, as has been discussed previously, the revenue potential for digital cable companies is considerably greater than that of DBS companies because of the high-speed back channel. Services such as video-on-demand, multi-user gaming and telephony are not services likely to be offered by DBS companies for some time, if at all. In reality, the portion of iTV services revenue going to DBS companies will be significantly less than that going to cable companies in the coming years.

iTV Revenue Projections for Leading US Satellite TV Companies, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
DirecTV	\$9.4	\$27.9	\$52.4	\$81.7	\$109.2
DISH	\$15.0	\$47.7	\$98.5	\$173.3	\$255.5
PGTV	\$0.1	\$2.4	\$9.6	\$15.1	\$24.5
Total	\$24.5	\$78.0	\$160.5	\$270.1	\$389.2

Source: ING Barings, February 2001

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Enhanced TV

Enhanced TV is any type of content, whether text, graphics or video, which is overlaid on regularly displayed video content. The enhanced content may be synchronized with the video, or it may be available on command, so a return path is not necessary. Wink is currently the leading enhanced TV provider in the US with 6 million homes using its service at the end of 2001. The company's proprietary technology enables internet-type content to be inserted into a broadcast stream in conjunction with any video program or advertisement. The additional content is generally specific data related to the program or advertisement, such as supplementary information, news, sports statistics, or product offers or coupons. The viewer is alerted that interactive content is available when a small "i" icon appears on the TV screen. Using only the TV remote control, the viewer can call up the information at no charge and navigate via menus at the bottom of the screen.

All information gathered by the set-top, including requests for information, purchases, and viewer habits, are sent by the set-top to the servers on a daily basis, where they are aggregated and forwarded to the Wink Response Network for additional processing.

Investment firm Arnold and S. Bleichroeder, Inc. forecast that Wink will be in over 16 million North American Households by 2005, and the majority of these households will be satellite TV households.

Total Wink iTV Households in North America, 2000-2005 (in millions)

	2000*	2001*	2002	2003	2004	2005
Cable	0.6	1.4	2.7	4.1	4.5	4.8
Satellite	1.5	4.1	6.6	7.7	9.0	11.0
Web TV	0.5	0.5	0.5	0.5	0.5	0.5
Total Wink households	2.6	6.0	9.8	12.3	14.0	16.3

Note: *Actual end of year results from company data
 Source: Arnold and S. Bleichroeder, Inc., March 2001

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Wink's business model includes three elements:

- Requests for Information (RFI) – When a viewer clicks on an interesting advertisement, this is essentially a sales lead, and Wink gets paid a small fee when this happens. Depending on the arrangement and volume this might be between \$0.80 and \$1.50 per RFI.
- Commission on Sales – Each time a viewer makes a purchase, either from an advertisement or dedicated commerce channel, Wink gets 12% of the total price from the merchant, with a minimum of \$2.00 per purchase.
- Services – Wink provides end-to-end consulting services on iTV and its elements.

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Wink recently reported revenues for the year ending 2001 of \$6.9 million across its 6 million households. This equates to \$1.15 per Wink household. The company has forecast that it will reach between \$10 and \$12 million in revenue in 2002, with an expected 9.8 million Wink households.

Wink Subscribers and Revenue, 2000-2002 (in millions)

	Revenue	Households
2000	\$4.3	2.6
2001	\$6.9	6.0
2002*	\$10-12	9.8

*Note: *estimates
Source: company data, 2002*

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According to Microsoft, as reported by Merrill Lynch in February 2001, “Interactive TV services will generate from between \$9 and \$39 per household per month in incremental revenue to the network operator.”

Merrill Lynch estimates that by 2005 the value of enhanced TV services will be worth \$15 per month, per subscriber. The network provider will reap the greatest share of this revenue, but those providing the software will also take a share of approximately 4%. Merrill Lynch’s analysis indicates worldwide enhanced TV revenues in 2005 to exceed \$20 billion and those providing the software platform to reap \$800 million.

Enhanced TV Platform Software Market Worldwide, 2005

WW cable TV Subscribers (millions)	278
Enhanced TV penetration	40%
Enhanced TV subscribers (millions)	111
Revenues per subscriber per month	\$15
Revenues per subscriber per year	\$180
Enhanced TV service revenues (billions)	\$20
Share to software platform provider	4%
Software platform market size (millions)	\$800

Source: Merrill Lynch, February 2001

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Forrester Research has forecast enhanced TV revenues to top \$10 billion in the US by 2004, with much of that revenue coming from ads.

Enhanced Broadcast Programming Revenues in the US, 2004 (in millions)

Ads	\$6,200
Commerce*	\$3,800
Subscriptions	\$72
Total	\$10,100

*Note: *excludes video-on-demand and pay-per-view, but includes direct-response infomercials and other home-shopping technologies*
 Source: Forrester Research, 2001

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ITV Advertising

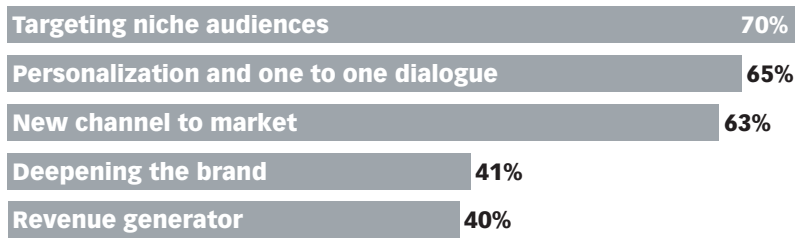
As has been well documented, the advertising sector across all media sectors took a nosedive in 2001. The September 11 attacks, combined with the economic recession and falling consumer confidence, were all important factors in this. eMarketer estimates the online advertising sector fell 11% in 2001, but will bounce back in 2002, with a return to the spending levels of 2000, at \$8.1 billion.

Interactive TV advertising has significant potential primarily because it can allow advertisers to target messages to particular users based on their broad customer profiles. Addressable advertising, as it is called, can personalize advertising by each individual set-top box, and provide advertisers with a new way of tracking and accounting for the success of their advertising – thereby giving them greater returns on their investment. Unlike a normal 30 second advertisement on the TV, where it is difficult to measure the impact, interactive advertising has the potential to allow advertisers to view, in real-time, whether ads are being viewed, clicked and accessed, as well as allowing them to dynamically change ads depending on the success or otherwise of the existing ads.

In a recent study of UK marketing professionals conducted by BMPtvi, 70% of respondents saw the benefits of iTV advertising as being able to target niche audiences, and 65% cited personalization and one-to-one dialogue as also beneficial.

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UK Marketing Professionals' Perceived Benefits of iTV Advertising, 2001 (as a % of respondents)



Note: n=304
Source: BMPtvi, March 2001

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For iTV advertising to reach its full potential, however, there are some significant barriers that advertisers will need to overcome. The first, of course, is the PVR. As was seen in the *consumer survey* chapter, skipping ads is one iTV service that over 70% of respondents were very interested in. PVRs will be discussed in more detail later on, but the very fact that viewers are increasingly skipping ads, and watching more time-shifted TV, should act as a wake-up call to advertisers, to re-think their concept of TV advertising. ITV actually has the potential to better target advertising, so on the one hand PVRs may reduce the effectiveness of the existing 30 second ad slot, but on the other, the interactive element of iTV can provide advertisers with a greater means of tracking and measuring the success of their investments.

The second important barrier that needs to be overcome if iTV advertising is to be successful is the potential privacy backlash. As user activity is tracked to particular set-tops, if privacy abuses occur, then it will hurt the entire sector. The third potential hurdle is the technological incompatibility of all the middleware. If one cable company is using one set-top box with a particular middleware and another is using an alternative, if an advertiser wishes to do a national or even regional campaign across multiple cable networks, then this could be a potential technological nightmare.

Despite these obstacles, eMarketer estimates that iTV advertising revenue will reach \$2.6 billion in 2005 from \$95 million in 2001. We predict the vast majority of this revenue will come from the interactive program guide from providers such as Gemstar TV-Guide, Scientific Atlanta and others.

eMarketer's forecast for iTV advertising is based on iTV advertising as a percentage of total TV advertising. According to ABN AMRO, total TV advertising in the US in 2001 was \$54.9 billion, which is about in the middle of other estimates in the industry.

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Comparative Estimates: US TV Advertising Spending, 2000-2005 (in billions)

	2000	2001	2002	2003	2004	2005
Universal McCann	\$59.23	\$52.42	\$54.70	–	–	–
Myers Group	\$59.32	\$53.72	\$50.32	\$51.07	\$53.40	\$54.41
ABN-AMRO	–	\$54.94	\$58.21	\$61.92	\$66.09	\$72.77
Veronis Suhler	\$55.70	\$55.29	\$60.07	\$63.42	\$69.34	\$72.74
PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates	\$58.20	\$59.39	\$66.01	\$70.66	\$79.99	\$85.10

Source: eMarketer, February 2002; various, as noted, 2001

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There were 105 million TV households in the US at the end of 2001, making television advertising revenue per household for 2001 at \$522. This figure is also confirmed by PricewaterhouseCoopers in their Global Media Outlook study, which also estimates advertising revenue per US TV household to be over \$500.

eMarketer's forecasts are based on the assumption that 1.4% of total television advertising revenue per household in 2001 was interactive advertising. In 2002, this will rise to 1.8% and in 2005 it will account for 6.7% of household advertising revenue.

US iTV Advertising Revenue, 2001-2005

	2001	2002	2003	2004	2005
iTV households (in millions)	12.7	22.1	33.4	45.7	58.2
Total TV advertising (in billions) ABN AMRO estimates	\$54.9	\$58.2	\$61.9	\$66.1	\$72.8
TV households (in millions)	105	106	107	108	109
TV Advertising per TV household per year	\$522	\$549	\$579	\$612	\$669
% of advertising per year that is iTV advertising	1.44%	1.82%	3.10%	4.90%	6.72%
iTV advertising per household per year	\$7.50	\$10.00	\$18.00	\$30.00	\$45.00
Total iTV advertising revenue (in millions)	\$95.3	\$221.0	\$601.0	\$1,356.0	\$2,619

Source: eMarketer, 2002

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Comparative Estimates: iTV Advertising Revenues

Comparative estimates from other researchers would indicate that this is a relatively conservative estimate. Jupiter Research, for example, estimates iTV advertising revenue in 2005 to be \$4.5 billion and ABN AMRO \$8.3 billion. Myers Mediaenomics, however, does not foresee any real iTV advertising sector in the next three years, with total revenues of \$215 million in 2005.

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Comparative Estimates: US iTV Advertising Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Myers Mediaenomics, May 2001	\$20	\$30	\$58	\$120	\$215
eMarketer, 2002	\$95.3	\$221	\$601	\$1,356	\$2,619
Forrester Research, 2001	\$127	\$290	\$739	\$1,487	\$2,622
Jupiter Media Metrix, June 2001	-	-	-	-	\$4,500
ABN-AMRO, 2002	\$106	\$348	\$1,888	\$3,934	\$8,270

Source: eMarketer, 2002; various, as noted, 2001 & 2002

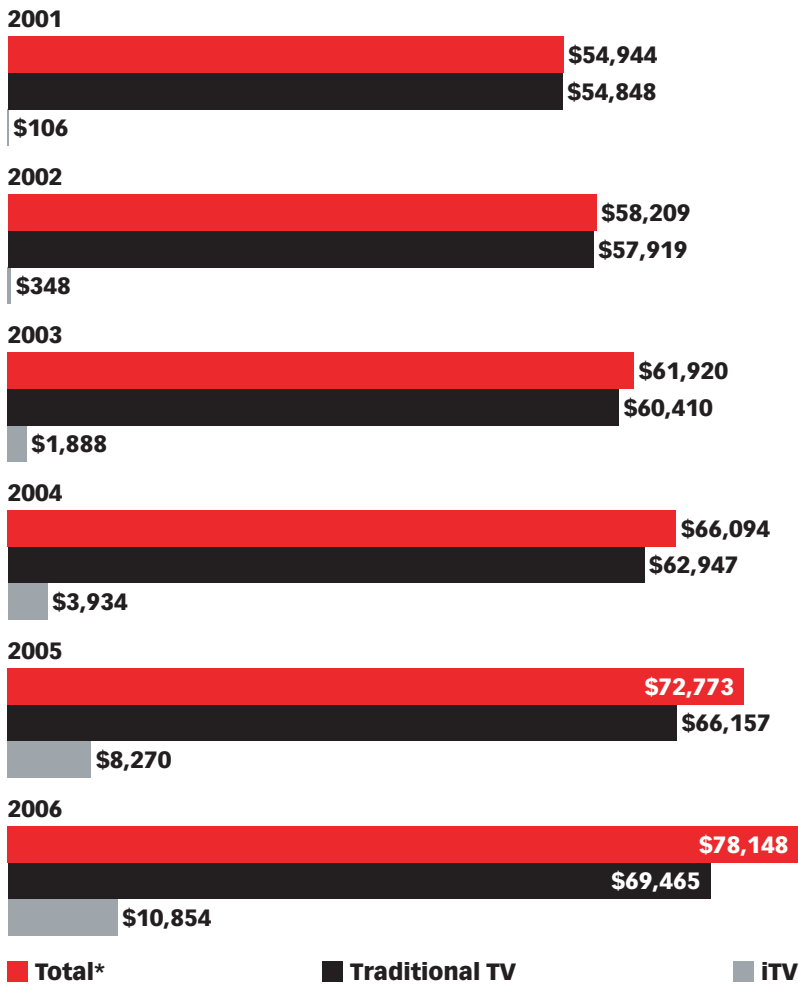
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ABN AMROs estimates of iTV advertising revenue show that by 2006, 13.8% of total TV advertising revenue will be iTV advertising, from less than 1% in 2001. Jupiter predicts iTV advertising revenues will account for just 2% of all TV ad revenues in 2003, but will increase to 7% of the total in 2005, generating \$4.5 billion.

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US Traditional TV versus iTV Advertising Revenue, 2001-2006 (in millions)



Note: *takes into account the adjustment for overlap between the two segments

Source: ABN AMRO, May 2001

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In the context of the total US digital marketing sector, Forrester Research indicates that marketing spending on the iTV platform will be half that of spending on e-mail campaigns for the next few years, and make up only 17.6% of all digital marketing spending in 2006.

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US Digital Marketing Spending, by Category, 2000-2006 (in millions)

	2000	2001	2002	2003	2004	2005	2006
Display advertising	\$7,403	\$6,002	\$6,334	\$7,174	\$8,074	\$9,150	\$10,305
E-mail list rental	\$247	\$220	\$223	\$207	\$224	\$244	\$275
E-mail to customers	\$396	\$1,127	\$1,770	\$3,122	\$4,280	\$5,742	\$6,498
Interactive TV (iTV)	\$20	\$127	\$290	\$739	\$1,487	\$2,623	\$3,661
Total	\$8,066	\$7,476	\$8,627	\$11,241	\$14,065	\$17,759	\$20,740
% of total marketing	2.0%	1.9%	2.2%	2.8%	3.3%	4.0%	4.5%

Source: Forrester Research, October 2001

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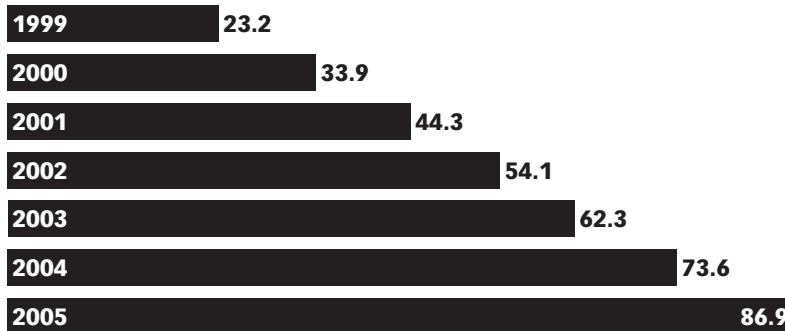
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Interactive Program Guide

The interactive program guide (IPG), which is also interchangeably called the electronic program guide (EPG), was one of the first interactive TV services available to viewers. eMarketer believes that the vast majority of iTV advertising revenue will come from the IPG. With digital satellite and cable services providing hundreds of additional channels, navigating through all these channels or reading the print copy of the TV Guide magazine, is cumbersome to say the least. An onscreen program guide which allows viewers to find programs by genre, time, and other criteria was developed in the 1990s to solve this problem. The potential for IPG is that it has the opportunity to become something of a web portal on TV, where advertising and commerce can be conducted. Data from leading IPG provider, Gemstar, indicates that 30,000 IPGs are being installed in homes each day.

