



**The evolution of the set-top box:**  
Current and future  
trends affecting return  
path data measurement

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## **INDEX**

- 4** Multichannel video program distributors
- 9** Gaming consoles
- 12** Smart TVs/Blu-ray players
- 15** Internet video set-top boxes
- 25** Tablets/smartphones
- 26** Summary

## INTRODUCTION

The set-top box world dominated by cable, DBS and telephone companies is evolving into a more fractured environment for the delivery of live linear programming and video-on-demand content from broadcasters and cable networks.

The growth in broadband subscribers and Internet speeds plus the rapid adoption of all manner of digital devices have created a second ecosystem adjacent to the current pay TV environment. Content providers that have been shut out of traditional channel delivery are finding Internet aggregators only too happy to test the limits of the pay TV ecosystem by giving consumers choices beyond traditional broadcast and cable network lineups.

At the same time, many of these online aggregators represent an opportunity for content providers to extend the visibility for much of their library product. Such providers also present a promotional opportunity for newly produced content.

For multichannel video program distributors (MVPDs), online aggregators present both a cord-cutting threat and a broadband opportunity, since consumers need a broadband connection to access such services.

As content distribution has spread to new outlets, new devices have been created for consumers to view that content. Gaming consoles, smart TVs, Blu-ray players, Internet-connected set-top boxes, tablets and smartphones all present new ways to view professionally produced content inside and outside today's pay TV ecosystem.

While there is a burgeoning array of devices on which to view content and a much wider menu of options from where to access such content, the underlying business model and the actual physical delivery mechanism used to deliver that content have only marginally increased in complexity.

Programmers are still making broadcast retransmission consent and cable network affiliation deals with MVPDs that form the basis for the \$100 billion pay TV industry. Those business deals have been tweaked over the years to include VOD, mobile and TV authentication rights that serve to benefit both sides and largely preserve the pay TV ecosystem.

While the number of delivery mechanisms has increased to handle different technologies and end devices, at their core there are two distinct methods of transporting a video signal to end users: Delivery via an MVPD through set-top-boxes or a broadband Internet Protocol (IP) connection from an Internet server to the new array of devices such as gaming consoles, smart TVs and tablets.

Understanding how these new delivery mechanisms operate and breaking down the transport methods provides greater clarity into the options along that transmission path where return path data can be measured.

The following white paper explores the current state of in-home devices to view live linear cable and broadcast programming, as well as VOD options, and the trend lines within each segment going forward.

## The MVPD space

The multichannel video provider (cable, DBS and telco) segment of the media industry has grown to more than 100 million homes, most of which now have digital set-top boxes that display the providers' linear channel lineups and serve as the two-way gateway device to access video on demand content (and thus provide return path data information).

In 2006, the entire cable industry counted 65 million subscribers, while DirecTV and Dish Network (making up the DBS industry) claimed 29 million subscribers. Verizon and then AT&T launched FiOS (2005) and U-verse TV (2006) services respectively, which have served to boost overall set-top box deployment in the past six years.

With the entry of those two telephone companies, the cable industry began to lose subscribers, a trend that continues to this day. However, the entrance of Verizon and AT&T has served to boost the overall U.S. pay TV subscriber universe since 2006.

### MVPD share shift 2006–2011

	2006	SHARE %	2011	SHARE %	GAIN/LOSS
DBS	29M	30.8%	33.9M	33.7%	4.9M
Telco	0.2M	0.2%	8.1M	8.0%	7.9M
Cable	65M	69.0%	58.6M	58.3%	(6.4M)
<b>Total</b>	<b>94.2M</b>		<b>100.6M</b>		<b>6.4M</b>

Source: One Touch Intelligence

While the cable industry has had to deal with legacy analog program channels and analog equipment, DirecTV, Dish, Verizon and AT&T have been able to use digital technology since their inception to provide service to consumers.

**Every DBS and telco video subscriber by definition is a digital subscriber, possessing equipment that provides the capability for the collection of return-path data via the set-top's two-way connection to headend facilities.** Here are the current subscriber counts of DirecTV, Dish, Verizon and AT&T as of June 30, 2012:

<b> DirecTV:</b>	19,914,000
<b> Dish:</b>	14,061,000
<b> Verizon:</b>	4,473,000
<b> AT&amp;T:</b>	4,146,000

Source: One Touch Intelligence

The cable industry has been undergoing a technology conversion from analog to all-digital video transmission during the past decade. Like the DBS and telco companies, any cable subscriber who subscribes to a digital programming tier receives a digital set-top box capable of transmitting return path data.

Cablevision has led the charge among MSOs in going all-digital, announcing on its Q2 '12 earnings call that its digital penetration stands at 98.5%, an industry high. Cablevision now counts 3,257,000 basic subscribers. Of that group 3,208,000 have a two-way digital set-top box, meaning Cablevision has only 49,000 subscribers remaining to convert to all-digital.

The top six public MSOs represent about 80% of all cable subscribers.

**Basic, digital subscriber counts for the top public cable MSOs:**

MSO (JUNE 30, 2012)	BASIC	DIGITAL	DIGITAL % OF BASIC
Comcast	22,118,000	20,896,000	94.5%
Time Warner Cable	12,299,000	9,653,000*	78.5%
Charter	4,098,000	3,484,000	85.0%
Cablevision	3,257,000	3,208,145	98.5%
Suddenlink	1,230,100	807,700	65.7%
CableOne	612,729	215,284	35.1%

Source: Company reports, \* estimate

Two other large operators that are private, Bright House Networks and Cox Communications, do not release basic or digital subscriber counts. But based on cable system subscriber information submitted to the U.S. Copyright Office, Bright House had roughly 2.1 million subscribers and Cox had 4.6 million subscribers as of Dec. 31, 2011. Both operators are among the top-tier of cable MSOs and thus likely have digital subscriber penetrations in the 75% to 80% range, much like their peers.

The balance of the cable industry is made up of smaller second- and third-tier operators on down to mom-and-pop-operations, a few of which may not even have digital STBs deployed — or if they do, they aren't moving to an all-digital system. Using CableOne (owned by Washington Post Co.) as a proxy, the balance of the cable industry beyond the top eight MSOs represent about 8 million basic subscribers and 3 million digital subscribers.

In total, the entire cable industry as of June 30, 2012 had approximately 58 million basic and 47 million digital subscribers. The entire MVPD digital STB picture (89.6 million homes) and percent of market share as of June 30, 2012, looks like this:

<b>Cable:</b>	47M	52.4%
<b>DBS:</b>	34M	37.9%
<b>Telco:</b>	8.6M	9.7%

Source: One Touch Intelligence

**Total digital STBs deployed**

It's important to remember the above subscriber counts relate to a single digital STB in the home, but most homes have more than one digital STB per home. **Charter, the one MSO that reports such figures, counts 1.5 digital STBs per home.**

**Given Charter's skew to more rural systems and a slower conversion to digital, the other major MSOs likely have a ratio 1.5 to 1.8 digital STBs per home.**

As a caveat, Comcast has been the most active in placing digital terminal adapters (DTAs) in consumer homes. The DTA is a small device that functions as a rudimentary set-top and digital to analog converter, allowing any analog TV set to tune to the digital channels on Comcast's cable lineup. The DTA is not inherently two-way, however; it cannot access VOD or serve up return path data.

Comcast has deployed 25 million DTAs since it started its all-digital conversion four years ago. The overwhelming majority of these DTAs are on second, third and fourth TV sets in the home.