According to Forrester Research there will be nearly 87 million people in the US using an electronic program guide by 2005.

US Households Using an Electronic Program Guide (EPG), 1999-2005 (in millions)



Source: Forrester Research, 2000

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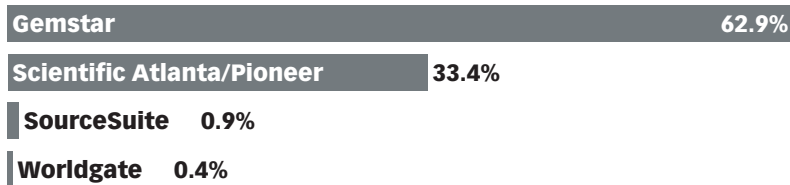
A study from Statistical Research of August 2001 showed that almost two in three homes that have IPGs said they use the guides more now than when they first got them. And the technology is linked to changes in program decision making; more than half (53%) said they channel-surf less now than before they had an IPG, and 82% said they use TV newspaper listings less.

Gemstar TV-Guide is the leading provider of interactive program guides in North America. They have formed partnerships with leading cable companies such as AT&T Broadband, Charter Communications, Comcast and Adelphia, as well as with Shaw and Cogeco in Canada. Gemstar has also formed partnerships with television manufacturers such as Thomson, Sony, JVC, Zenith and Philips, which are including Gemstar's Guide Plus+ product on all of their larger television sets. Gemstar is expected to deploy the first two-way television set this year which will utilize wireless technology as the back-channel, thereby providing all of the functionality of those TV sets wired to cable.

Gemstar also licenses its technology to a variety of set-top boxes, including that of DirecTV and Motorola. EchoStar, the other leading DBS company in the US is being sued for alleged intellectual property infringement.

According to Deutsche Banc Alex Brown, Gemstar has 63% of the North American IPG market, followed by Scientific Atlanta/Pioneer at 33%.

Interactive Program Guide Provider Market Share in North America, Q1 2001



Source: Deutsche Banc Alex. Brown, July 2001

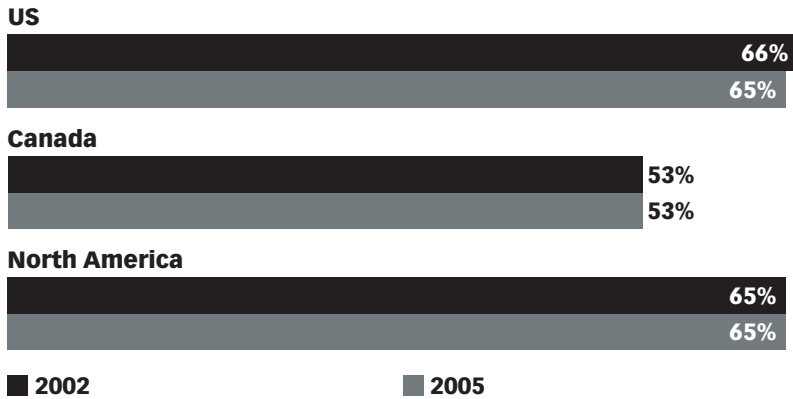
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Gemstar 62.9% Scientific Atlanta/Pioneer 33.4% SourceSuite 0.9% Worldgate 0.4% Source: Deutsche Banc Alex. Brown, July 2001
 Gemstar's dominant market share throughout North America is likely to hold over the coming years.

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Gemstar Interactive Program Guide Market Share in North America, 2002 & 2005 (as a % of all IPG subscribers)



Source: Deutsche Banc Alex. Brown, July 2001

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Gemstar's IPG is currently in 10 million North American homes according to Deutsche Banc, and will be in 28 million by 2005. Publicly reported data from Gemstar itself indicates that at the end of 2001 it reported its interactive program guide to be in 13 million households – 7.5 million digital cable households and within 5.5 million TV sets. It also reports its IPG is growing by 30,000 sets/households per day.

Gemstar Interactive Program Guide Subscribers in North America, 1999-2005 (in millions)

	1999	2000	2001	2002	2003	2004	2005
US	2.9	5.9	9.2	15.1	19.5	23.6	27.2
Canada	0.2	0.3	0.5	0.7	0.9	1.0	1.2
North America	3.1	6.2	9.7	15.7	20.3	24.6	28.4

Source: Deutsche Banc Alex. Brown, July 2001

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As was discussed earlier, in the section *PC vs TV*, there is a considerable advertising opportunity for both the interactive program guide provider and the advertiser when it comes to the IPG.

eMarketer has put the analysis of investment firm ABN AMRO side-by-side with that of Deutsche Banc, and it reveals that even the smallest difference in assumptions can mean significant differences in the bottom line.

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Both firms estimate TV viewing households watch 7 hours of TV per day and Deutsche Banc estimates viewers will visit the interactive TV guide four times in the hour and visit three pages within the IPG. This works out to be 2,555 page views per month, calculating 84 page views per day for 365 days dividing by 12 months. In contrast, if the IPG is visited one less time per hour and one less page is viewed, as ABN AMRO estimates, then the bottom line works out to be almost half the revenue per household per year that Deutsche Banc's estimates.

Nevertheless, the evidence does suggest there is an opportunity that is developing, and one that should not be ignored.

“The IPG has the potential to deliver almost 92,000 advertisements per year per household.”

– Deutsche Banc Alex Brown

Comparative Estimates: iTV Advertising Potential, 2001

	Deutsche Banc Alex. Brown	ABN-AMRO
TV hours/day/households	7	7
Guide visits/hour	4	3
Pages views/visit	3	2
Days/month	30	30
Page views/month	2,555	1,260
Ads/page	3	3
Months/year	12	12
Total ads/year/households	91,980	45,360
Utilization	27%	25%
Ads sold	24,835	11,340
CPM	\$6.00	\$7.50
\$/households/year	\$149	\$85

Source: eMarketer, 2002; Deutsche Banc Alex. Brown, ABN-AMRO, 2001

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Using a more conservative approach, of three visits to the guide per hour and two pages within the guide, Deutsche Banc has calculated both the potential advertising and t-commerce revenue per household per month for Gemstar IPG. They indicate this will rise from an actual figure in the first quarter of 2001 of \$0.41 per household per month to \$6.47 per household per month in 2006.

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Gemstar Interactive Program Guide - Advertising and T-Commerce Revenue per Household, 2001-2006

	Q1 2001*	2002	2003	2004	2005	2006
Hours	7	7	7	7	7	7
Visits	3	3	3	3	3	3
Pages	2	2	2	2	2	2
Ads/page	3	3	3	3	3	3
Total ads/ households/day	126	126	126	126	126	126
Average CPM rate	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00	\$6.00
% inventory sold	1.80%	5%	9%	15%	21%	25%
Ad revenue/ households/month	\$0.41	\$1.15	\$2.07	\$3.45	\$4.83	\$5.75
Commerce Revenue/ household/month	\$0.00	\$0.03	\$0.10	\$0.22	\$0.43	\$0.72

Note: *Actual revenues as reported in quarterly earnings statements
 Source: Company data and Deutsche Banc Alex. Brown estimates, July 2001

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Taking into account actual reported revenues in the first three quarters of 2001, it is likely that Gemstar's Interactive program guide revenues totaled approximately \$100 million for the year ending 2001. Deutsche Banc Alex Brown expects this to almost triple in 2002 to \$282 million and by 2007 to reach almost \$4 billion. By anyone's reckoning, this would indicate a rapidly growing industry... for one provider, anyway.

Gemstar Interactive Program Guide Platform Revenues , 2001-2007 (in millions)

Q1 2001*	\$13.10
Q2 2001*	\$20.50
Q3 2001*	\$29.20
Year ending 2001	\$99.20
Year ending 2002	\$282.40
Year ending 2003	\$1,454.80
Year ending 2004	\$1,454.80
Year ending 2005	\$2,404.40
Year ending 2006	\$3,259.90
Year ending 2007	\$3,861.90

Note: *Actual revenues as reported in quarterly earnings statements
 Source: Company data and Deutsche Banc Alex. Brown estimates, July 2001

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T-Commerce

Television commerce, or t-commerce, includes sales of books, CDs, clothing, travel, food and other e-commerce goods and services one typically finds on the internet. eMarketer forecasts t-commerce revenue will near \$4 billion in 2005 from \$12.5 million in 2001. Our 2001 forecast is based on the assumption that only 1% of iTV households, or 125,000 households, actually engaged in T-commerce in that year. eMarketer estimates that of these t-commerce households, they spent on average \$100 for that year.

We expect the level of interest in t-commerce to rise as more commerce providers embrace the platform and consumers become more familiar and better educated about the platform. However, eMarketer estimates only 15% of iTV households will engage in t-commerce in 2005, with the vast majority preferring to use the PC to conduct home shopping.

US T-Commerce Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
iTV households	12.7	22.1	33.4	45.7	58.2
% of iTV households engaging in t-commerce	1.0%	2.5%	5.0%	7.5%	15.0%
T-commerce households	0.125	0.553	1.67	3.43	8.73
Average annual revenue per t-commerce household	\$100	\$125	\$175	\$300	\$450
Gross t-commerce revenue	\$12.5	\$69.1	\$292.3	\$1,029.0	\$3,928.5

Source: eMarketer, 2002

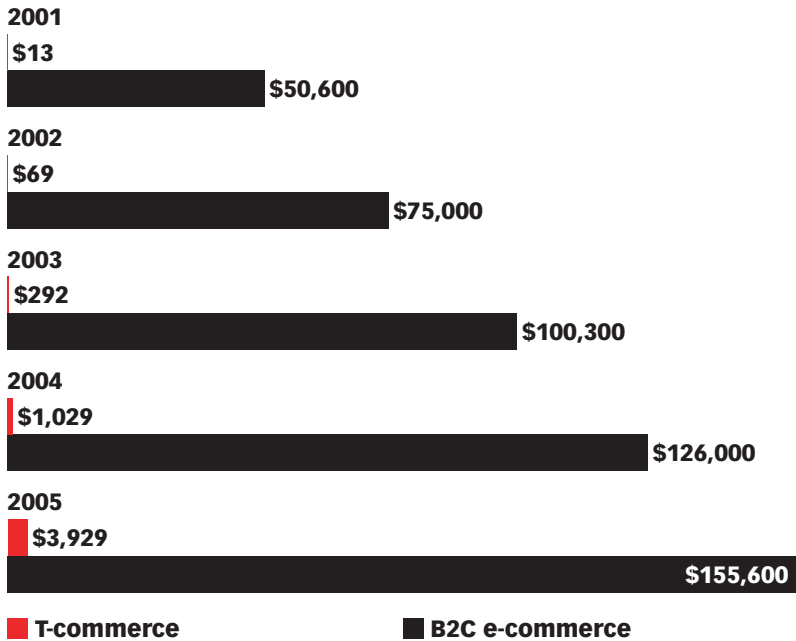
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Putting eMarketer's t-commerce projections side by side with our PC-based e-commerce projections, what is abundantly clear is that eMarketer views the PC platform as the primary source of all B2C e-commerce revenues in the next few years. By 2005, t-commerce will only account for 2.5% of all B2C e-commerce revenue.

T-Commerce vs. B2C E-Commerce Revenues, 2001-2005 (in millions)



Source: eMarketer, 2002

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eMarketer's B2C PC-based e-commerce projections are based on the following model.

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US Consumer Online Buying and Shopping Grid, 2000-2004 (in millions and % penetration)

	2000	2001	2002	2003	2004
Internet users*					
US population aged 14+ (US Census)	221.3	223.2	225.6	228.0	230.5
Total US internet users	95.4	119.0	136.0	151.8	165.5
Internet users aged 14+	86.6	108.0	123.4	137.8	150.2
Online penetration among population aged 14+	39.1%	48.4%	54.7%	60.4%	65.2%
Shoppers					
% Internet users aged 14+	73.0%	77.0%	79.0%	81.0%	82.0%
Shoppers aged 14+	63.2	83.2	97.5	111.6	123.2
Buyers					
% Internet users aged 14+	48.5%	53.2%	55.8%	58.3%	59.9%
Buyers aged 14+	42.0	57.5	68.9	80.3	90.0
Average annual purchase per online buyer	\$969.02	\$880.67	\$1,089.21	\$1,248.48	\$1,400.47
Total US B2C e-commerce revenues (incl. online travel)**	\$40,700	\$50,600	\$75,000	\$100,300	\$126,000

*Note: *eMarketer's internet user figures are based on the International Telecommunication Union (ITU) baseline figure of 95.4 million internet users for 2000; the age 14+ group represents roughly 90% of all users according to the August 2000 US Department of Commerce survey; **eMarketer benchmarks its B2C retail revenue figures against US Department of Commerce data, for which the last period measured was Q4 2001; the travel component was formulated based on aggregated data Source: eMarketer, December 2001; various, as noted, 2000 & 2001*

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eMarketer's t-commerce forecast is relatively conservative compared to other research firms. Gartner recently released a report predicting total B2C e-commerce in 2005 to be \$227.7 billion across the PC, TV and mobile platforms. Of that total, they predict e-commerce conducted over the television to total \$13.4 billion or 5.9% of total e-commerce.

Myers, in contrast, does not predict a bright future for t-commerce at all, estimating total revenues in 2005 to be just \$250 million.

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Comparative Estimates: US T-Commerce Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Myers Mediaenomics, May 2001	\$18	\$28	\$60	\$120	\$250
eMarketer, 2002	\$12.5	\$69.1	\$292.3	\$1,029.0	\$3,928.5
Jupiter Media Metrix, June 2001	-	-	-	-	\$4,300
ABN-AMRO, 2001	\$43.1	\$272.0	\$1,213.9	\$3,405.5	\$6,211.5
Gartner, December 2001	-	-	-	-	\$13,400

Source: eMarketer, 2002; various, as noted, 2002

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One of the reasons why most research firms predict t-commerce will gain in popularity and prove lucrative in the long run is because Americans already shop over their TV through cable TV shopping channels. Two of the biggest, QVC and Home Shopping Network (HSN), had combined revenue of \$3.6 billion in 1999. More recent revenue figures from QVC (across all its businesses) show their total revenues in 2000 were \$3.5 billion, and in 2001 were \$3.9 billion.

In 1999 the average spend, per customer, per year for QVC was \$455 and \$323 for HSN. The conversion rate of viewers to customers was 8% for QVC and 6% for HSN. eMarketer's t-commerce forecasts, are to a large extent, modeled on these numbers, but are considerably more conservative in the viewer/customer conversion rate, and the average spend per customer.

US TV Shopping Channel Average Revenue per Customer, 1999

	QVC	Home Shopping Network
Revenue (US)	\$2.4 billion	\$1.2 billion
Viewers at year end	65 million	62 million
Customers as a % of viewers	8%	6%
Customers	5.3 million	3.9 million
Average revenue per customer per year	\$455.84	\$323.24
Average revenue per customer per month	\$37.99	\$26.94

Source: ABN-AMRO, company data, 2001

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iTV Subscription Revenue

eMarketer expects subscription services such as PVR functionality, video-on-demand, gaming, telephony, internet and messaging services, betting, music services, and other subscription services to have the greatest iTV revenue potential in the years to come. eMarketer estimates that current subscription revenue to be approximately \$360 million at the end of 2001 which will rise to over \$5 billion in 2005. These estimates do not include high-speed internet or near-video-on-demand (currently called pay-per-view) revenues, nor do they include online game console subscription revenues.

eMarketer's forecasts are based on the assumptions that in 2001 only 20% of iTV households, or 2.5 million households, of total iTV households subscribed to additional paid interactive services (Wink, for example, is a free interactive service). The average spend per subscription household was estimated at \$12 per month. eMarketer forecasts that the demand for PVR functionality combined with the roll out of services such as video-on-demand and gaming services will be the primary driver for more iTV households subscribing to interactive services on the TV. In 2005, eMarketer predicts that 48% of iTV households (27.9 million) will spend \$15 per month on interactive subscription services, over and above what they pay for in terms of digital TV.