(Over time, perhaps 10 years, these DTAs will fade into history as consumers replace their analog TV sets with digital TV sets. Consumers would then decide whether to hook those new digital TVs up to an MVPD's set-top box or hook them up directly to the Internet via smart TV connections.)

DirecTV, Dish, Verizon and AT&T sport higher digital STBs per home (anywhere from two to three digital STBs per home), because their all-digital technology provides better picture quality and because each is a more recent entrant to the MVPD arena. The chart on page 7 provides estimates for the number of digital STBs per provider, with the total across the entire universe standing at an estimated 150 million.

## **HD/DVRs**

In the past 10-plus years, the cable, DBS and telephone industries have offered subscribers four types of set-top boxes: HD-only set-tops, HD set-tops with a built-in DVR, and before the dawn of HD, SD set-tops and SD set-tops with built-in DVRs.

Some 80 million U.S. homes, or 69%, have an HDTV set, according to Nielsen. Not all homes with an HDTV set, however, subscribe to an MVPD service. And not all homes with an HDTV set that subscribe to an MVPD have an HD STB.

Tabulating figures available across the MPVD landscape, roughly 40 million homes have HDTV set-tops.

Separately, Nielsen reports national DVR penetration stands at 44%, or 50 million homes, as of February 2012.

Many cable MSOs, along with DirecTV, Dish, AT&T and Verizon, are now pushing an HD/DVR set-top as the "lead" set-top box for any level of service, even if the consumer does not have an HD set. As such, some MSOs including Comcast report HD/DVR numbers because it is largely the only STB it is deploying. Comcast reports 11.2 million HD/DVRs across its 20.9 million digital subscribers.

Time Warner Cable reports HD (6.8 million estimated) and DVR numbers (5 million) separately. It's important to note that the majority of TWC subscribers in the above categories have both services with the same box, so some double counting is taking place. The true breakdown for TWC is likely 4 million subscribers with an HD/DVR, 2.8 million with an HD-only STB and 1 million with a standard definition DVR.

The chart on page 7 delineates the basic, digital, digital STB, HD/DVR and broadband subscriber statistics for the top cable, DBS and telephone companies.

	BASIC	DIGITAL	HD	DVR	HD DVR	DIGITAL STBs	BROADBAND
AT&T	4,146,000	4,146,000	1,762,450*	4,146,000	N/A	8,000,000*	14,499,000
Verizon	4,473,000	4,473,000	2,996,910	2,996,910	N/A	11,000,000*	8,776,000
Century Link	94,000	94,000	40,000*	94,000*	N/A	150,000*	5,763,000
Frontier	63,938	63,938	30,000*	30,000*	N/A	60,000*	1,781,295
Windstream							1,210,700
DirecTV	19,914,000	19,914,000	6,420,000*	7,140,000*	N/A	45,000,000*	
Dish	14,061,000	14,061,000	2,290,000*	5,460,000*	N/A	30,000,000*	
Cable One	612,729	215,284	120,000*	80,000*	N/A	300,000*	462,426
Cablevision	3,257,000	3,208,145	2,084,000*	100,000*	N/A	6,000,000*	3,032,000
Charter	4,098,000	3,484,000	N/A	N/A	2,051,876*	5,400,000	3,662,000
Comcast	22,118,000	20,896,000	N/A	N/A	11,172,000	30,000,000*	18,738,000
Suddenlink	1,230,100	807,700	520,966	371,542	N/A	1,200,000*	979,400
TWC	12,299,000	9,653,000*	6,820,000*	5,075,000	N/A	15,000,000*	10,775,000
Other	14,000,000	8,600,000					10,000,000
<b>Households</b>	<b>100,363,767</b>	<b>89,616,067</b>				<b>150,000,000</b>	<b>79,678,821</b>

\*estimate

Note: The majority, but not all, digital homes have broadband service

Source: Company reports

6/30/12

## Network DVR

One new trend that will boost DVR penetration is the introduction of the network DVR.

**A network DVR is basically a cloud-based storage system that allows a cable subscriber to store video programs remotely instead of storing them on a DVR hard drive in their home.**

Cablevision is the first MSO to deploy a network DVR, which allows any Cablevision digital subscriber to record and store TV programs on a Cablevision network server. Akin to an in-home DVR, the \$11 monthly service gives subscribers 160 Gigabytes (GB) of storage they can access at any time with full trick play capability.

For Cablevision, the costs are cheaper than paying for and deploying DVRs in millions of homes. Also, with network DVR, Cablevision and the subscriber do not have to deal with malfunctioning in-home DVR equipment.

Elsewhere, Comcast has recently filed a patent for a network-based DVR that could be a precursor to the company rolling out a network DVR service, perhaps in 2013. The move would allow Comcast to boost DVR service from its 11 million customer installed base to all 21 million homes with a digital set-top.

If the entire industry rolled out network DVR, DVR penetration would skyrocket to effectively match the same penetration as digital set-tops.

## Growth Trends

While there has been much debate about whether cord cutting is occurring, the pay TV universe continued to grow in 2010, 2011 and in the first six months of 2012. The cable industry has lost subscribers ever since the arrival of Verizon and AT&T. DBS's growth has also slowed (see chart below) with the entrance of telco competitors in the market.

### MVPD subscriber additions

CABLE	FY 08	% GROWTH/ LOSS	FY 09	% GROWTH/ LOSS	FY 10	% GROWTH/ LOSS	FY 11	% GROWTH/ LOSS	1H 12	% GROWTH/ LOSS
<b>CableOne</b>	-2,381	-0.4%	-30,483	-5.1%	-20,573	-3.3%	-25,070	-3.9%	-8,684	-1.4%
<b>Cablevision</b>	-19,484	-0.6%	-45,000	-1.4%	-55,700	-1.8%	-64,000	-1.9%	7,000	0.2%
<b>Charter</b>	-270,200	-5.1%	-221,700	-4.4%	-214,300	-4.7%	-214,300	-5.0%	-46,000	-1.1%
<b>Comcast</b>	-703,000	-2.8%	-623,000	-2.6%	-756,000	-3.2%	-459,000	-2.0%	-213,000	-1.0%
<b>Suddenlink</b>	-25,680	-2.0%	-35,800	-2.8%	-31,500	-2.5%	-45,200	-3.7%	-22,100	-1.8%
<b>TWC</b>	-303,000	-2.3%	-210,000	-1.6%	-454,000	-3.6%	-451,000	-3.7%	-263,000	-2.2%
<b>Top 6 Cable</b>	<b>-1,323,745</b>	<b>-2.7%</b>	<b>-1,165,983</b>	<b>-2.5%</b>	<b>-1,532,073</b>	<b>-3.4%</b>	<b>-1,258,570</b>	<b>-2.8%</b>	<b>-545,784</b>	<b>-1.3%</b>
<b>DBS</b>										
<b>DirecTV</b>	861,000	5.1%	939,000	5.3%	663,000	3.6%	662,000	3.4%	29,000	0.1%
<b>DISH</b>	-102,000	-0.7%	422,000	3.1%	33,000	0.2%	-166,000	-1.2%	94,000	0.7%
<b>DBS Total</b>	<b>759,000</b>	<b>2.5%</b>	<b>1,361,000</b>	<b>4.3%</b>	<b>696,000</b>	<b>2.1%</b>	<b>496,000</b>	<b>1.5%</b>	<b>123,000</b>	<b>0.4%</b>
<b>Telcos</b>										
<b>AT&amp;T</b>	814,000	352.4%	1,019,000	97.5%	922,000	44.7%	804,000	26.9%	355,000	9.4%
<b>Verizon</b>	975,000	103.4%	943,000	49.2%	728,000	25.4%	701,000	20.2%	300,000	7.2%
<b>Telco Total</b>	<b>1,789,000</b>	<b>152.4%</b>	<b>1,962,000</b>	<b>66.2%</b>	<b>1,650,000</b>	<b>33.5%</b>	<b>1,505,000</b>	<b>23.3%</b>	<b>655,000</b>	<b>8.2%</b>
<b>Total Video</b>	<b>1,550,058</b>	<b>1.9%</b>	<b>1,937,007</b>	<b>2.4%</b>	<b>428,227</b>	<b>0.5%</b>	<b>465,430</b>	<b>0.6%</b>	<b>120,916</b>	<b>0.1%</b>

The key point, however, is that basic video growth continued and that digital set-top growth was even higher over the past five years because of growth in the telco and DBS categories. Even as MSOs were losing basic subscribers, they were gaining digital subscribers.

Here's a year-by-year look at cable's basic and digital growth since 2006:

YEAR	TOTAL BASIC (MILLIONS)	BASIC ADDS/LOSSES	TOTAL DIGITAL (MILLIONS)	DIGITAL ADDS
2006	65.0	212,000	33.6	3,435,000
2007	64.4	-556,000	37.0	3,696,000
2008	63.4	-998,000	40.7	2,682,000
2009	62.0	-1,386,000	43.4	1,899,000
2010	60.1	-1,918,000	45.3	1,874,000
2011	58.6	-1,536,000	47.0	1,013,000

Source: OTI analysis of company reports, excludes telcos and DBS

While basic customer growth may be slowing to 2% to 3% per year and will perhaps reach zero or even negative territory in the next few years, digital growth will continue for two reasons: Subscriber growth in the DBS and telco segments and cable's conversion to all-digital.



Given the trend lines during the past three years including recent slower growth in DBS and telco subscribers, here's a plausible look at digital subscriber growth across cable, DBS and telco for 2012–2014:

MVPD	2012	DIGITAL SHARE	2103	DIGITAL SHARE	2014	DIGITAL SHARE
<b>Cable (basic/digital)</b>	57.3M/48M	52.4%	56.3M/49M	52.4%	55.5M/50M	52.5%
<b>DBS</b>	34.2M	37.4%	34.3M	36.6%	34.3M	36.0%
<b>Telco</b>	9.3M	10.2%	10.3M	11.0%	11M	11.5%

Source: OTI analysis of company reports

## Gaming consoles

Over the past five years, the manufacturers of gaming consoles (Microsoft, Sony and Nintendo) have branched out into the entertainment space. The growth in gaming consoles in aggregate has mirrored previous growth curves in DVD players.

In March 2012, Nielsen reported 56% of U.S. homes, or 64 million, had at least one gaming console. NPD Group reports that nearly 100 million current-generation consoles from the top three providers have been sold in the U.S.:

<b>Nintendo Wii:</b>	39.5 million
<b>Microsoft Xbox 360:</b>	34.1 million
<b>Sony PS3:</b>	21 million

Over time, consumers have used gaming consoles in different ways. Playing games within the home with a few friends or by themselves has given way to playing against other competitors via the Internet. Using that Internet connection, gaming providers have added entertainment options to their platforms. Leichtman Research Group estimates some 28 million U.S. homes have a gaming console connected to the Internet.

In the gaming console entertainment space, Microsoft is the clear leader.

### Microsoft Xbox 360

Microsoft has a worldwide installed base of 66 million Xbox 360 units and now counts 40 million Xbox Live users worldwide, up from about 35 million as of mid-2011.

The Xbox Live service allows users to play games and access VOD content. There are three Xbox Live tiers: A free tier including access to rent or buy HD movies; a \$5 monthly Gold tier that adds the ability to instantly watch HD movies from Netflix, HBO GO (authenticated) and other subscription video providers, watch TV series via Hulu and see live sports via ESPN (authenticated); and a \$8.33 monthly Family Pack, which supplies four Xbox Live Gold memberships. About 26 million of the total 40 million Xbox Live customer base worldwide takes the Gold package.

Xbox Live sports a lineup of more than 1,000 games, allowing users to play opponents from throughout the world using a broadband connection. The current VOD lineup includes content from some 90 channels, including ABC, CBS, Disney, Discovery, Fox, HBO, MTV, NBC, Nickelodeon, PBS, Showtime, Starz, TBS, TNT, USA and WWE.

## Microsoft's MVPD connection

When AT&T launched its U-verse TV service, it relied heavily on Microsoft software and servers to launch the business. The guide and software on the U-verse digital STB is supplied by Microsoft. Thus it was no surprise when AT&T was the first MVPD to authorize the use of Xbox consoles as secondary set-tops in U-verse subscriber homes.

In October 2010, AT&T launched the service feature allowing consumers to convert their Xbox 360 consoles into secondary set-tops via a \$99 kit. The feature has been temporarily suspended as of summer 2012 due to software update issues. Until that time, U-verse subscribers could use their Xbox consoles as secondary STBs to view U-verse TV channels. **Subscribers, however, could not access the hard drive space on the Xbox to record content, nor could they access U-verse VOD. The Xbox serves as a TV tuning mechanism only.**

In December 2011, Verizon and Microsoft launched the first live linear TV app on the Xbox, allowing FiOS TV subscribers with Xbox Live subscriptions to view a lineup of 26 live channels on the Xbox. Here's the channel list:

**HD:** BET, Cinemax, CNN, Comedy Central, ESPNNews, Food Network, HBO2, HBO, HGTV, MTV, Nickelodeon, Spike, TBS, TNT, Travel Channel, truTV, VH1.

**SD:** Boomerang, Cartoon Network, DIY, Hallmark Channel, HLN, MTV2, Nick jr., TCM, TV Land.

Verizon counts 4.4 million subscribers, and given its higher data speeds, it likely has a higher penetration of Xbox Live users than other MVPDs. BTIG estimates there are 12 million Xbox Live Gold members in the U.S., or roughly 10% of all homes. That would put the number of FiOS TV subscribers who are also Xbox Live Gold members in the 440,000 range using the same 10% base. Given FiOS boasts the highest data speeds in the country, the number of Xbox Live Gold members in FiOS homes likely indexes higher — towards the 500,000 subscriber level.

**It's important at this point to understand the technological underpinnings of how an MVPD delivers live TV channels over an IP Internet connection to the Xbox because it aligns with the transmission path for those same live TV channels to smart TVs, Blu-ray players, Internet video set-top boxes and tablets discussed later in this report.**

**All entertainment content, whether it's VOD or live TV channels that are accessed using an Xbox console, arrives via an IP broadband connection — the same broadband connection that the household uses to surf the Internet.**

**In the case of VOD, Microsoft has contracted for that content and stored that content on its own servers. Once a VOD stream is requested by an Xbox Live user, a signal is sent through the consumer's local broadband connection to a regional peering point and then onto to a national backbone to Microsoft's servers, at which point the IP VOD stream is authorized and sent back to the home through the same national/regional/local delivery path.**

**The delivery is slightly different, however, for a live TV stream. In the case of a U-verse or FiOS subscriber, the IP video stream for a CNN or ESPN channel originates from a server located inside AT&T or Verizon's network. That video stream flows from that server (either national or regional) through AT&T or Verizon's network, through the home gateway or modem device that also carries other broadband traffic to the Xbox and then on to the TV set for display. So the live TV stream never touches the "public" Internet.**

**The above transmission path for a live TV channel is mirrored for any authenticated linear TV app for any other provider (DirecTV or Time Warner Cable) to any other IP end device such as a Samsung smart TV, Roku box or iPad.**

### **Sony PlayStation**

Sony has been cagey about sales figures for its PlayStation 3 console, frequently mixing those results with that of the older but still marketed PlayStation 2 and PlayStation Vita handheld devices. At the end of Sony's fiscal year 2011 ending in March 2012, the PlayStation 3 had an install base of 63.9 million worldwide (20 million homes in the U.S. according to Nielsen). Based on estimates of sales for the first fiscal quarter ending June 30, 2012, that number has probably risen to about 65 million.