US iTV Subscription Revenue, 2001-2005

	2001	2002	2003	2004	2005
iTV Households (in millions)	12.7	22.1	33.4	45.7	58.2
% of iTV households subscribing to additional iTV services such as PVR, VOD, games, internet, messaging, etc.	20%	25%	31%	39%	48%
Subscription households (in millions)	2.5	5.5	10.4	17.8	27.9
Subscription revenue per household per month	\$12	\$13	\$14	\$15	\$15
Subscription revenue per household per year	\$144	\$156	\$168	\$180	\$180
Total subscription revenue (in millions)	\$360	\$858	\$1,747	\$3,204	\$5,022

Source: eMarketer, 2002

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eMarketer's forecast is similar to that of ABN AMRO's. The fact that Myers does predict significant growth in this sector in the short term is an encouraging sign, considering their less than optimistic forecast for iTV advertising and t-commerce.

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Comparative Estimates: US iTV Subscription Revenue, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Myers Mediaenomics, May 2001	\$340	\$530	\$950	\$2,150	\$4,000
eMarketer, 2002	\$360	\$858	\$1,747	\$3,204	\$5,022
ABN-AMRO, 2001	\$210	\$640	\$1,704	\$3,215	\$5,557

Source: eMarketer, 2002; various, as noted, 2001

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Video-on-Demand (VOD)

Video-on-demand is often talked about as the Holy Grail of interactive TV services. Watching any movie or TV show, at any time of the day or night, with full VCR functionality, is undoubtedly an attractive proposition for most, but VOD is by no means a fait accompli. Video-on-demand has serious competition, first and foremost from the existing home video market, which is not going away in a hurry, as 94% of TV households have a VCR; second, from the growing DVD market, which the Consumer Electronics Association reported was the fastest growing consumer electronics product sold in 2001; and third, from PVRs, which are allowing TV viewers to better utilize the 4 hours a day they spend in front of the box.

“Unless video-on-demand can provide a service less expensively than home video, it will have difficulty gaining traction.” – PricewaterhouseCoopers, May 2001

Digital Video Disc (DVD) players are in an increasing number of American homes. The Consumer Electronics Association estimate 12.5 million players were sold in 2001 and, if this growth is maintained, by 2002 nearly 25% of households will have a DVD player.

US DVD* Player Sales, 1998-2001 (in millions)



Note: *stand alone and portable DVDs; **projected
Source: CEA Market Research, January 2001

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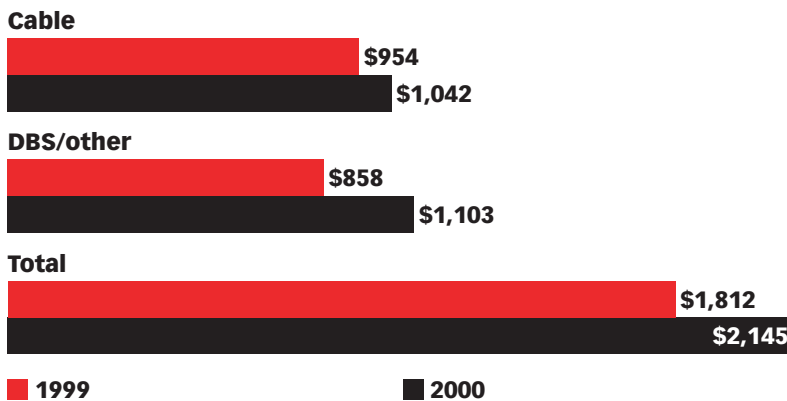
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One of the main reasons why analysts view VOD as a 'sure thing' is the fact that there is already a healthy pay-per-view (PPV) market in the US. Pay-per-view differs from VOD in that pay per view movies and events are on at scheduled times, usually at staggered intervals on multiple channels. Users, however, are unable to watch the movie more than once, nor are they able to pause or rewind the movie, as is possible with VOD. It is likely that the PPV market will be the first to embrace video on demand.

Data from Paul Kagan Associates and Showtime Event Television, indicates that the PPV market was worth \$1.8 billion in 1999 and rose to \$2.1 billion in 2000. Satellite TV providers actually made more money from PPV than cable companies, despite the fact that there are vastly greater numbers of cable subscribers in the US. The main reason is that satellite TV (DBS) is digital, and this has allowed these operators to include many more pay-per-view channels within their subscription packages, giving users a near video-on-demand experience.

Pay-Per-View Spending in the US, by Cable and Direct Broadcast Satellite (DBS), 1999 & 2000 (in millions)



Source: Paul Kagan Associates, Showtime Event Television, PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

Movies, including adult content, are the most popular category of content for PPV, but sporting and other events are also significant revenue earners. Boxing, particularly, is an important component of PPV and the fact that only a few heavyweight bouts have been on the calendar over the last couple of years has directly affected the event component of PPV revenues.

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Pay-Per-View Spending in the US, by Cable, DBS and Content Category, 1999 & 2000 (in millions)

	1999			2000		
	Movies	Events	Total	Movies	Events	Total
Cable	\$605	\$349	\$954	\$760	\$267	\$1,042
DBS/other	\$721	\$137	\$854	\$990	\$128	\$1,103
Total	\$1,326	\$486	\$1,812	\$1,750	\$395	\$2,145

Source: Paul Kagan Associates, Showtime Event Television, PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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“Convenience has always been considered an advantage for pay-per-view and video-on-demand. We believe that the opposite is true and that convenience has actually hampered the pay-per-view market because it placed it in a more competitive environment.” – PricewaterhouseCoopers, *Global Media & Entertainment Outlook, 2001-2005, May, 2001*

It is clear that finding the right price-points to make video-on-demand attractive to both consumers and profitable to cable companies will be the challenge ahead for those providing the service. The key question for VOD providers is: at what price are users prepared to pay for the convenience of not going to the video store, and not having to rewind the tape or pay for late return fees? Survey data from Accenture (mentioned in the *Consumer Survey* section) indicates that there is definitely a percentage of the population that is willing to pay a \$1.50 - \$3.00 premium over video store rentals for the convenience of video-on-demand.

Apart from paying for video-on-demand on an individual movie basis, it is likely that subscription services will also be available (so-called SVOD). This might take the form of users being offered a flat fee so they can watch a set number of movies in a month, or even an ‘all you can eat’ package for a higher monthly fee. Apart from movies, other content will be available on-demand, including niche programming, content related to hobbies, children’s shows, ‘how-to’ videos, non-fiction titles and documentaries, as well as episodes from favorite TV shows such as Friends and The Sopranos.

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Kagan World Media has looked at a number of scenarios which take into account costs and potential revenues of VOD. Their analysis indicates that video-on-demand could be profitable for cable companies in as short a time as 19 months or as long a time as 6 years, depending on consumer demand.

Video-on-Demand (VOD) Payback Analysis in the US, 2001

	Downside		Upside	
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
VOD revenue per VOD household/month	\$10	\$15	\$10	\$15
VOD users % basic subscribers	15%	15%	25%	25%
Revenue per basic subscriber	\$1.50	\$2.25	\$2.50	\$3.75
VOD cash flow margin	45%	45%	45%	45%
VOD cash flow per basic subscriber/month	\$0.68	\$1.01	\$1.13	\$1.69
Server cost per stream	\$300	\$300	\$250	\$250
Network & infrastructure cost per stream	\$200	\$200	\$150	\$150
Total cost per stream	\$500	\$500	\$400	\$400
Maximum concurrent usage per node	10%	10%	8%	8%
Cost per basic home	\$50	\$50	\$32	\$32
Months to pay back	74	49	28	19

Note: includes Subscription Video-on-Demand (SVOD), as well as pay-per-view
 Source: Kagan World Media, 2001

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Cahners In-Stat estimates there were 1.3 million global VOD households in 2001 and this will rise to 33 million by 2005.

Number of Television Households Using On-Demand Services Worldwide, 2001 & 2005 (in millions)

2001	1.3
2005	33.0

Source: Cahners In-Stat Group, 2001; as cited in CyberAtlas, January 2002

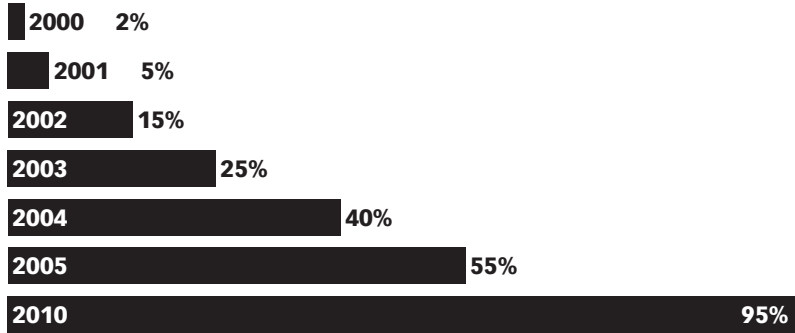
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Investment firm ABN AMRO, as well as Kagan World Media, estimates that 2% of US digital cable households had video-on-demand available to them at the end of 2000. Kagan expects this to rise to 15% by 2002 and 55% by 2005. In 2010, 95% of digital cable subscribers will be able to access VOD.

Video-on-Demand (VOD) Penetration of Digital Subscribers in the US, 2000-2005 & 2010



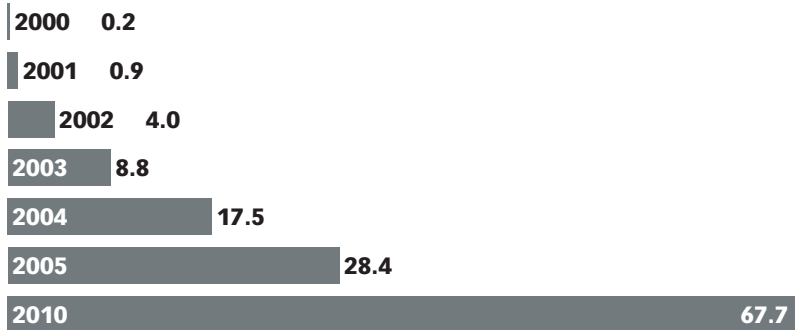
Source: Kagan World Media, 2001

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This equates to 200,000 households in 2000, rising to 28.4 million households in 2005 and 67.7 million households in 2010 according to Kagan’s estimates.

Video-on-Demand (VOD) Households in the US, 2000-2005 & 2010 (in millions)



Source: Kagan World Media, 2001

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Trial results of VOD indicate that revenue per VOD household could average \$10 - \$15 per home, per month. Kagan’s model is slightly more conservative, acknowledging the fact that whenever a new service moves out to mass deployment, the per home revenue tends to drop. Kagan’s forecasts assume per household, per month revenue of \$11.40 initially in 2000, which will fall to \$8.82 in 2005 and \$6.80 in 2010. As the novelty factor of VOD wears off, price will need to move down accordingly.

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Average Movie and Subscription Video-on-Demand (VOD) Revenue per VOD Household per Month in the US, 2000-2005 & 2010



Source: Kagan World Media, 2001

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Estimates for future VOD revenues vary greatly. In 2005, Jupiter estimates that video-on-demand will only generate \$278 million dollars. Kagan, on the other hand, estimates VOD revenues will exceed \$3 billion. The Yankee Group and Cahners both estimate about \$2 billion in revenues will be generated by 2005.

Comparative Estimates: Video On Demand (VOD) Revenues in the US, 2001-2005 (in millions)

	2001	2002	2003	2004	2005
Kagan World Media, 2001	\$120	\$490	\$1,040	\$1,950	\$3,010
Yankee Group, June 2001	\$70	\$420	\$970	\$1,430	\$1,980
Cahners In-Stat*, 2001	\$86	-	-	-	\$1,750
Jupiter Media Metrix, December 2001	\$16	\$34	\$61	\$113	\$278

Note: *North America; **movies only

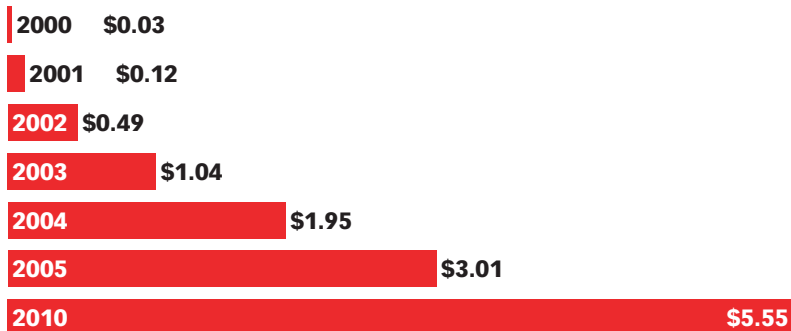
Source: eMarketer, 2002; various, as noted, 2001

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By 2010, Kagan expects VOD revenues to exceed \$5.5 billion.

Video-on-Demand (VOD) & Subscription VOD Revenues in the US, 2000-2005 & 2010 (in billions)



Source: Kagan World Media, 2001

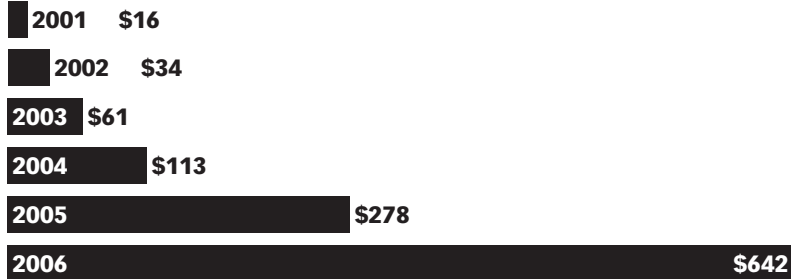
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Jupiter expects only \$642 million in movie VOD revenues by 2006.

US First-Run Movie On-Demand Revenues, 2001-2006 (in millions)



Source: Jupiter Research, December 2001; iTV Marketer, December 2001

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PricewaterhouseCoopers estimates the combined pay-per-view and VOD sectors to be worth \$3.9 billion in 2005, from \$2.2 billion in 2001

Pay-Per-View and Video-On-Demand Spending in the US, by Cable and DBS, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Analog	\$373	\$360	\$325	\$260	\$220	\$175
Digital cable	\$387	\$615	\$990	\$1,465	\$1,690	\$1,935
Total cable	\$760	\$975	\$1,315	\$1,725	\$1,910	\$2,110
DBS/other	\$995	\$1,260	\$1,465	\$1,590	\$1,715	\$1,820
Total pay-per-view movies	\$1,755	\$2,235	\$2,780	\$3,315	\$3,625	\$3,930

Source: PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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A number of cable companies have launched VOD across the country. VOD vendors Diva and Concurrent are two of a handful of vendors looking for dominance in the lucrative global VOD market.

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Video-on-Demand in the US, July 2001

Multiple Service Operator	Market	VOD vendor
AT&T broadband	Atlanta	Diva
	Los Angeles	Diva
Charter *	Fort Worth	Diva
	Gwinett Co., GA	Diva
	Los Angeles	Diva
Cox	St. Louis	Diva
	Hampton Roads, VA	Concurrent
	Phoenix	Concurrent
	San Diego	Concurrent
Insight	Columbus, OH	Diva
	Evansville, IN	Diva
	Rockville, IL	Diva
Time Warner**	Austin, TX	Diva
	Honolulu	Concurrent
	Tampa Bay	Concurrent

Note: *launching VOD in additional markets in 2001; **testing SVOD in 2 markets in 2001

Source: Kagan World Media, 2001

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Personal Video Record (PVR)

Personal video recorders, also called digital video recorders, have the full functionality of a VCR with additional storage and functionality allowing users to automatically record programs by time, genre, actor and other criteria without the ads, as well as allowing users to pause and skip-ahead live TV. The latest models of PVRs even allow users to transfer movies from one PVR to another over a broadband connection. Consumer survey data indicates that PVRs and video-on-demand are the two interactive TV features of most interest to consumers. The feature of skipping ads is one function that the vast majority of consumers are interested in, but it is certainly not something advertisers would want to encourage.

“[We’re] laying down the foundation to destroy advertising models, and thus, TV as we know it today.” – CEO of SonicBlue, Ken Potashner

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This is a bold statement from one of the leading providers of PVR technology in the US. But will PVRs really destroy advertising models and TV as we know it? What is certain is that broadcasters and major content providers are worried enough that they have taken SonicBlue to court over its device, which they allege allows people to infringe copyright. The argument that lawyers for the content providers will present to the court will be similar to that presented years ago, when they took VCR manufacturers to court – and ultimately failed.

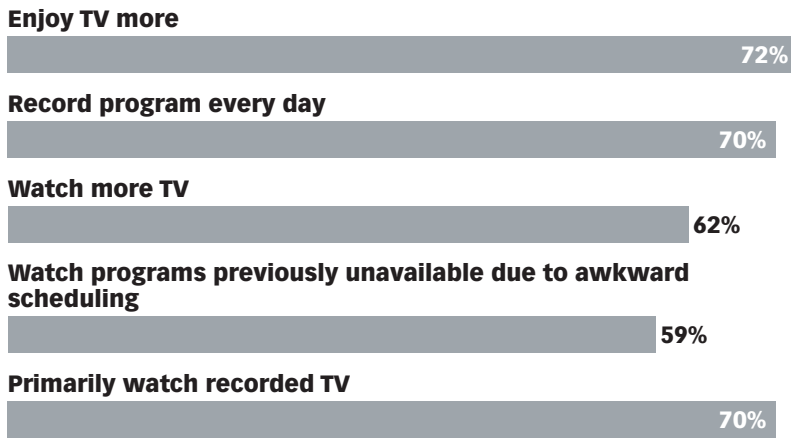
“Advertisers have long since dropped their concerns over commercial skipping even though there are VCRs in nearly every household. We expect advertisers will be equally unconcerned with commercial skipping on digital recording devices once it is shown that incidence of playback remains low.” – PricewaterhouseCoopers

This statement from PricewaterhouseCoopers is based on the assumption that currently only about 4% of television programs are watched in playback mode, not because people have difficulty programming their VCR, but because they have little interest in taping shows, they suggest. The impediment to playback of TV shows is that it competes with the programs currently shown and therefore is not something TV viewers regularly engage in.

Recent data suggests, however, that PVR users are a different breed. They are watching more TV, and are watching a great deal of recorded TV without the ads. A study conducted by the BBC, TiVo and Magid Associates shows that 70% of PVR users record shows every day and 70% primarily watch recorded TV. While this is only one small study, the results fly in the face of the contention that people are not interested in watching TV in ‘playback’ mode.

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Usage Patterns of Current Personal Video Recorder (PVR) Owners in the US, 2000 (as a % of respondents)



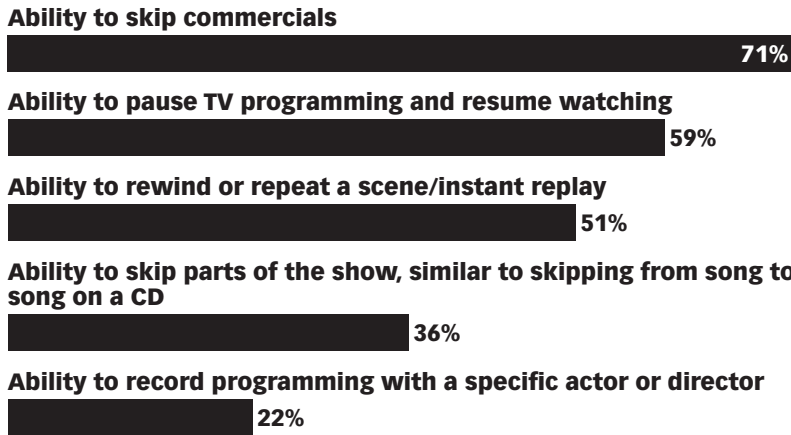
Source: BBC/TiVo and Magid Associates, 2001; iTV Marketer, December 2001

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The ability to skip commercials is something that 71% of respondents to a CEA survey were interested in. The ability to pause and the ability to rewind or have instant replays was also of interest to the majority.

US Consumer Interest in Personal Video Recorder (PVR) Features, 2000 (as a % of respondents)



Source: CEA Market Research, 2000

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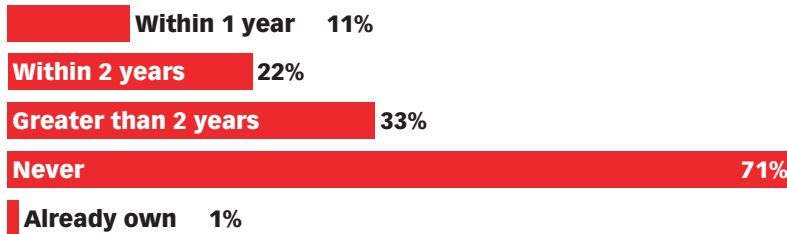
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In 2000, KPMG conducted a survey at the National Association of Broadcasters' convention. In a key finding, 35 percent of those surveyed said they expected PVR usage to have up to a 5 percent negative impact on advertising revenue over the next five years, while 22 percent said the impact could be between 5 and 10 percent.

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Despite the considerable hype over personal video recorders, advertisers need not panic just yet. There were only about 1 million PVRs in homes worldwide at the end of 2001, with 90% being in North America. A Consumer Electronics Association survey indicates that, despite PVR functionality being something that is of interest to many, only 11% will be looking to purchase a PVR in the next year, and only 22% within the next two years. This would indicate that the stand-alone PVR device may not be as popular as PVR functionality installed on a set-top, which is a service paid with a monthly subscription.

US Consumer Interest in Purchasing a Personal Video Recorder (PVR), 2000 (as a % of respondents)



Source: CEA Market Research, 2000

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By 2005, however, Informa Media Group predicts 54 million PVRs worldwide and almost 500 million in 2010. By that date, they predict 109 million households will have PVRs in North America, which equates to nearly 90% of all households! Maybe that is the time when advertisers need to start worrying.

Worldwide Personal Video Recorder (PVR) Households, by Region, 2001, 2005 & 2010 (in millions)

	2001	2005	2010
Asia-Pacific	–	19.7	208.6
Europe	0.05	15.2	134.3
Latin America	–	3.4	38.5
Middle East	–	0.7	8.6
North America	0.9	15.2	108.7
Total	1.0	54.2	498.6

Source: Informa Media Group, June 2001

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While originally PVRs developed as a stand-alone product, the technology is being installed now on cable and satellite TV set-top boxes. Informa Media Group estimates there will be 30.7 million PVR-enabled digital cable homes in 2005 and over 300 million by 2010 making it by far the most dominant digital TV platform for PVRs.

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Personal Video Recorder (PVR) Households Worldwide, by Delivery Platform, 2001, 2005 & 2010 (in millions)

	2001	2005	2010
Digital Cable	0.7	30.7	309.9
DSL	0	1.7	35.8
Satellite	0.3	14.3	64.4
Digital Terrestrial TV	0	7.6	88.6
Total	1.0	54.2	498.7

Source: Informa Media Group, 2001

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Cahner's In-Stat completely disagrees with Informa's assessment of the market, suggesting that satellite TV (DBS) set-tops with PVR functions will far outnumber cable or stand-alone products. They predict 19.9 million shipments of DBS/PVR set-tops in 2004, while only 5.9 million cable/PRV set-tops in the same year. Only 3.6 million stand-alone boxes will be shipped in 2004.

Worldwide Personal Video Recorder (PVRs) Unit Shipment Forecast, 1999-2004 (in thousands)

	1999	2000	2001	2002	2003	2004
Direct broadcast satellite set-top boxes	110	461	2,108	5,517	11,187	19,891
Stand-alone PVRs	15	240	672	1,466	2,505	3,633
Cable set-top boxes	–	–	130	844	3,140	5,915
Other	–	–	–	15	130	275

Source: Cahners In-Stat Group, 2000

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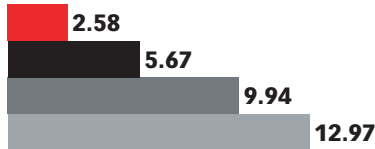
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Comparative estimates for the US PVR market differ widely. Estimates for 2001 range from a low of 655,000 to a high of 7.3 million. In 2005, the range is between 13 million and over 30 million. eMarketer estimates there were approximately 900,000 PVR households in the US at the end of 2001. In mid-2002, it will be possible to get a more accurate gauge of where the market is heading, and whether some of these estimates are low or high.

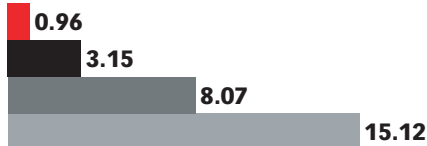
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Comparative Estimates: US Personal Video Recorder Market, 2001-2004 (in millions of subscribers)

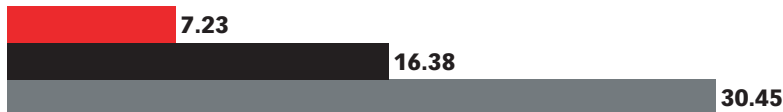
International Data Corporation (IDC)



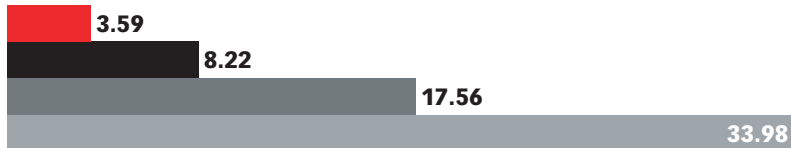
Cahners In-Stat



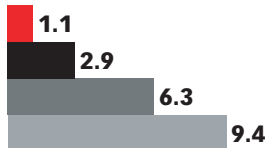
TechTrends



Forrester Research



Adams Media Research



■ 2001 ■ 2002 ■ 2003 ■ 2004

Source: TiVO, 2001

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Putting Adams Media Research estimates side by side with Forrester Research shows the extent of the divergence between the two firms. Adams, for example, does not see stand-alone PVRs numbering more than 300,000 in 2004 and beyond. Forrester, in contrast, estimates 9.3 million stand-alone boxes in 2005, with a steady growth to that point.

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Comparative Estimates: US Personal Video Recorder (PVR) Subscribers, by Type of Delivery Platform, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
PVRs deployed by cable						
Adams Media Research, June 2001	0.0	0.4	1.2	2.9	4.4	7.1
Forrester Research, 2001	0.0	0.1	0.9	2.7	7.0	13.7
PVRs deployed by satellite						
Adams Media Research, June 2001	0.2	0.6	1.6	3.1	4.7	6.6
Forrester Research, 2001	0.1	0.3	0.8	2.1	5.3	7.7
Stand-alone PVRs						
Adams Media Research, June 2001	0.1	0.1	0.2	0.3	0.3	0.3
Forrester Research, 2001	0.1	0.5	1.8	4.2	7.1	9.3
All types of PVRs						
Adams Media Research, June 2001	0.3	1.1	2.9	6.3	9.4	14.0
Forrester Research, 2001	0.3	0.8	3.5	9.0	19.4	30.7
Yankee Group, 2001	-	0.9	2.4	5.6	11.5	-

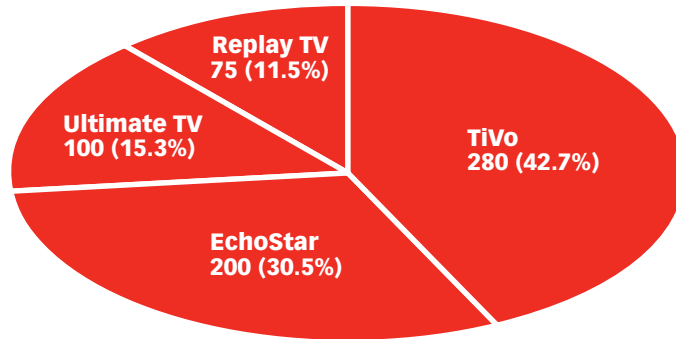
Source: eMarketer, 2002; various, as noted, 2001

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Currently, TiVo is the leading US PVR service provider with approximately 43% of the market according to iTVMarketer. Satellite TV company EchoStar has 30% of the market, followed by Microsoft-owned UltimateTV and SonicBlue's Replay TV.

US Personal Video Recorder (PVR) Market, December 2001 (in thousands and market share)



Source: iTV Marketer, 2001

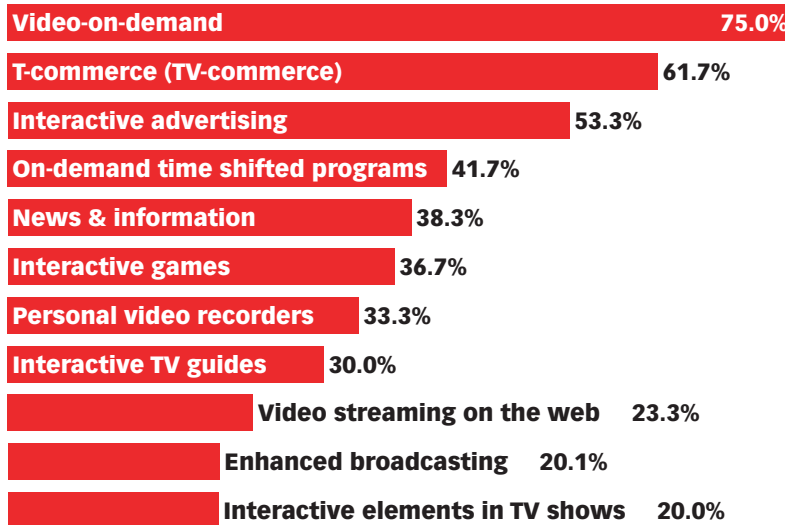
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PVR functionality is proving popular among interactive TV users, but it is not regarded by those in the industry as having the greatest revenue potential among iTV services. According to a Myers Group survey, video on demand (VOD), e-commerce through the TV (t-commerce) and interactive advertising have the greatest revenue potential in the suite of iTV services. PVRs rank 7th on their list, yet it is always in the top two iTV services consumers are interested in.

Revenue Potential for iTV Services in the US, 2000 (as a % of respondents)



Source: Myers Group, 2000

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One worrying sign, perhaps, for iTV operators is that PVRs may actually cannibalize those services with the greatest revenue potential – pay-per-view and video-on-demand services. In a survey of its subscribers, satellite TV operator EchoStar found that subscribers with embedded PVR units significantly reduced their pay-per-view expenditures. Users, it seemed, were getting more out of their existing subscription and finding less need to pay extra for additional programming. If this trend continues when VOD becomes more widely available, then the revenue potential for video-on-demand may not be as significant as iTV providers hope. If TV viewers of the future have hundreds of national and international channels to choose from, and they can find, sort, record and watch the programs they want to watch through a device like a PVR, then the video on demand proposition becomes less attractive, particularly if it is more expensive than a home videotape.

Adams Media Research is one of the more conservative forecasters for PVR growth in the US (forecasting 14 million PVRs in 2005), and their data indicates that revenues in the sector will grow from \$6 million in 2000 to \$170 million in 2005.

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US Personal Video Recorder (PVR) Service Revenues, by Type of TV Household, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Digital Cable TV home with PVR	\$0.03	\$1.40	\$6.00	\$19.40	\$37.40	\$76.70
Satellite TV homes with PVR	\$0.30	\$1.80	\$6.40	\$17.10	\$35.90	\$66.10
Stand-alone PVRs	\$5.70	\$10.30	\$13.80	\$19.70	\$25.80	\$27.90
All types of PVRs	\$6.00	\$13.60	\$26.20	\$56.10	\$99.10	\$170.70

Source: Adams Media Research, June 2001

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Game Consoles

Game consoles are not often included in the suite of iTV platforms and services but, as has been mentioned earlier, the new game consoles closely resemble set-top boxes and have an internet capability enabling users to download game software and link-up with other gamers over a broadband connection. While eMarketer does not foresee the game console transforming into a device that will replace an existing iTV set-top box, the processing power and multi-function capability of the new game consoles makes them more than just games devices.