In video, PlayStation 3 customers can download movie and TV titles via the PlayStation Network content portal, which offers apps that provide access to free or subscription content from aggregators Amazon Instant Video, YouTube, Netflix, Video Unlimited, NHL, MLB.TV, Hulu Plus, Best Buy's CinemaNow, Vudu, Crackle, the Southeast Conference Digital Network and Crunchyroll.

Sony has not made any deals with any cable/DBS or telephone company to offer their VOD lineups or linear TV channels. Microsoft has taken the lead in this area and because it has the most live gaming users, MVPDs have concentrated on reaching deals with Microsoft before moving to other platforms such as the PlayStation. The software integration between a cable system and a gaming device is no small task, which has further delayed such agreements.

Sony has not released PlayStation Network subscriber counts, but given Microsoft's Xbox Live penetration of 60%, PlayStation Network's subscriber count is likely around 35 million homes worldwide. If half of those subscribers are in the U.S., that would put the U.S. PlayStation Network subscriber count at 17.5 million.

### **Nintendo Wii**

The Nintendo Wii is far and away the largest game console in terms of installed base, with a worldwide count of 96 million. Nintendo does provide North American unit volumes, putting the installed base there at 45.7 million.

But the Wii is the most limited of the three major gaming consoles in terms of video content, offering access via app downloads that support only subscription Netflix and Hulu Plus video titles. Given that, any development by MVPDs to include Nintendo in distribution plans appears to be years away.

### **Growth trends**

Despite growth over the past few years, the three major Internet-connected gaming platforms are encountering stiff headwinds in 2012, with sales numbers tumbling for the first two quarters. NPD estimated U.S. sales of new video games, consoles and accessories fell 20% in July 2012, an indication the downward trend is continuing.

Of the three, Sony's PlayStation platform is the weakest, with sales falling more rapidly. Sony is apparently pinning its hopes for a revival on a next-generation PlayStation 4 console, reportedly scheduled for launch some time in 2013.

Similarly, Nintendo is about to release its next-generation console, the Wii U, which reportedly will include upgraded HD playback capabilities. Microsoft also is reportedly working on a new console dubbed Xbox 720 possibly for launch in late 2013, and recently released internal documents hint that it will include 1080p 3D support, a Blu-ray player and DVR functions.

Given the fact all three platforms have added an Internet video connection port to their products, the updated consoles will likely carry enhanced video content ties as well.

Going forward, these next-generation, Internet-connected consoles will begin to muddy the numbers in terms of total households, as many customers will buy these units to replace older PlayStation 3, Nintendo Wii and Xbox 360 units.

But owning the unit is not enough. Consumers have to ante up a subscription fee (\$60 annually in the case of Xbox Live) before they can access apps such as Netflix or the VOD and TV lineups of MVPDs, if that MVPD has a deal with that particular gaming console company. It's a complex, and sometimes pricey labyrinth that will serve to dampen growth.

And any MVPD deal with a gaming console company for the display of linear TV programming has to include rights granted by the programmers. Verizon, for instance, offers only 26 live channels to Xbox Live users, less than 10% of its entire FiOS TV channel lineup.

The complexity of those rights deals, often tied to the next affiliate negotiation cycle, would seem to ensure slower growth for the gaming-console-as-a-STB going forward.

## Smart TVs and Blu-ray players

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As the digital revolution hit device manufacturers, MVPD operators and programmers, TV manufacturers set out to include popular Internet apps (Hulu, Netflix) in so-called smart TVs and Blu-ray players.

Such devices now make up the majority of TV sets and Blu-ray players on store shelves, as they use built-in Internet ports to access these apps via a broadband connection.

There is a crucial difference between the number of homes that have smart TVs and the number of smart TVs that are actually connected to the Internet and thus capable of accessing Internet content apps or live TV channels from an MVPD.

NPD Group estimates there are 25 million U.S. smart TV homes, but only 12 million are connected to the Internet. That 12 million figure matches Nielsen's estimate. What's more, that 50% ratio of smart TVs to actual Internet-connected smart TVs has held steady since the debut of smart TVs in the latter part of the last decade. It's a conundrum no one industry has been able to solve.

Hand-in-hand with smart TVs are Blu-ray players, which offer consumers a much more affordable way to connect to the Internet and Internet apps.

There are 42.1 million homes in the U.S. with Blu-ray players, according to the Digital Entertainment Group. LRG estimates 15 million homes have a Blu-ray player connected to the Internet, a bit under 40% of the installed Blu-ray base.

Because less than half of all smart TVs and Blu-ray players are connected to the Internet, some of the promise of these devices has yet to materialize.

Without an Internet connection, all the apps available on those devices, whether it's Netflix, Hulu or an MVPD's cable programming channel lineup, lie dormant.

Below is a list of smart TV manufacturers and Blu-ray players and the apps present on those devices.

### Smart TVs

Manufacturer	Content
<b>LG</b>	NetCast Entertainment, Google TV, YouTube, Netflix, Vudu, CinemaNow, Pandora, Flickr, Skype, Yahoo TV
<b>Mitsubishi</b>	Vudu, Pandora, Flickr, Picasa, Facebook, AP, NYTimes
<b>Panasonic</b>	Netflix, Amazon, YouTube, CinemaNow, Picasa, Bloomberg, Skype, Pandora, Twitter, Fox Sports
<b>Samsung</b>	Blockbuster On Demand, YouTube, Hulu Plus, Netflix, CinemaNow, Vudu, Twitter, Flickr, ESPN Next Level, MLB.TV, Facebook. Media Hub includes content from MTV, NBC, Paramount, Universal and Warner Bros.
<b>Sharp</b>	Netflix, Vudu, CinemaNow
<b>Sony</b>	Amazon, Netflix, Sony Pictures, YouTube, Hulu Plus, Facebook, Blip TV, Google TV
<b>Toshiba</b>	Netflix, YouTube, Flickr, Facebook, Pandora, Twitter
<b>Vizio</b>	Amazon, Netflix, Vudu, Pandora, NBA Game Time, Flickr, Yahoo, Hulu Plus, Blockbuster On Demand, Twitter

### Blu-ray players

Manufacturer	Content
<b>LG</b>	CinemaNow, YouTube, Netflix, Vudu, Picasa, Pandora, Accuweather.com
<b>Panasonic</b>	VieraCast, Netflix, Amazon, YouTube, Picasa, Skype, Twitter, Fox Sports
<b>Samsung</b>	Netflix, YouTube, Facebook, Twitter, Crackle, Blockbuster, CinemaNow, Picasa, Pandora, Vudu, AP, USA Today, Accuweather
<b>Sharp</b>	Netflix, Vudu, Pandora
<b>Sony</b>	Hulu Plus, Netflix, Amazon, Yahoo, YouTube, Pandora, Blip.TV, Crackle, DailyMotion, FearNet, NPR, Howcast, Google TV
<b>Toshiba</b>	Netflix, Vudu, Blockbuster, YouTube, Flickr, Facebook, Pandora, Twitter
<b>Vizio</b>	Netflix, Pandora, Vudu, Twitter, Flickr

## Delving deeper into the transport technology

It's important to understand the transport path for the content/apps that appear on smart TVs and Blu-ray players.

A smart TV or Blu-ray player contains ports (typically wired or wireless Ethernet ports) that allow a consumer to connect that device to their in-home broadband router. Using that connection, consumers can call up Netflix or Hulu's web portal on a smart TV or Blu-ray player and start streaming content to that device.

The content will originate from a Netflix or Hulu server, travel over the open Internet to the broadband provider's local access facilities (a central office [CO] in the case of a telco or a cable mode termination system [CMTS] at a cable systems' headend) and then pass over the provider's local connection (last mile) to the cable/DSL modem/gateway in the home.

**If that consumer started a stream from Netflix or Hulu on their PC or tablet, the transmission path would be exactly the same. In terms of return path data measurement, there are three to four possible areas in that transmission where activity could be monitored: The originating server that houses the content, the cable/telco's access facility (the telco CO or cable operator's CMTS), the in-home gateway device (either a router or modem) and the end device itself (the smart TV, Blu-ray player, iPad etc.).**

Most apps on smart TVs and Blu-ray players draw content using this same transmission path. The one exception, which is key for programmers, is the set of apps that provides live cable and broadcast networks from MVPDs.

Let's take Samsung and Verizon FiOS for example. In August, Verizon announced it had launched an application on Samsung smart TVs that allowed FiOS subscribers to view parts of the FiOS channel lineup on their Samsung smart TVs without the need of digital set-top box. At the moment, Verizon is only offering 26 live channels (see page 10), as it awaits agreements with other programmers to expand that list.

Verizon has two national headends that ingest cable network signals from the satellite feeds originated by those programmers. Verizon sends those signals using MPEG-2 encoding to all its regional headends, then to local headends in its 13 U.S. service territories, where they are transported via the last-mile fiber-optic connection to subscriber homes. That's the transmission path for the entire FiOS channel lineup to the FiOS digital set-top box.

Verizon also creates a duplicate Internet (or IP) video feed of those same channels, transcoding them into an IP format for delivery over that same national/regional/local fiber network to customers' authorized IP devices. The first such device is the Xbox (see page 10). Verizon has now added the Samsung smart TV to that list.

In terms of return path data, the key points where traffic information could be collected would be Verizon's originating headend facilities, where the individual program stream originates, the broadband modem in the home (which directs the stream to appropriate end device) and the actual end device.

## Growth trends

Just as it is nearly impossible to buy a TV set today that is not HD, increasingly all TV sets sold in the future will be considered “smart TVs,” defined as having an Internet connection and sporting apps/content from online content providers and media companies.

But that doesn’t mean all consumers will hook them up to the Internet (see above) or that usage of those apps will mirror usage of those apps on other devices.

First, smart TVs don’t become smart unless they are hooked up to the Internet. People in any of America’s homes can buy a smart TV, but only those homes with a broadband connection (80 million) can use the features, including the live channel lineups from a Verizon or Time Warner Cable.

Second, consumers have to make the conscious decision to use the smart TV as their set-top box in the place of the set-top box offering by the cable or telephone companies. That’s a behavior shift that will happen to some degree over time, but limited content availability means the shift is not automatic. Until an MVPD’s full channel lineup is available on a smart TV or Blu-ray player, usage of those devices to watch linear television will be limited.

Also, a smart TV does not include any storage. Given that DVR penetration stands at 44%, a sizable portion of Americans want in-home storage of video content. The move to network DVR could, however, help the smart TV trend, since MVPD subscribers could gain access to storage for their smart TVs via a cloud-based service delivered by their MSO or another cloud-based provider.

**The key stats to follow going forward are the number of smart TVs that are actually hooked up to the Internet, any survey data from those connected TVs of how much they are watching, what content they are watching, etc., and the deals MVPDs make with smart TV manufacturers to offer VOD and live TV channel lineups (and the channels in those lineups) on those platforms.**

## Internet video STBs

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For the segment of consumers who were alienated from their pay TV provider for a host of reasons, such as rising programming costs and lack of a *la carte* channels, the appearance of Internet video (OTT) set-top boxes during the past five years has been a Godsend.

With the growing amount of video content on the Internet, starting with YouTube and followed by iTunes, Netflix, Hulu, Amazon and others, the allure of buying a set-top box to access content that MPVDs had little to no interest in offering has held great appeal for certain parts of the American demographic.

During the past five years, the Apple TV, Roku, Boxee, Google TV and Slingbox devices have come to define the OTT set-box space. They all differ in price, capabilities and most importantly in marketplace acceptance.



Combined, perhaps 15 million devices have been shipped across all these providers, with Apple leading the way with about 6.8 million devices shipped as of the second quarter 2012. It's important to note, however, that these numbers reflect total shipments as opposed to total units now in use — for example, as Apple TV consumers buy the third-generation box launched in June 2012, many of those units replaced the second-generation Apple TV box launched in 2010. If the total universe of OTT set-tops is 15 million units shipped, the total number of unique homes is probably closer to 12 million.

All these devices require a broadband connection to access available Internet video content and apps. Thus the transmission path and return path definitions are exactly the same as discussed in the smart TV section above.

A consumer with a Google TV that accesses Netflix to stream an episode of *Lost* receives that episode via the same path used to stream *Lost* to a PC or tablet in that home. The stream originates from a Netflix server, travels through an Internet backbone to the local access facility belonging to the broadband service provider, then over the local last-mile connection to the consumer's modem/router in the home and then on to the OTT set-top.

No MVPDs have deals with any OTT box maker for live channels. A handful of "TV Everywhere" deals are in place, such as Roku's pact to offer HBO GO and Epix apps to authenticated AT&T, Charter, Cox, RCN and Verizon subscribers.

### **Apple TV**

The Apple TV box is now in its third generation, with the current version retailing for \$99. (It supports 1080p video using h.264, MPEG-4 and Motion JPEG formats, with support also for Dolby 5.1 surround sound.)

Like the unit it replaces, this set-top can stream video content from Apple's iTunes plus access content from YouTube and Netflix, along with content supplied by Disney, Fox and BBC America. More recently, users were given access to content from Hulu Plus, MLB.com and NBA.com's Season Pass.

The current version has indeed proven popular, with 1.3 million units sold in Q3 '12 ending June 30, and 4 million units sold so far for the year. That would bring the total device shipments as noted above to about 6.8 million across the three models.

### **Roku**

Another popular alternative is the Roku set-top, with four models comprising the entry-level \$49.99 Roku LT, the \$59.99 Roku HD, the \$79.99 Roku 2 XD and the \$99.99 Roku 2 XS — all of which can connect to TV sets using an A/V cable and connect to the home broadband connection via a built-in Wi-Fi link. All four models also offer 720p video playback, a remote control and access to content from hundreds of providers, including Netflix, Hulu Plus, Amazon Prime Video, HBO GO, Pandora, Disney, UFC, MLS, CNBC, NBA.com, Epix, Fox News, MLB.TV, Dish Works, NBC News and Showtime.

The Roku 2XD adds 1080p video, while the Roku 2 XS adds gaming features including motion control, a free version of *Angry Birds* and perhaps most importantly, Ethernet and USB ports that allow it more flexible connections to TV sets and even other devices.

Thus far, Roku has sold more than 3 million boxes to date. CEO Anthony Wood has recently predicted he expects to sell 19 million Roku devices during the next three to four years.