Gaming across both consoles and iTV platforms has the potential to be a very lucrative subscription service.

Gartner Dataquest recently indicated there were 29 million video game console shipments worldwide in 2001. They predict this to rise to 49 million in 2002.

Worldwide Video Game Console Shipments, 2001 & 2002 (in millions)



Source: Gartner Dataquest, November, 2001

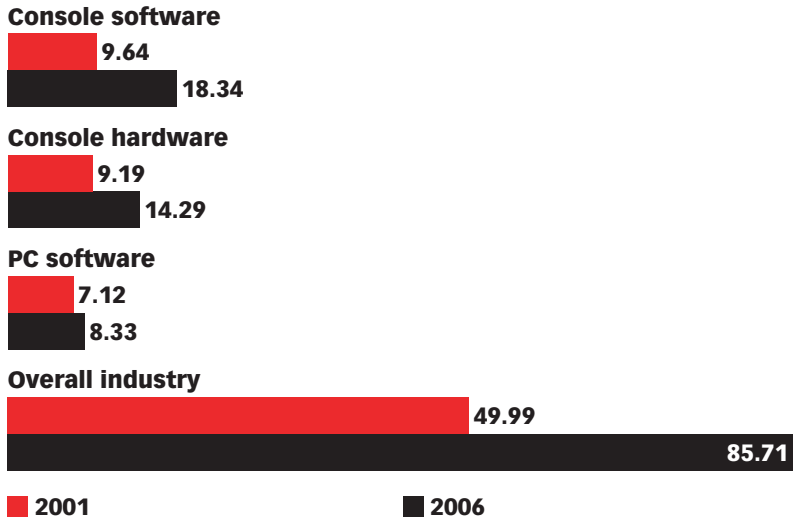
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The global video gaming market is massive. Informa Media Group estimate the market was worth \$50 billion in 2001 and will rise to over \$85 billion in 2006.

Global Video Game Revenue, 2001 & 2006 (in billions)



Source: Informa Media Group, 2001

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The US currently has an installed base of nearly 50 million game consoles. This will rise to nearly 100 million by 2004 according to the International Development Group. Those consoles which allow users to connect to the internet (currently X-Box and PS2, but Ninetendo GameCube is developing a broadband capability) are forecast to grow from 8 million in 2001 to over 65 million in 2004. This equates to nearly two thirds of all US households.

Installed Base of Major Gaming Consoles in US Homes, 1998-2004 (in millions)

	1998	1999	2000	2001	2002	2003	2004
Nintendo 64	9.8	13.2	15.7	17.0	17.8	-	-
Nintendo GameCube	-	-	-	1.1	5.6	10.8	16.6
Sony Playstation	16.0	21.9	25.0	27.4	28.8	29.4	29.9
Sony Playstation 2	-	-	1.0	6.2	13.8	21.9	30.3
Microsoft Xbox	-	-	-	1.1	6.0	11.8	18.8

Source: International Development Group, September 2001

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According to the Digital Gaming in America Survey by Ziff Davis, while 80% of gamers already have internet access and 63% play online games for an average of 4.4 hours a week, 48% of respondents to the survey said they would pay for internet access strictly through their consoles. Gartner predicts that 13.1% of all US households (14.5 million) will have a game console online by 2005.

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Online Gaming Households in the US, 2001-2005 (as a % of households)

	2001	2002	2003	2004	2005
Households with a game console	32%	35.1%	37.3%	38.9%	40%
Households with an internet-enabled game console	1.1%	4.8%	11.8%	16.7%	18.7%
Households online via console	0%	1.4%	5.6%	10.3%	13.1%

Source: GartnerG2, November 2001

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Gartner’s recent report “Let the Online Games Begin: Xbox and GameCube Hit the Market” classified console gamers into four categories depending on their willingness to subscribe to an online console gaming services. The categories are:

- **Sampler tier:** Includes some free games and some episodic gaming for sampling; cost is \$5 per month for a trial subscription; has the highest churn rate.
- **Casual gamer tier:** Includes select older sports genre, family games, older shooter games, older racing games, and some free games; cost is \$10 per month and churn rate is high. Largest number of subscribers of all tiers.
- **Serious gamer tier:** Includes most sports and role-playing games, all racing, all family games, some free games; cost is \$15 per month; churn rate is moderate.
- **Hard-core gamer tier:** Includes all role-playing and sports games, etc.; cost is \$20 per month; churn rate is the lowest and smallest number of subscribers by tier in outer years.

Online Gaming Market in the US, by Tiered Service Level, 2001-2005 (as a % of total revenues)

	2001	2002	2003	2004	2005
Sampler	0%	0%	7.1%	14.4%	15.9%
Casual	0%	39.2%	27.7%	25.8%	26.6%
Serious	0%	29.4%	39.1%	41.4%	39.8%
Hardcore	0%	31.4%	26.1%	18.4%	17.7%

Source: GartnerG2, November 2001

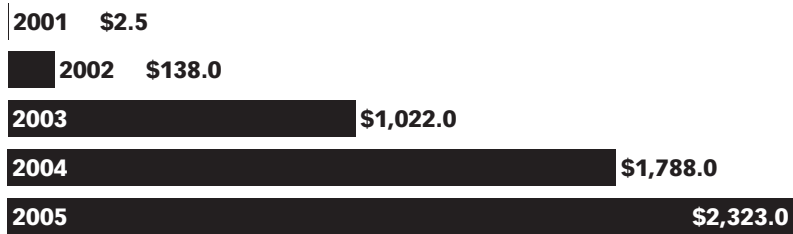
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Gartner suggests that online console gaming revenues will reach \$2.3 billion by 2005 from only \$2.5 million in 2001. Datamonitor reports that the market for online games and iTV gaming in Europe and the US will hit \$5.6 billion by 2005 – up from \$174 million in 2001. Datamonitor predicts that there are currently 13 million gamers in the two regions, and that the total number will jump to 111 million in 2005. The company believes that, in the next four years, 90% of online gaming revenue will come from subscriptions and pay-per-play. As for iTV gaming, by 2006 the market will generate \$1.2 billion in US alone, they indicate.

US Online Console Gaming Revenue, 2001-2005 (in millions)



Source: GartnerG2, November 2001

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A. TV Households

There were 237 million TV households in Europe in the year 2000, according to Kagan World Media. The household penetration rate in that year was 97% in Western Europe and 98% among the Eastern European countries of Russia, Czech Republic, Poland and Russia, according to PricewaterhouseCoopers.

Interestingly, the countries with the highest annual advertising per TV household rate are Portugal, Greece and Norway, all at over \$300 per household, per year. The two largest TV markets in Europe - Germany and the UK - have an annual advertising per TV household rate of \$153 and \$226, respectively, reflecting the greater regulation on advertising in those countries. In comparison, the US has an advertising per TV household rate of over \$500 per year.

TV Households in Europe, 2000 (in millions, TV penetration and advertising per TV household)

Western Europe	TV households (millions)	TV household penetration	Annual advertising per TV household
Austria	3.0	95%	\$175
Belgium	4.5	95%	\$197
Denmark	2.2	97%	\$131
Finland	2.1	95%	\$111
France	22.4	94%	\$147
Germany	33.4	98%	\$153
Greece	2.2	96%	\$360
Ireland	1.2	98%	\$189
Italy	20.8	98%	\$231
Netherlands	6.6	98%	\$107
Norway	1.8	98%	\$315
Portugal	3.0	99%	\$360
Spain	12.1	98%	\$222
Sweden	4.0	98%	\$120
Switzerland	2.9	91%	\$143
UK	24.2	97%	\$226
Total Western Europe	146.6	97%	\$188
Eastern Europe			
Czech Republic	4.2	99%	\$98
Hungary	3.7	95%	\$158
Poland	12.7	98%	\$91
Russia	51.4	99%	\$17
Total Eastern Europe	72.0	98%	\$42

Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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There is a reasonably high penetration of multi-channel TV in Europe. The term multi-channel is not completely interchangeable with the term Pay-TV, because in some markets, such as Germany and Japan, multi-channel TV is available for free. However, in most markets around the world, multi-channel TV usually means that a household has to pay for additional TV channels such as CNN and movie channels, which are not freely available. Western Europe has a multi-channel TV penetration of 52%, while Eastern Europe has half that at approximately 25%, which is due to the different economic circumstances of those regions.

Multichannel TV Households in Europe, 2000-2005 (in millions)

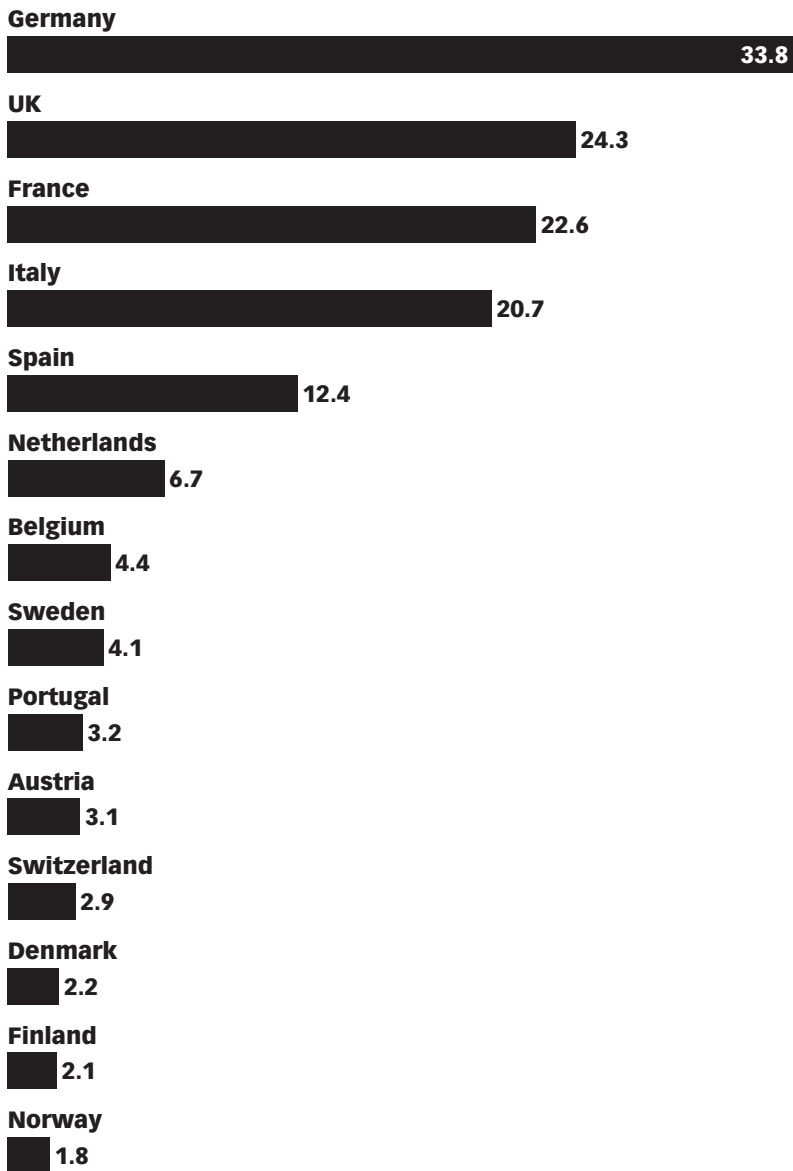
Western Europe	2000	2001	2002	2003	2004	2005
Austria	2.5	2.7	2.7	2.8	2.9	2.9
Belgium	4.4	4.4	4.5	4.5	4.6	4.7
Denmark	1.9	2.0	2.0	2.1	2.1	2.1
Finland	1.2	1.2	1.2	1.3	1.3	1.4
France	6.5	7.0	7.6	8.3	9.0	9.7
Germany	34.0	35.5	36.7	37.9	39.0	40.0
Greece	0.3	0.3	0.4	0.4	0.5	0.5
Ireland	0.7	0.8	0.8	0.9	0.9	0.9
Italy	1.5	2.0	2.8	3.6	4.5	5.3
Netherlands	6.5	6.6	6.7	6.8	6.9	6.9
Norway	1.2	1.3	1.4	1.4	1.5	1.6
Portugal	1.0	1.0	1.2	1.4	1.6	1.7
Spain	1.8	2.2	2.6	3.1	3.4	3.7
Sweden	3.0	3.2	3.3	3.3	3.4	3.5
Switzerland	2.6	2.7	2.7	2.8	2.9	2.9
UK	7.6	8.2	8.9	9.6	10.1	10.6
Total Western Europe	76.8	81.0	85.4	90.1	94.4	98.4
Eastern Europe						
Czech Republic	1.5	1.6	1.8	1.9	2.0	2.1
Hungary	2.8	2.8	2.9	3.0	3.1	4.0
Poland	6.0	6.4	6.7	7.0	7.3	7.6
Russia	8.4	9.3	10.2	11.1	12.0	12.9
Total Eastern Europe	18.7	20.1	21.5	22.9	24.3	26.6

Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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Germany is the largest TV market in Western Europe, with nearly 34 million TV households, followed by the UK, France and Italy each with over 20 million TV households.

European TV Homes, 2000 (in millions)



Source: *Media's Marketing Europe, 2000*

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Cable penetration varies significantly among Western European countries. Two of the largest TV markets, for example – Germany and the UK - have a relatively low cable penetration rate; other countries, such as The Netherlands and Belgium, have a very higher penetration rate. Direct-to-home (DTH) satellite TV also called digital broadcast satellite (DBS) in the US, is also not widely adopted in Western Europe. According to Zenith media, Austria is the Western European country with the highest penetration of DTH at approximately 40% of households and Germany also has a similar penetration. While many European households have embraced digital TV, it is likely that digital terrestrial will eventually be the dominant digital platform in Europe.

European Cable and Satellite (DTH) TV Household Penetration, 2000-2005

	2000	2001	2002	2003	2004	2005
Germany						
DTH	36.0%	37.0%	37.0%	38.0%	38.0%	39.0%
Cable	56.0%	56.0%	56.0%	57.0%	57.0%	57.0%
UK						
DTH	20.8%	23.9%	25.9%	26.9%	27.3%	27.7%
Cable	14.6%	15.9%	17.0%	18.1%	19.2%	20.2%
France						
DTH	11.8%	14.1%	16.5%	18.9%	21.0%	22.6%
Cable	13.4%	14.3%	15.0%	15.7%	16.4%	16.9%
Italy						
DTH	9.5%	10.9%	12.9%	14.5%	16.0%	17.2%
Cable	0.4%	0.5%	0.6%	0.8%	0.9%	1.0%
Spain						
DTH	13.4%	17.3%	18.8%	19.5%	20.1%	20.2%
Cable	3.2%	6.3%	10.5%	13.9%	17.6%	20.6%
Netherlands						
DTH	4.5%	4.4%	4.5%	4.5%	4.5%	4.5%
Cable	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%

Source: Zenith Media, 2000

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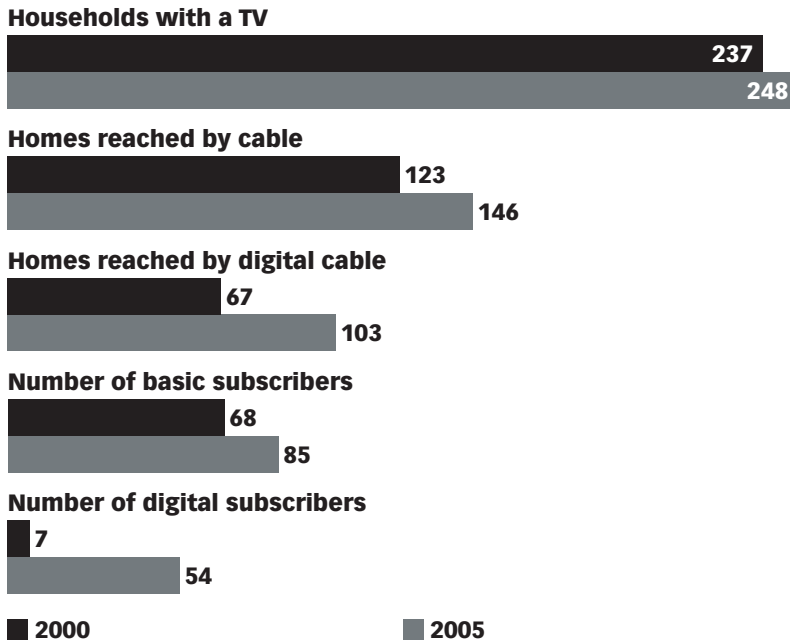
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B. Digital TV

Kagan World Media estimates that 123 million of the total 237 million TV households in Europe were reached by cable. Of those, 68 million were basic cable TV subscribers and only 7 million subscribed to digital cable. Digital cable subscribers are expected to grow to 54 million by 2005.