## Boxee

Boxee began its life as software downloaded to PCs, but in the past year it has shifted its product focus entirely to a dedicated OTT box. The current \$199.95 model includes a two-sided remote and plugs into the TV using an HDMI cord. It also requires an Internet connection, with options to supply that link using Wi-Fi or wired Ethernet.

Content partners include MLB, Netflix, NHL, Vudu, Pandora and Spotify, providing a range of on-demand titles. But Boxee also offers an optional Live TV service consisting of local broadcast networks accessed using a \$49 dongle plug-in device. The dongle essentially is an antenna that pulls in the local ATSC broadcast TV signals.

Recent reliable estimates put the Boxee user base — including legacy software as well as customers who bought the box hardware — at about 2 million.

DEVICE	PRICE	CONTENT	UNITS SOLD
Apple TV	\$99	iTunes, YouTube, Netflix, MLB.com, NBA.com, Flickr, Mobile Me	7M
Boxee	\$180	Netflix, Vudu, ABC, CBS.com, CNN.com, ComedyCentral.com, YouTube, BBC, Flickr, Digg, Picasa, Netflix, WB, MTV Music, MLB.TV, NBA, NHL	N/A
Google TV	\$99	YouTube, Turner, NBCU, NBA, Amazon Instant, Netflix	less than 1M
Roku	\$59–\$99	Netflix, Hulu Plus, Amazon, HBO GO, Crackle, Facebook, Revision 3, Flickr, Pandora, MLB.TV, Vimeo, Wealth TV, Al Jazeera	3M
Slingbox	\$179	Subscriber's home cable lineup	N/A

## Google TV

A software platform based on the Android operating system and Chrome browser, Google TV has faced numerous challenges including failed hardware and still lukewarm reception among consumers. When built into either TV sets directly or provided via a companion box, it offers access to apps from Clicker, Netflix, Adult Swim, Amazon Instant Video, Cartoon Network, Crackle, HBO GO, PBS Kids, RussianTV, SlingPlayer, SnagFilms, TBS and TNT.

Google TV launched in October 2010 only in the United States aboard the Sony Internet TV and Internet TV Blu-ray disk player and the Logitech Revue set-top streaming player. In November 2011 Logitech CEO Guerrino De Luca said the Revue was “a mistake of implementation of gigantic nature” and that there were no plans to introduce a replacement box.

As of August 2012, of the three original Google TV devices, only the Sony Blu-ray player remains available. In their place, newer Google TV offerings include two LG Smart TV sets and the Sony NSZ-GS7 streaming player. Vizio also has announced the \$99 Co-Star streaming player with Google TV, and Chinese electronics maker Hisense also has announced preorders for a sub-\$99 Hisense Pulse video player with Google TV.

Because of the multiple devices, assessing the Google TV user base is challenging. A February 2012 report by mobile app search Xyologic estimated there are about 4.7 million Google TV users, and with the transition between new and discontinued devices that probably hasn't grown much in the subsequent months. That number represents U.S. users only, as Google TV only launched in Europe and Canada via the Sony NSZ-GS7 player in late August 2012.

## **Slingbox**

Arguably the original OTT streaming set-top, Sling Media's Slingbox launched in early 2007. It operates as a relay — when hooked up to a pay TV set-top box and the home Internet connection, the Slingbox allows users to watch all live TV and recorded DVR video using an Internet-connected PC, mobile phone or tablet device.

In late 2007, EchoStar Corp. acquired Sling Media in a deal worth about \$380 million. While still operating as a subsidiary, Slingbox technology was built into Dish Networks' ViP 922 set-top, which recently was discontinued. It still continues to field the Slingbox stand-alone set-tops, including the \$299 Slingbox Pro HD and the \$179.99 Solo SD boxes, along with a smaller Slingbox 700U device offered to MVPD partners for use with IP Internet-connected TV set-top boxes. Also, Sling Media has launched applications that integrate with Google TV and Western Digital Live set-tops.

Of all of the Internet video set-top players Sling Media and parent EchoStar have been the most cagey when it comes to providing Slingbox's subscriber base. There are perhaps 1 million ViP 922 set-tops in use, and that number will dwindle as it has now been replaced by the flagship Hopper/Joey box combination — which interestingly does not have Sling capability built in.

## **Other new players**

Aside from these players, there are a gaggle of lesser Internet video streaming boxes, including the Belkin @TV Plus, Iomega TV ScreenPlay, GoFlex TV HD, Netgear NeoTV and the Western Digital WD TV Live Hub. But none of these devices has made a noticeable impact in the consumer market, and we estimate that their numbers are likely in the sub-100,000 range in total.

## **Growth trends**

These OTT STBs have appealed to a younger demographic interested in mixing and matching different Internet-based content from Internet video aggregators such as Netflix and Hulu, without subscribing to a cable, DBS or telco video service.

In a few instances, MVPDs and programmers have agreed to allow authenticated content to flow through these devices, such as the HBO GO deal with Roku. But it's a crazy patchwork quilt of programmer rights, MVPDs and OTT STB providers, which ensures a rather lengthy process to get deals completed.

Given the lackluster sales figures for some of these devices (Boxee and Google TV) and the quickly shifting sands in this market, it's difficult to see OTT STBs moving ahead of gaming consoles or smart TVs in the minds of consumers. In fact, these OTT STBs may be rendered largely obsolete as those other categories add desirable consumer features. And Apple, arguably the leader in this segment, appears intent on entering the smart TV or the digital STB space itself, which could serve to further upend this nascent market.

Even Google is using a traditional set-top box architecture with its launch of Google Fiber in Kansas City where it will offer a traditional cable TV lineup of channels and VOD programming rather than relying on its Google TV OTT set-top box.

## Mobile devices (tablets)

Of all of the mobile devices now available to consumers, tablet devices provide the most logical pathway for delivering TV video content. With larger screens measuring between 7 and 10 inches, they are well-suited for video playback.

Within this device segment, the undisputed king is the Apple iPad, now in its third generation. Gauging the actual U.S. user base is difficult, as Apple and other tablet manufacturers frequently release only worldwide quarterly shipment numbers. Also, we are starting to see the predictable replacement cycle come into play, as users replace older models with newer versions and therefore don't add to the overall user base.

Given those caveats, eMarketer estimates that there will be about 53.2 million iPad users in the U.S. by the end of 2012, representing about 76.4% of total tablet users. If accurate, the eMarketer figures would put the total tablet user base in the U.S. at about 66.3 million by year-end 2012. The marketing group estimated U.S. tablet penetration will reach 29.1% of U.S. Internet users by that time.

### U.S. iPad users and penetration, 2010–2015

	2010	2011	2012	2013	2014	2015
<b>iPad users (million)</b>	<b>11.5</b>	<b>28.0</b>	<b>53.2</b>	<b>70.5</b>	<b>81.1</b>	<b>90.8</b>
—% change	—	143.9%	90.1%	32.6%	15.1%	11.9%
—% of total population	3.7%	8.9%	16.8%	22.1%	25.2%	27.9%
—% Internet users	5.1%	12.1%	22.2%	28.7%	32.3%	35.3%
—% tablet users	88.0%	83.0%	76.4%	71.2%	68.0%	68.0%

Note: individuals of any age who use an iPad at least once per month  
Source: eMarketer, June 2012

Meanwhile, the Consumer Electronics Association is a bit more optimistic, estimating that about 29% of all U.S. Internet users owned a tablet already as of the end of June 2012. When compared to the 243.2 million U.S. Internet users as estimated by the U.S. Census Bureau, that works out to about 70.5 million tablet users.

Again, actual numbers are not available, so the estimates from eMarketer and CEA do at least establish a likely range as of September 2012 of somewhere between 60 million and 70.5 million.