Cable Households in Europe, 2000 & 2005 (in millions)



Source: Kagan World Media, April 2000

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Of those households in Europe capable of receiving cable TV, Kagan expects the penetration of digital cable to reach 37% by 2005, up from 6% in 2000.

Digital Cable Households in Europe, 2000-2005 (in millions and penetration)

	2000	2001	2002	2003	2004	2005
Cable homes passed	123	129	134	139	143	146
Digital cable subscribers	7	13	22	31	43	54
Penetration rate	6%	10%	16%	22%	30%	37%

Source: Kagan World Media, April 2000

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Durlacher, a British investment house, estimates digital TV penetration in Europe will rise from just under 12% in 2000 to 85% in 2010. Jupiter Research examined the five largest TV markets in Western Europe and identified the United Kingdom as the clear leader in Europe at the end of 2001, in both sheer numbers of digital TV households and penetration. Germany, and Sweden, however, are expected to surpass the UK in digital TV penetration in the years to come.

European Digital TV Installed Base, 2000-2005 (in millions)

Country	2000	2001	2002	2003	2004	2005
Germany	3.0	5.0	10.7	17.8	24.2	29.4
UK	5.5	7.8	9.4	11.4	13.5	15.5
Sweden	0.4	0.8	1.4	2.1	2.7	3.2
France	3.2	3.9	4.8	5.7	6.8	8.1
Italy	1.6	2.3	3.3	4.2	5.1	6.0
Spain	1.5	1.9	2.2	2.5	2.8	3.3
Others	2.4	3.9	6.2	9.7	13.8	17.6
Total	17.7	25.6	38.0	53.4	69.1	83.0

Penetration of DTV Service (Cable, Satellite, Terrestrial)

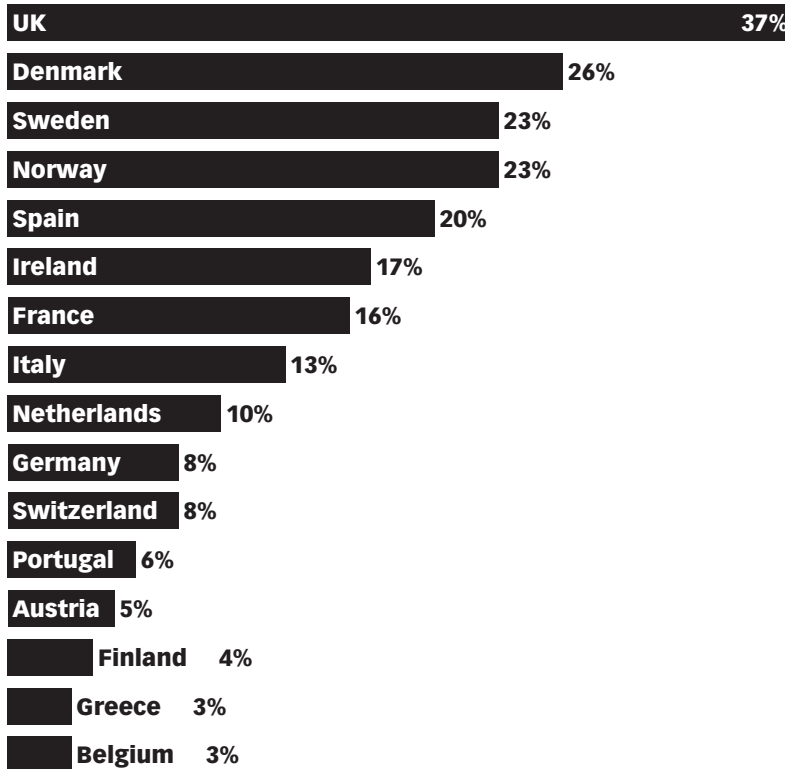
Germany	8%	13%	28%	45%	61%	74%
UK	23%	32%	39%	47%	55%	63%
Sweden	10%	20%	35%	51%	67%	78%
France	13%	16%	19%	23%	27%	31%
Italy	7%	11%	15%	19%	23%	26%
Spain	12%	15%	17%	19%	22%	25%
Others	7%	12%	19%	29%	40%	51%
Total	11%	16%	24%	33%	42%	50%

Source: Jupiter Research, 2001

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Strategy Analytics also recently reported that the UK was approaching 40% digital penetration of households, with Denmark the next nearest country at 26%.

Digital TV Ownership* for Selected Countries in Europe, 2001 (as a % of total households)



Note: *end of 2001 estimates; includes all platforms (satellite, cable, terrestrial and DSL)

Source: Strategy Analytics, January 2002

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Digital TV Revenues

Digital TV revenues in Western Europe will reach \$72 billion in 2006, rising from \$6 billion in 2000 according to The Arc Group. In comparison, The Arc Group estimates the North American market to reach \$60 billion in 2006, from \$5.7 billion in 2000.

Digital TV* Revenues in North America and Western Europe, 2000-2006 (in billions)

	2000	2001	2002	2003	2004	2005	2006
North America	\$5.76	\$9.61	\$14.31	\$21.19	\$28.96	\$41.91	\$60.76
Western Europe	\$6.15	\$10.69	\$17.68	\$27.42	\$39.53	\$54.60	\$72.22

Note: *Digital TV= homes with digital set-top box or integrated digital TV

Source: The ARC Group, 2001

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C. iTV Households

Interactive television is well advanced in Western Europe, with some analysts estimating it is 12 to 18 months ahead of the US. The comparative estimates indicate that there were between 20 million and 24 million iTV households in Europe in 2001. This is forecast to rise to between 70 and 80 million by 2005.

Comparative Estimates: European iTV Households, 1999, 2001, 2003 & 2005 (in millions)

	1999	2001	2003	2005
Jupiter Research	5.6	20.5	47.3	72.8
Yankee Group	–	24.5	–	81.2
International Data Corporation (IDC)	–	–	–	79.0*
Strategy Analytics	–	23.6	43.3	69.7

*Note: *iTV enabled households. IDC estimates 45% of W. European households will actually access iTV content in 2005 or 44.1 million households.*

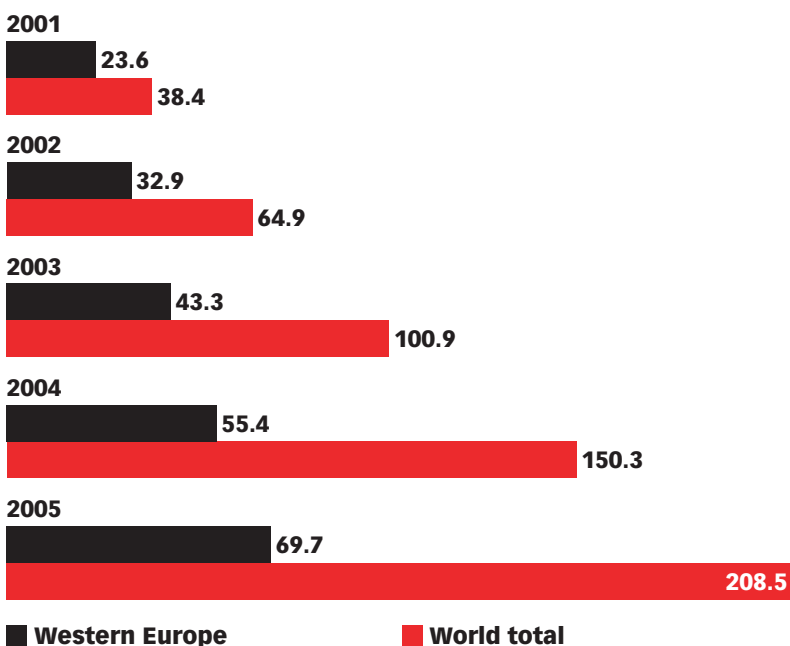
Source: eMarketer, 2002; various, as noted, 2001

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Strategy Analytics estimates that Western Europe accounted for over 61% of worldwide iTV households in 2001. By 2005, however, Western Europe's share of the world total will shrink to 33% as a result of the emerging iTV markets in North America and Asia-Pacific.

iTV Households in Western Europe, 2001-2005 (in millions)



Source: Strategy Analytics, 2001

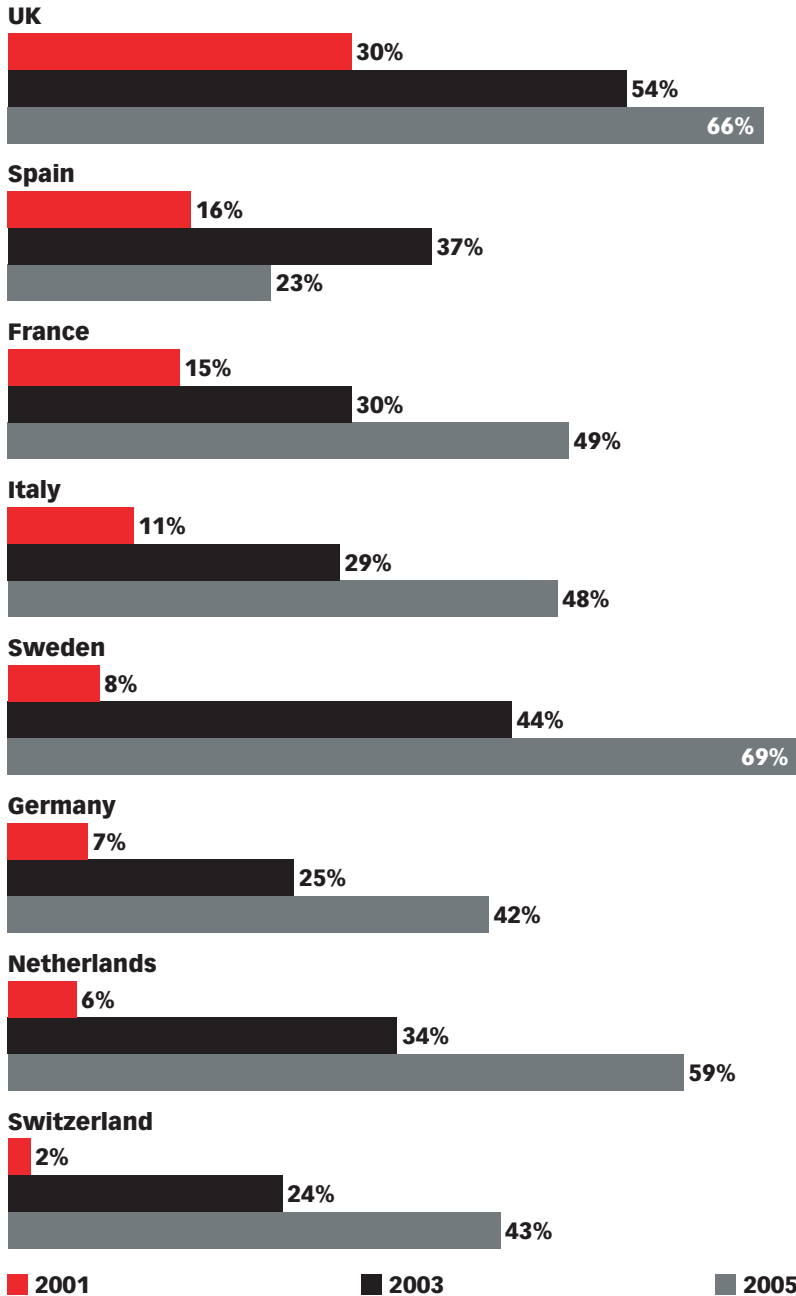
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Sweden will have the highest penetration of iTV households in Western Europe by 2005 according to Datamonitor, followed by the UK and The Netherlands.

iTV Penetration for Selected European Countries, 2001, 2003 & 2005 (as a % of households)



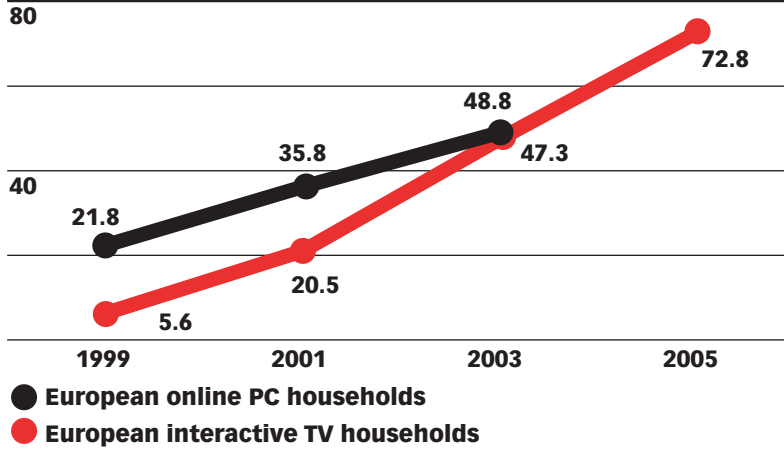
Source: Datamonitor, Jupiter Research, 2001

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D. PC vs TV

Both Jupiter Research and The Yankee Group are of the view that interactive TV households in Europe will surpass PC internet households within just three years.

Growth in European Online PC and Interactive TV Households, 1999, 2001, 2003 & 2005 (in millions)



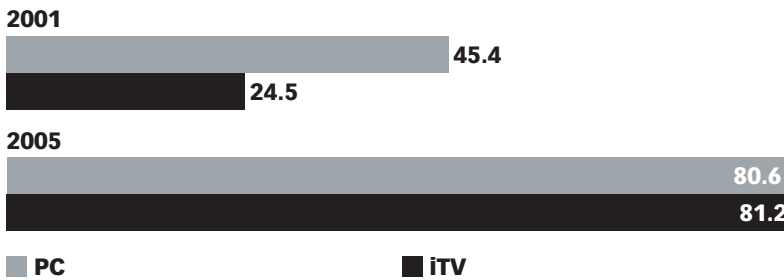
Source: Jupiter Research in Industry Standard, September 2000

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The Yankee Group estimates 45 million PC internet households in Western Europe in 2001, compared to 24 million iTV households. By 2005, however, iTV households will surpass PC-internet at 81 million versus 80 million, respectively.

Households in Western Europe Accessing the Internet by PC and iTV, 2001 & 2005 (in millions)



Source: Yankee Group, 2001

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E. T-Commerce in Europe

The Yankee Group predicts the rise of t-commerce revenues in Europe will be swift, from a forecasted \$267.5 million in 2001 across Europe, to just over \$17 billion by 2006.

Projected T-Commerce Revenues in Western Europe, 2001 & 2006 (in millions)

2001	\$267.5
2006	\$17,000.0

Source: Yankee Group, 2001

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iTV Gambling

One lucrative iTV revenue stream unavailable to US operators because it is currently outlawed is iTV gambling. Leading European iTV operator BSkyB, recently released its 2001 revenue statement which indicated that over half of all its interactive TV revenues came from betting. Datamonitor indicated in May 2001 that the UK will indeed lead Europe in revenues generated from iTV gambling reaching \$4 billion in 2006. The top six European TV markets are expected to generate over \$11 billion in iTV gambling revenues by 2006, from \$742 million in 2002.

iTV Gambling Revenues for Selected European Countries, 2002-2006 (in millions)

	2002	2003	2004	2005	2006
France	\$255.4	\$516.6	\$889.2	\$1,411.2	\$2,203.2
Germany	\$2.4	\$40.2	\$164.2	\$423.9	\$912.0
Italy	\$158.4	\$509.7	\$907.9	\$1,361.9	\$1,982.4
Spain	\$77.3	\$316.5	\$612.6	\$918.2	\$1,340.6
Sweden	\$5.2	\$70.0	\$144.3	\$236.0	\$364.3
UK	\$244.1	\$951.6	\$1,796.5	\$2,840.0	\$4,255.8
Total	\$742.8	\$2,404.6	\$4,514.7	\$7,191.2	\$11,058.3
Growth rate	467%	224%	87%	60%	54%

Source: Datamonitor, May 2001

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Breaking down the gambling components, both lotteries and betting will generate a similar share of total iTV gambling revenues over the coming years, according to Datamonitor.

iTV Gambling Revenues in Europe*, 2001-2006 (in millions)

	2001	2002	2003	2004	2005	2006
Betting	131.0	648.7	1,329.7	2,369.9	3,821.9	6,012.6
Lotteries	-	94.1	1,074.9	2,117.8	3,369.3	5,045.7
Total	131.0	742.8	2,404.6	4,487.7	7,191.2	11,058.3
Growth rate	-	467%	224%	87%	60%	54%

Note: *for UK, France, Germany, Italy, Spain and Sweden
Source: Datamonitor, May 2001

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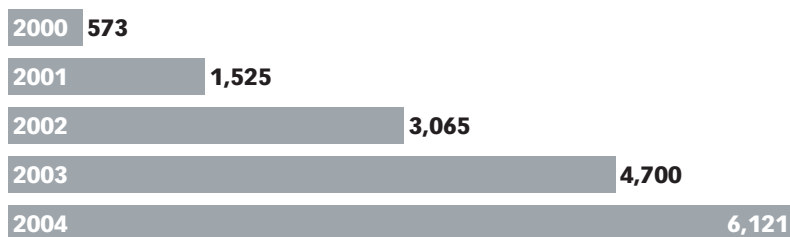
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Gaming on the iTV platform is also expected to prove popular, and be lucrative for service providers. By 2006, the European market will generate \$1.5 billion in revenues, according to Datamonitor.

iTV Banking

With the growth in popularity of interactive television in Europe, more and more financial institutions are offering TV-based banking services. A 2001 Celent Communications report projects that there will be 10 million interactive television (iTV) banking users on the Continent by 2004. Datamonitor is not quite as optimistic about iTV banking as Celent, predicting only 6 million iTV banking customers by 2004.

European iTV Banking Customers, 2000-2004 (in thousands)



Source: Datamonitor, 2000

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The leading European countries for iTV banking will be the UK, France, Germany and the Nordic countries according to Datamonitor.

European iTV Banking Customers, 2000-2005 (in thousands)

	2000	2001	2002	2003	2004	2005
Benelux	–	–	40	130	330	870
France	50	130	230	350	610	1,140
Germany	–	–	30	70	470	1,440
Italy	–	10	30	60	200	450
Nordics	–	20	200	660	1,690	3,250
Denmark	–	–	30	120	330	590
Sweden	–	10	100	370	880	1,610
Norway	–	–	20	60	230	500
Finland	–	10	50	110	250	550
Spain	30	100	200	350	510	870
Switzerland	–	–	10	50	120	270
UK	250	500	750	1,210	2,200	4,310
Other	–	–	10	20	40	120
Total	330	760	1,500	2,900	6,170	12,720

Note: Nordics is the sum of Denmark, Norway, Sweden and Finland
Source: Datamonitor, October 2001

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F. UK

The UK is the leading iTV market in Europe, and arguably the world. Led by direct-to-home satellite TV provider SKY, there are an estimated 9.39 million digital TV households at the end of 2001, most of which are also active iTV households.

According to a survey of British adults conducted in March 2001 by Market & Opinion Research International (MORI), UK consumers will steadily adopt digital television, with more than half (55%) of UK households expected to have digital service by 2006. As of Spring 2001, the digital television owners in Great Britain reached the same level as internet users in the country – 36% – according to e-MORI. This trend is expected to continue, according to forecasts by Jupiter Media Metrix. Jupiter predicts that by 2005, the annual growth rate for interactive television will reach 83%, compared to an internet growth rate of 9% during the same period.

One of the reasons the UK has a particularly high penetration of digital and interactive TV is because consumers, in many cases, have three digital platforms to choose from – satellite, cable and terrestrial. This has made the UK iTV market very competitive and iTV services increasingly sophisticated.

iTV Households in the UK, by Company, Year-end 2001 (in millions and as a % of total UK households)

BskyB	5.5 (22.5%)
NTL	1.1 (4.7%)
Ondigital	1.3 (5.2%)
Telewest	1.2 (4.9%)
Total	9.4 (38.5%)

Source: eMarketer (from company data), 2002

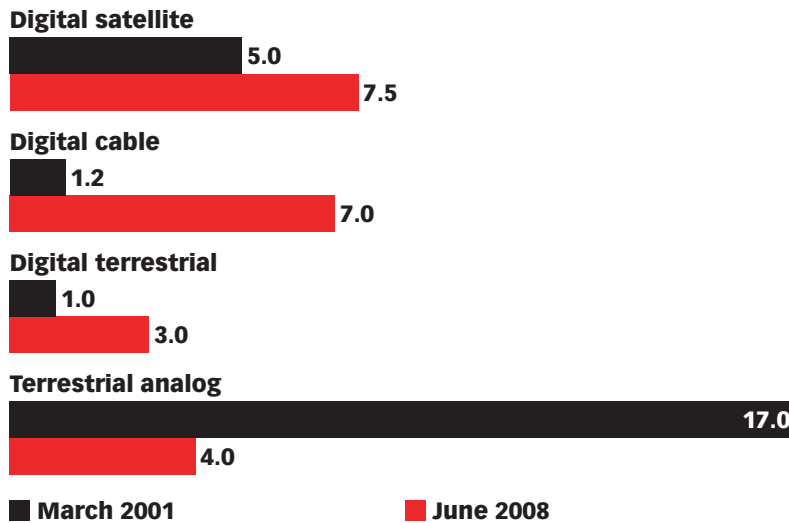
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UK cable company Flextech expects there to be only 4 million households, out of approximately 24 million, without digital TV in 2008. Digital satellite is expected to maintain its lead as the dominant digital TV platform, but digital cable subscribers will not be far behind.

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TV Platforms in UK Households, March 2001 & June 2008 (in millions)



Source: Flextech Television, 2001

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The most popular interactive TV activity in the UK is pay-per-view movies, according to Continental research, followed by listening to the radio. Online shopping, banking and betting ranked very low on the list.

Top 11 Uses for iTV Services in the UK, Year End 2000

	% of people with iTV	Number of people (millions)
Pay-per-view movies	23%	2.8
Listen to radio	17%	2.0
Play computer games	14%	1.7
Pay-per-view sports	11%	1.4
Playercam	10%	1.2
Interactive news	9%	1.2
Listen to fanzine	6%	0.7
Interactive quiz or prize draw	4%	0.5
Online shopping	4%	0.4
Online banking	2%	0.3
Online betting	2%	0.1%
None of these	51%	6.3%

Source: Continental Research, 2001

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According to a recent MORI study, while 36% of the British population has digital TV, only 15.9% - fewer than half - have shopped, banked, played games, or e-mailed through their TVs. Consumers seem to care very little about the ability to use their televisions to access the internet. While most of those surveyed listed the larger number of channels and better picture quality as advantages of digital TV – and reasons to make the switch from analog service, internet access and e-mail capabilities were scarcely mentioned.

According to Telecommunications Reports International, the internet TV market may, in fact, be stalled. With only 812,000 subscribers nationwide, and a decline of 33.6% during the third quarter of 2001, internet service providers and portals anticipating that iTV will be an important access mode may need to rethink their business models. And, even if consumers buy interactive TV services, they appear unlikely to surf the web from their televisions as they do from a personal computer. It seems clear that interactive TV is not internet on the TV, nor is it ever likely to be, rather it is an interactive companion to existing TV broadcasts.

iTV Revenues

The leading UK iTV provider Sky, released its end of 2001 revenue statement which revealed they made £93 million in interactive TV services revenues for that financial year. They reported over half of iTV revenues, £49 million, were generated by betting via interactive television, the internet and the telephone. The remaining £42 million represented Sky's share of revenues from interactive services on the digital satellite platform generated by Sky Active and by third parties.

BSkyB Revenue Statement - Full Year, 2000-2001 (in millions of £)

DTH subscribers	£1,536.7
Cable and DTT subscribers	£299.1
Advertising	£270.5
Interactive*	£93.0
Other	£106.7
Total	£2,306.0

*Note: *Interactive revenues come from gaming, online ads, internet, e-commerce, interconnect, text services and Sky Interactive set-top box subsidy recovery*

Source: British Sky Broadcasting Group PLC, December 2001

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BskyB reports that average revenue per user (ARPU) for the year ending 2001 was £325. The interactive component of that was only £13 per subscriber or 4% of total ARPU. They predict interactive revenue ARPU to rise to £50 by 2005.

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Investment firm Lehman Brothers is less optimistic than Sky, predicting that by 2005 interactive revenue per subscriber will only reach £23 and by 2010, £39.

BskyB Interactive Revenue per Subscriber Forecast in the UK, 2000-2005 & 2010 (in £)



Note: *actual results
 Source: Lehman Brothers, November 2001

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Forrester Research’s estimated iTV revenues throughout the UK will reach £9.36 billion in 2005, from only £50 in 2000. Their forecast for 2001 was £571 million in iTV revenues. Taking into account Sky’s recent 2001 revenue statement and the fact that they account for over 60% of the UK iTV market in subscriber numbers (probably a great deal more in relation to revenue) we can safely say that Forrester was overly optimistic in their 2001 forecast. eMarketer estimates iTV revenue in the UK in 2001 was considerably less than £200 million.

Forrester’s detailed analysis shows the largest component of iTV revenues in 2005 will be t-commerce, both within and outside ‘walled gardens’. They predict very little future for walled garden advertising; rather the bulk of advertising revenue will come from the electronic program guide, and within the actual video broadcast stream.

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iTV Revenue in the UK, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Total	£49	£571	£1,687	£3,772	£6,802	£9,368
Total EPG*	£0.1	£49	£240	£977	£1,620	£1,929
EPG retail	£0.0	£16	£42	£81	£133	£175
EPG advertising	£0.1	£33	£198	£896	£1,487	£1,754
Total Walled Garden (WG)	£48	£323	£600	£1,179	£1,944	£2,564
WG retail	£48	£320	£594	£1,162	£1,905	£2,501
WG advertising	£0.2	£2.2	£6.0	£17	£39	£63
Total interactive video (IV)	£0.6	£199	£848	£1,616	£3,238	£4,875
IV retail	£0.6	£16	£238	£871	£1,905	£3,251
IV advertising	£0.0	£183	£610	£745	£1,332	£1,624

Note: *Electronic Program Guide
 Source: Forrester Research, 2001

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Jupiter Media Metrix is not quite as optimistic about the revenue potential of iTV in the UK, predicting £3.2 billion in 2005. In comparison, they predict nearly four times that revenue will be generated on the PC in the same year, despite their assumption that iTV households will outnumber PC internet households in this year. This gives a clear indication that despite a high iTV penetration, Jupiter still believes that the PC will remain the favored means of online commerce in the coming years.

Revenue Generated Online* on PCs and iTV in the UK, 2005 (in billions of £)

PC	£11.1
iTV	£3.2

Note: *through advertising and commerce activities on the internet
 Source: Jupiter MMXI, 2001

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In an encouraging sign for retailers, Domino's Pizza (UK & Ireland), recently announced preliminary financial results for 2001, which indicated that gross sales via interactive TV reached £2.16 million. Interactive TV is now the largest e-commerce sales channel for Domino's in the UK, representing 60% of all e-commerce sales. Domino's offers t-commerce capabilities on all of the main iTV platforms in the UK. Analysis from the online publication iTV Marketer indicates that if the average order was £15, Dominos received 144,000 orders via TV in 2001. They further add, however, that t-commerce only represents 2.3% of Domino's total sales in the UK. But the evidence does suggest that many people are beginning to embrace the concept of t-commerce and it is becoming a viable sales channel.

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iTV Gambling

One element of iTV revenue which Sky admits made up the bulk of their interactive services revenue was betting and gambling. Datamonitor forecasts iTV gambling revenue to reach \$4.2 billion in the UK in 2006 from approximately \$255 million in 2001.

Investment firm ABN AMRO has put together a detailed model of the potential iTV betting market in the UK. Their assumptions are that, in 2001, 2.5% of iTV users will be willing to bet one £10 bet per week. This correlates to £162.9 million in revenues for that year. They expect this to rise to £1.6 billion by 2005. This is considerably less than Datamonitor's forecast of over \$4.2 billion at the same time.

UK iTV Betting Market, 2001-2005

	2001	2002	2003	2004	2005
Sky digital interactive users (millions)	8.9	11.4	12.5	13.5	14.2
Digital terrestrial interactive users (millions)	1.5	4.2	4.9	5.4	5.9
Digital cable interactive users (millions)	2.2	4.3	6.7	8.8	11.2
Total interactive users (millions)	12.5	19.9	24.1	27.7	31.3
Interactive users willing to bet	2.5%	2.5%	5.0%	10.0%	10.0%
Total betting interactive users (millions)	0.3	0.5	1.2	2.8	3.1
Frequency of betting per week	1	1	1	1	1
Total bets placed annually (£ millions)	£16.3	£25.9	£62.7	£144.2	£162.9
Average bet size (£ millions)	£10	£10	£10	£10	£10
Total revenues (£ millions)	£162.9	£259.3	£627.6	£1442.4	£1629.2
Individual bookmakers' share	25%	25%	25%	25%	25%
Revenue for individual bookmaker (£ millions)	£40.7	£64.6	£156.7	£360.6	£407.3
Net return to bookies (£ millions)	5%	5%	5%	5%	5%
Profit for bookmaker	£2.0	£3.2	£7.8	£18.0	£20.4
Tax at 30%	0.6	0.9	2.3	5.4	6.1
Attributable profit (millions)	£1.4	£2.2	£5.5	£12.6	£14.3
Discount factor	0.92	0.85	0.77	0.70	0.64
Net present value (millions)	£1.3	£1.9	£4.2	£8.9	£9.1

Source: ABN-AMRO, 2001

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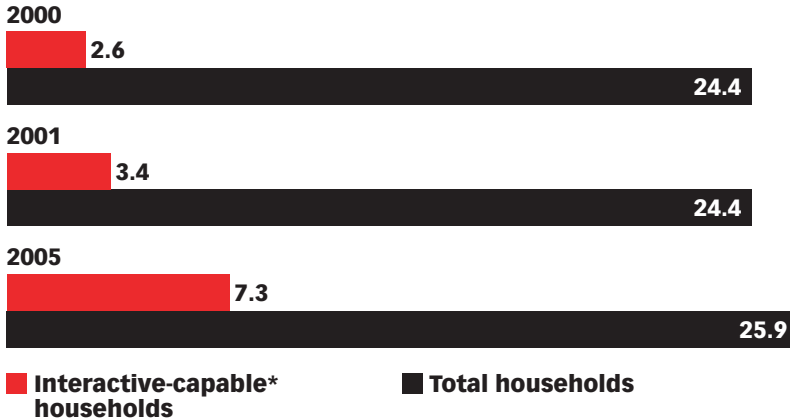
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G. France

France is one of the leading Western European countries for iTV. Jupiter Research estimates there were 2.6 million iTV capable households in 2000 rising to 3.4 million in 2001 and 7.3 million in 2005. The two leading digital operators in France are CanalSatellite and TPS (Television Par Satellite).