### The iPad

As stated above, the iPad with its three device generations is the overwhelming market leader, shipping 17 million units worldwide in the second quarter 2012 alone for a 68.2% market share, according to recent estimates from IDC Corp.

The iPad versions all offer a 9.7-inch diagonal screen and some sort of Internet connectivity, with options ranging from Wi-Fi only to cellular and in the case of the latest version, LTE broadband wireless access as well.

Despite the options for cellular connectivity, the core Internet access point for most iPad users is Wi-Fi, with estimates that roughly 75% of all iPad users rely solely on it for web access. In March 2012, wireless analyst Chetan Sharma estimated about 90% of all tablet owners rely exclusively on the Wi-Fi connection for Internet access, even if the device offered cellular connectivity.

In the home, the iPad is quickly becoming the “second screen” for consumers watching television. MVPDs have been quick to hop on this trend, developing apps that allow consumers to use an iPad as a remote control for channel changing, DVR scheduling and VOD viewing. Cablevision, Time Warner Cable and DirecTV now offer some version of their linear TV channel lineups on the iPad to authenticated users.

Pricing for the iPad depends on the model. The current available models include the iPad 2 with onboard 16 GB storage for \$399 with Wi-Fi only or \$529 with cellular connectivity from either AT&T Mobility or Verizon Wireless. The now-flagship third-generation iPad includes Wi-Fi versions ranging from \$499 with 16 GB storage up to \$699 with 64 GB storage, while the cellular versions sell for \$629 with 16 GB storage up to \$829 with 64 GB storage.

In content, the iPad is a vehicle for Apple’s massive iTunes store for the purchase of video TV and movie content. In TV content, the iTunes store draws from long list of programmers, including A&E, ABC, ABC Family, Adult Swim, AMC, BBC America, BET, Bravo, Cartoon Network, CBS, CNN, Comedy Central, The CW, DC Comics, Discovery, Disney, Disney Junior, Disney XD, E!, ESPN, Food Network, Fox, FX, Hallmark Channel, HBO, HDTV, History Channel, The Hub, IFC, Lifetime, Logo, Looney Tunes, Marvel, MLB.com, MTV, National Geographic, NBA, NBC, NFL Network, NHL, Nickelodeon, Nick Jr., Oxygen, PBS, PBS Kids, Showtime, Spike, Starz, Sundance Channel, SyFy, TBS, TLC, TNT, Travel Channel, USA Network, VH1 and WE tv.

In addition, iPad users have access to a host of TV apps via the store. Most major programmers, including Turner, ABC/Disney, HBO, ESPN and broadcasters NBC, CBS, ABC and Fox, have all launched iPad apps offering varying levels of on-demand access to full-length TV episodes as well as program schedules, video extras, photos and program information.

Turner and HBO are among a growing list of programmers offering authenticated access to TV content in partnership with MVPDs. Subscribers log in using their pay TV user name and password (often this is the user’s e-mail and password) and are granted access to a more complete list of full-length episodes.

Some programmers including ESPN and Disney through their “Watch” apps are also offering authenticated access to live TV streams. Again, users must log in using an authenticated ID and password from a partner MVPD.

Live TV access also has come into play: Cablevision’s Optimum for iPad app offers Cablevision customers Cablevision’s entire live TV channel lineup within the home only; similarly, Time Warner Cable’s TWC TV iPad app offers more than 90 live TV channels to authenticated digital TV customers, also only within their homes. At the end of 2011, TWC reported 850,000 of its 10 million broadband subscribers (close to 10%) had downloaded the TWC TV app and could thus view live TV channels.

It is important to remember only those Cablevision and TWC subscribers who also subscribe to that company’s broadband service can access live TV on the iPad. TWC’s data to basic penetration stands at 87%; Cablevision’s at 93%.

DirecTV offers 50 live TV channels for in-home viewing on its iPad app. DirecTV has not released the number of subscribers who have downloaded the app, but it requires an advanced HD/DVR with a broadband connection. The number of DirecTV STBs hooked to the Internet is 2 million-plus.

Beyond the iTunes store, iPad users also have access to on-demand TV content via apps provided through aggregators such as Netflix and Hulu Plus or through apps provided by their own MVPD, such as Comcast Xfinity.

As an alternative, iPad users can access an array of video via the tablet's Safari web browser. But there is one difficulty: As with all other iOS devices, the iPad is unable to render Flash video, thanks to a longstanding rivalry and technology war between Apple and Flash developer Adobe Inc. For that reason, much of the TV video access for iPad users is funneled through the apps, which can provide the video in HTML5 or MPEG-4 formats that can be rendered by the device.

Going forward, it is expected that Flash will give way to HTML5 among web developers, including programmers' portal pages. As that occurs, there is the potential for greater direct distribution of Internet video content to the iPad and other tablet devices via a website rather than a downloadable app.

### **Android tablets**

Although the iPad dominates the tablet market, there are now other tablet competitors available in the market, although to date none has gained enough market share to seriously challenge the iPad.

Most notable among this subset is Samsung's Galaxy Tab line, including 7-inch, 7.7-inch and 10.1-inch versions. Worldwide, Samsung shipped just shy of 2.4 million tablets in the second quarter, for a 9.6% market share, according to IDC numbers. Between the fourth quarter 2010 and second quarter 2012 Samsung sold 1.4 million Galaxy Tab 7, Galaxy Tab. 7.7 and Galaxy Tab 10.1 devices in the U.S.

It is of note that Samsung's ability to continue selling the Galaxy Tab tablet is in question in light of a U.S. District Court jury decision in August 2012 that Samsung infringed on Apple's basic design and violated five patents. That decision will undoubtedly be appealed, ensuring the case will drag on through 2013 at least.

In all, there are now 12 versions ranging from Wi-Fi only for all three tablet sizes as well as models with storage options and cellular connections through Verizon Wireless, AT&T Mobility, Sprint Nextel Corp., T-Mobile USA and US Cellular.

In addition, the manufacturer also launched the Samsung Note line of tablets Aug. 29, offering Wi-Fi only connectivity, a 10-inch screen and a novel pen peripheral that allows signatures and touch-point editing.

Pricing wise, the Galaxy Tab devices range from \$199.99 for the 7-inch Verizon Wireless model up to \$399.99 for the Wi-Fi only Galaxy Tab 10.1. The Galaxy Note tablets range from \$499.99 with 16 GB storage to \$549.99 with 32 GB storage.

All Samsung tablets offer access to the Google Play Store, which offers a range of TV and movie content for purchase.

As with the iPad, there also are a host of apps available for content aggregators including Netflix and Hulu Plus, as well as Android app versions for authenticated programmer apps including WatchESPN, HBO GO and Turner's TNT and TBS live TV apps.

However, the overall volume of available content and apps on Android tablets is far less compared to iPad tablets. And the lineup of TV content via Google Play for purchase consists of about 270 TV series drawn from ABC, AMC, CBS, PBS, SyFy, NBC, Starz, Lifetime, Fox, USA Networks, Bravo, WWE, TNT, FUNimation and National Geographic among others — far less than that of the iTunes store.

Similarly, the supply of programmer apps for the Android platform also is more limited compared to the Apple iOS. For example, Disney's recently released Watch Disney XD, Watch Disney Junior and Watch Disney apps are available for the Apple iPhone, iPad and iPod Touch devices, but not for Android. The same is true for DirecTV's Nomad app, allowing users to transfer content from their DVRs to iOS devices — as yet there is no Android version of the app.