Digital and iTV Capable Households in France, 2000, 2001 & 2005 (in millions)



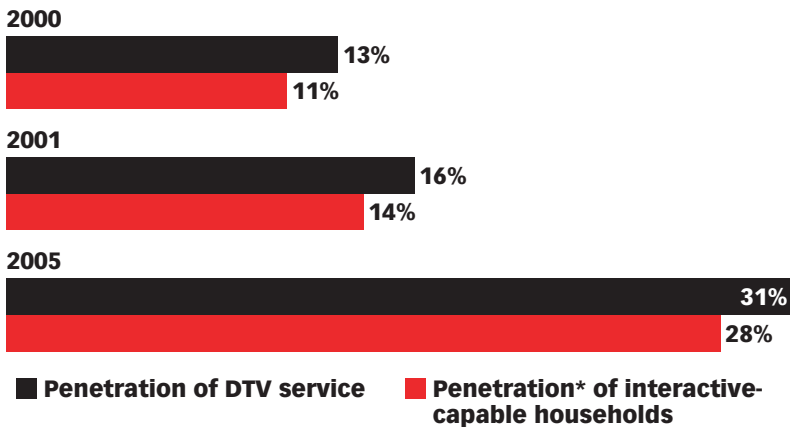
Note: *through DTV
Source: Jupiter MMXI, 2001

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Like all markets, there is a direct correlation between digital TV penetration and iTV penetration. France is no different, with the vast majority of DTV subscribers also being iTV households.

Digital and iTV Penetration in France, 2000, 2001 & 2005 (% of households)



Source: Jupiter MMXI, 2001

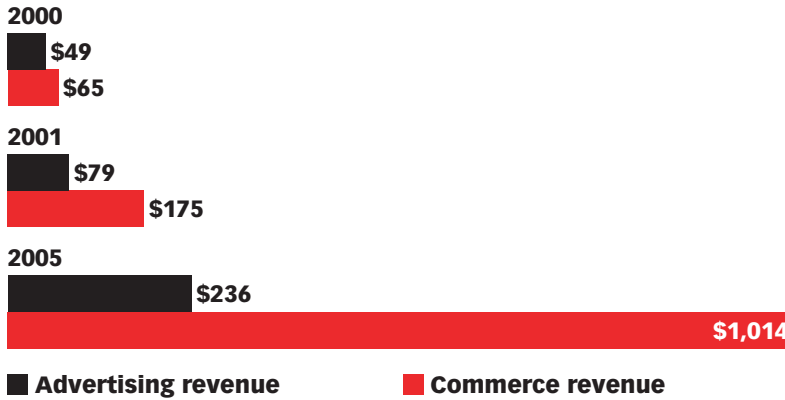
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Jupiter expects iTV revenue in France to reach over \$1.2 billion in 2005 from only \$115 million in 2000. T-Commerce will overwhelmingly dominate all iTV revenues in 2005 according to Jupiter, making up over 80% of all revenues.

iTV Advertising and Commerce Revenue in France, 2000, 2001 & 2005 (in millions)



Source: Jupiter MMXI, 2001

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The Asia-Pacific region is the largest TV market in the world with 546 million TV households. China accounts for nearly two thirds of all TV households at 343 million according to Zenith Media. TV penetration varies considerably throughout the region. Countries such as Australia, Hong Kong and Japan have a 99% TV penetration of households. In countries such as Pakistan, India and Indonesia, however, they have less than 50% penetration. The market with the greatest annual advertising per TV household is Hong Kong at \$709. The US, in comparison, generates approximately \$500 per household, which indicates that Hong Kong has a very liberalized TV advertising market.

TV Households in the Asia-Pacific Region, 2000 (in millions, penetration and advertising per TV household)

High penetration countries	TV households	TV household penetration	Annual advertising per TV household
Australia	7.1	99%	\$238
Hong Kong	2.1	99%	\$709
Japan	46.3	99%	\$314
Malaysia	3.3	97%	\$72
New Zealand	1.2	96%	\$227
Singapore	1.0	99%	\$327
South Korea	13.1	100%	\$107
Total	74.0	99%	\$269
Medium-to-low penetration countries			
China	343.0	91%	\$6
India	61.4	34%	\$11
Indonesia	26.6	53%	\$16
Pakistan	8.8	43%	\$11
Philippines	10.2	70%	\$31
Taiwan	6.5	90%	\$154
Thailand	15.6	94%	\$46
Total	472.1	71%	\$11
Total	546.1	74%	\$46

Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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Of the 546 million TV households in the Asia-Pacific region, only 167 million were multi-channel households. Cable penetration is particularly low throughout most of Asia Pacific and, according to PricewaterhouseCoopers, Taiwan is currently the only nation running digital cable trials. Australia has introduced digital cable and DBS services in small regions and Hong Kong, Singapore and South Korea are scheduled to launch digital cable services within 18 months. With such a low cable penetration in Asia Pacific, it is within the satellite and digital terrestrial platforms that most of the DTV growth will be felt.

Multichannel TV Households in the Asia-Pacific Region, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Australia	1.4	1.6	1.7	1.8	2.0	2.1
China	95.0	102.0	110.0	120.0	130.0	140.0
Hong Kong	1.0	1.1	1.2	1.3	1.4	1.4
India	32.7	35.0	37.8	39.6	41.8	43.8
Indonesia	0.7	0.8	0.9	1.2	1.4	1.7
Japan	24.5	26.5	29.0	30.8	32.5	34.0
Malaysia	0.3	0.4	0.4	0.5	0.5	0.6
New Zealand	0.1	0.1	0.2	0.2	0.2	0.2
Pakistan	1.3	1.5	1.7	1.9	2.0	2.2
Philippines	1.0	1.5	2.1	2.9	3.6	4.4
Singapore	0.3	0.3	0.4	0.4	0.5	0.6
South Korea	2.3	2.8	3.2	3.6	4.0	4.4
Taiwan	6.0	6.3	6.6	6.9	7.2	7.4
Thailand	0.4	0.5	0.6	0.8	1.0	1.2
Total	167.0	180.3	195.8	211.7	228.1	244.0

Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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A. Japan

Japan is the leading economy in the Asia-Pacific region, but the digital TV industry is still relatively immature according to Nomura Research Institute. They indicate that there were only 3.2 million digital TV households in Japan in 2000. They forecast this to rise significantly – in 2005 they expect 24.3 million digital TV households.

Japan has launched a number of new digital satellite services - broadcast satellite (BS) and communication satellite (CS). While technically similar, they differ in legal terms. BS programming reaches a broad audience of unspecified users and faces the same restrictions on content as terrestrial broadcasting. CS programming targets specific users and therefore faces fewer restrictions on content. CS spectrum also offers greater capacity and thus more channels than BS.

“The PC has created a culture of active interaction, but people want to watch TV passively, in a relaxed mood.” – Katsuyuki Shiga, Analyst, Gartner Group Japan.

Number of Households and Revenues for Digital Broadcasting in Japan, 2000 & 2005

	Number of households		Market value	
	2000 (in thousands)	2005 (in thousands)	2000 (billions of yen)	2005 (billions of yen)
BS digital	750	12,500	¥11.3	¥507.8
CS digital	2,690	6,080	¥141.7	¥278.1
Terrestrial digital	–	5,746	–	¥266.3
Total digital broadcasting	3,440	24,326	¥153.0	¥1,052.2
Cable television	3,160	5,400	¥208.2	¥308.7
Total including cable	6,600	29,726	¥361.2	¥1,360.9

Source: Nomura Research Institute, 2001

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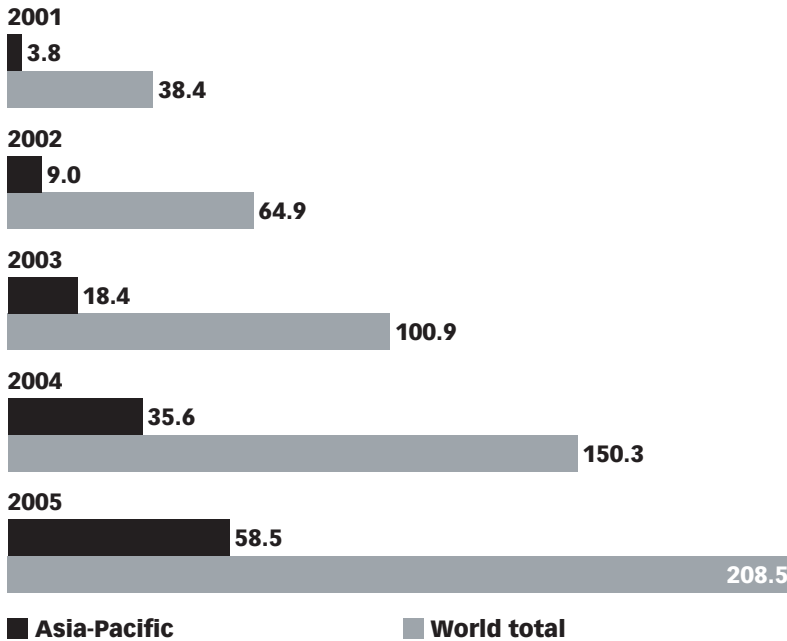
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“I don’t think TV will be successful as an interactive media. It is effective, but only as a passive medium. The dividing line between the TV and the Net will disappear hardware-wise, but we still won’t use them in the same way.” – Toshiaki Kanda, CEO of KNN.com

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Strategy Analytics indicates there were only 3.8 million iTV households in Asia-Pacific in 2001, but they forecast this to rise significantly to 58.5 million in 2005, led by Japan, Singapore, South Korea and Taiwan.

iTV Households in the Asia-Pacific Region, 2001-2005 (in millions)



Source: Strategy Analytics, 2001

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According to OpenTV corp, the leading iTV middleware provider in the world – Asia Pacific will be the largest interactive television market within four years. Jeffrey Brown, the Managing Director of OpenTV Asia-Pacific, said interactive TV market growth is more limited in Europe, where two-thirds of the 40 million set-top boxes were sold, as well as in North America, Latin America and Australia. Mr. Brown believes Asia Pacific has the biggest growth potential because of its large population and increasing subscription numbers for pay television. In a recent report from OpenTV, they indicated they have already partnered with 13 digital broadcast network providers throughout the region and will roll out iTV services within the next twelve months.

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Zenith Media indicates that there were 84 million TV households in Latin America in 2000, with most of the countries having a TV household penetration rate above 93%. The largest TV market in Latin America is Brazil, with nearly 50% of all TV households in the region, but it has the lowest penetration rate within the region.

TV Households in Selected Countries in Latin America, 2000 (in millions, TV penetration and advertising per TV household)

	TV households (millions)	TV household penetration	Annual advertising per TV household
Argentina	8.7	97%	\$146
Brazil	39.0	86%	\$91
Chile	3.2	93%	\$85
Colombia	8.3	98%	\$219
Mexico	20.2	96%	\$135
Venezuela	4.7	96%	\$225
Total	84.0	91%	\$127

Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

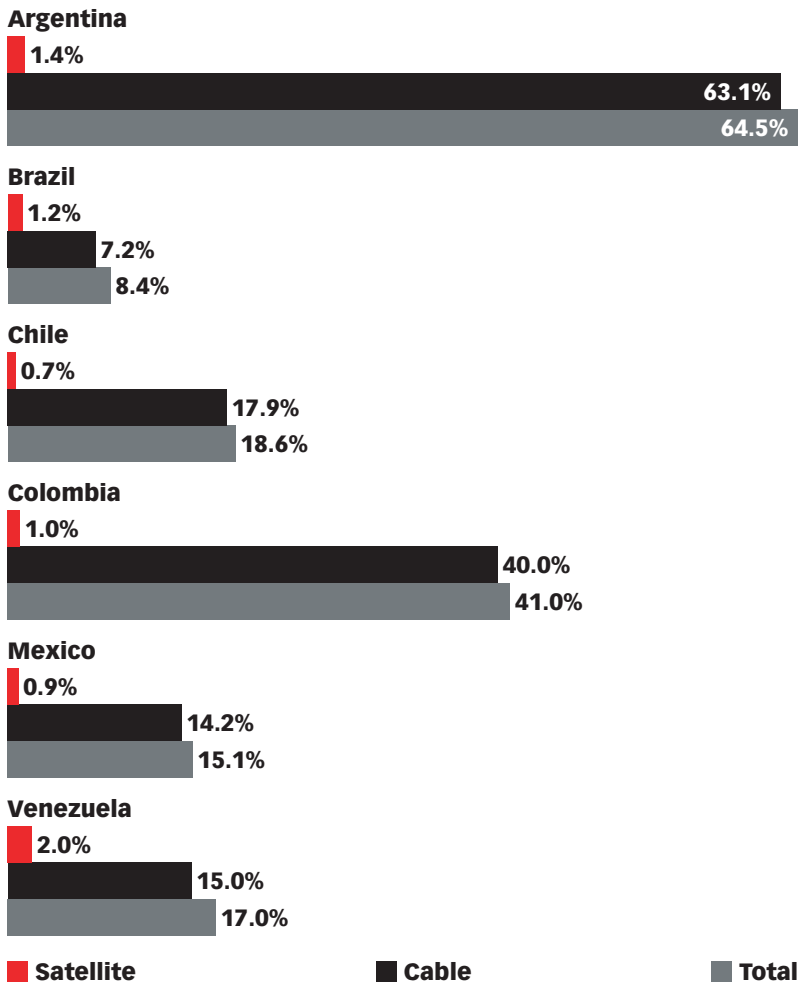
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Argentina is the only country in Latin America with a significant penetration of cable TV, at 63% of households, followed by Colombia with 40%. Satellite TV currently does not have a significant share of the TV market across Latin America, although US operators have been trying to enter this market for some time.

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Pay-TV Penetration for Selected Countries in Latin America, 2000



Source: Zenith Media as cited in PricewaterhouseCoopers (PwC), May 2001

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The best prospects for interactive TV in Latin America most likely be in Argentina, with its relatively high cable penetration. However, the current instability in the economy will hamper any significant investment for some time. Cable and DBS providers need to devise inexpensive packages in this region to appeal to low-income households.

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Pay-TV Households for Selected Countries in Latin America, 2000-2005 (in millions)

	2000	2001	2002	2003	2004	2005
Argentina	5.4	5.2	5.3	5.4	5.7	6.2
Brazil	3.2	4.0	4.7	5.6	6.3	7.1
Chile	0.6	0.6	0.7	0.7	0.8	0.8
Colombia	3.3	3.6	3.8	4.0	4.3	4.5
Mexico	3.0	3.4	3.7	4.0	4.5	4.8
Venezuela	0.7	0.8	0.9	1.1	1.3	1.4
Total	16.2	17.6	19.0	20.8	22.8	24.9

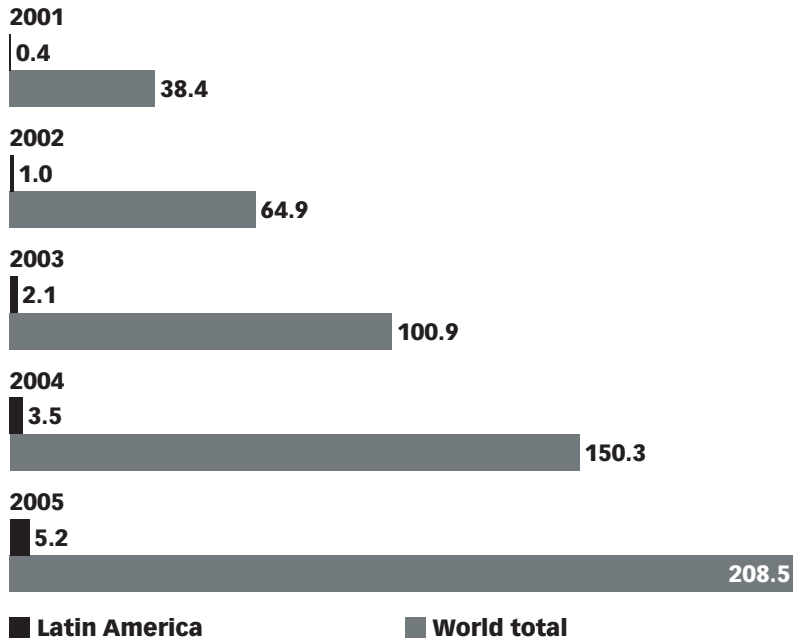
Source: Zenith Media, 2000; PricewaterhouseCoopers (PwC), Wilkofsky Gruen Associates, May 2001

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Strategy Analytics estimates iTV households will only number 5.2 million in 2005 from 400,000 in 2001.

iTV Households in Latin America, 2001-2005 (in millions)



Source: Strategy Analytics, 2001

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