### **Kindle Fire**

More recently, the \$199 Amazon Kindle Fire has managed to grab some U.S. tablet market share. As with the other tablets, there are no exact figures, but recently Amazon itself announced the Kindle Fire had sold out, and that it had attained a 22% U.S. market share since its launch in November 2011 — although the company refuses to give exact numbers.

IDC estimates Amazon shipped 1.2 million Kindle Fire tablets in the second quarter and to date has sold 10 million or more. At the high end, if we extrapolate based on the 29% tablet penetration of U.S. Internet users estimated by CEA, this works out to about 15.7 million Kindle Fire devices.

Feature wise, the Kindle Fire is a Wi-Fi, only 7-inch tablet with an operating system based loosely on the Android OS. As such, it is not sanctioned by Google, and many Android apps will not work on the device.

In content, the Kindle Fire offers users direct access to TV and movie content via Amazon Prime Video, including more than 100,000 titles from programmers A&E Television Networks, ABC, ABC Studios, Acorn Media, Animal Planet, BBC, BBC America, Bravo, Cartoon Network, CBS, Comedy Central, Country Music Television, Discovery, Discovery Channel, Fox, FUEL TV, FUNimation, FX, HBO, Investigation Discovery, ITV Global Entertainment Ltd, Logo, MGM, MTV, National Geographic, National Geographic Channel, NBC, NBC Universal, Nelvana, NFL, NHL, Nick Jr., Nickelodeon, PBS, Showtime, Sony Pictures Home Entertainment, SPEED, Spike, Starz, SyFy, The CW, TLC, TNT, Travel Channel, TVF International, USA, VH1, Vision Video, Vivendi Entertainment and Viz Media.

### **Google Nexus 7**

Another tablet that may have an impact is the Google Nexus 7 tablet released in August 2012. As the name hints, it is a 7-inch tablet that also includes Wi-Fi connectivity and the new Android 4.1 Jelly Bean operating system.

Obviously, sales figures are unavailable as yet, but early reports were the tablet initially sold out via the Google Play store.

For content, as with the Samsung Galaxy Tab models, it comes preloaded with a link to the Google Play Store and its lineup of TV and movie content.

Google is providing a free Nexus 7 tablet to all subscribers to its Google Fiber TV/broadband platform in Kansas City.

### **Other Android tabs**

Following the Samsung Galaxy Tabs and the Kindle Fire, there are lesser Android tables including the Motorola Xoom, the Asus Eee Pad, Sony Tablet S, Toshiba AT 200 and Huawei MediaPad 7. While the list is long, the shipment numbers are relatively small. Excluding the Kindle Fire as it is not fully an Android tablet, worldwide Android tablet shipments totaled just 7.3 million compared to the iPad's 17 million.

## Worldwide Tablet shipments

	2Q12 SHIPMENTS	MARKET SHARE	2Q11 SHIPMENTS	MARKET SHARE	2Q12/2Q11 GROWTH
1. Apple	17,042,000	68.20%	9,248,000	61.50%	84.30%
2. Samsung	2,391,000	9.60%	1,099,000	7.30%	117.60%
3. Amazon.com	1,252,000	5.00%	0	N/A	N/A
4. ASUS	855,000	3.40%	397,000	2.60%	115.50%
5. Acer	385,000	1.50%	629,000	4.20%	-38.70%
Others	3,067,000	12.30%	3,668,000	24.40%	-16.40%
<b>All Vendors</b>	<b>24,994,000</b>	<b>100%</b>	<b>15,042,000</b>	<b>100.00%</b>	<b>66.20%</b>

Source: IDC Corp.

Of these competitors, Asus leads with about 855,000 tablets shipped world wide in the second quarter, followed by Acer at 385,000 tablets, according to IDC numbers.

### Microsoft Surface

In the near future there is one tablet industry watchers are pegging as a possible competitive force: The Microsoft Surface. Rumored to be set for an October 2012 release along with the new Windows 8 operating system, the Surface will include two versions. A more consumer-oriented version will be built on a stripped down version of the Windows 8 OS and will offer a 10.6 inch display with HD resolution.

A second version will be built using a full version of Windows 8 and will be aimed more at a business user.

Both will offer a unique pressure-sensitive cover that doubles as a keyboard and a micro SD card slot along with 32-128 GB storage, allowing users to download content and take it on the road.

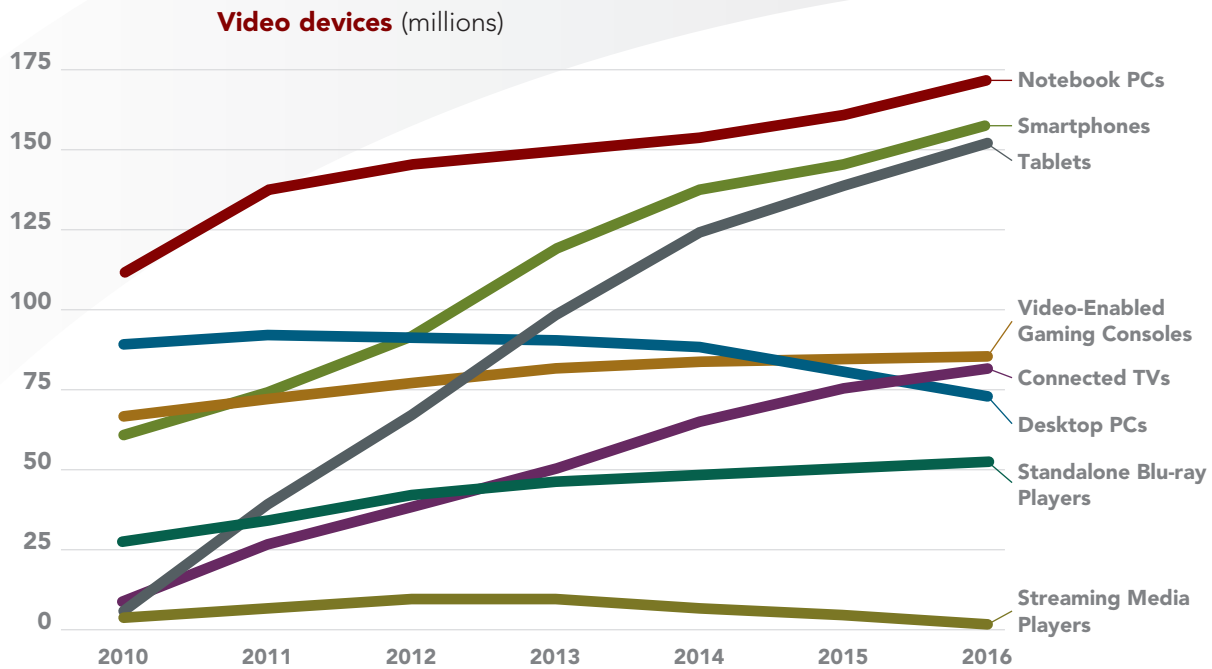
What connectivity the Surface will offer, as well as pricing for its models, has not been released as yet.

The Surface will be Microsoft's first stab at a tablet, although its Windows OS is already the basis for other lesser tablets supplied by Samsung, Fujitsu and Acer among others.

### Growth trends

While the tablet market will continue to be dominated by the iPad, overall growth estimates are optimistic. ABI Research recently projected that worldwide tablet shipments will range between 102 million and 110 million for 2012. The chart on page 24 from NPD provides a cross section projection of all device sales going forward, including tablets.





Source: NPD Group

New entries will affect that growth curve. On Sept. 6 Amazon announced an expanded lineup of Kindle Fire tablets, including a \$159 refreshed version of the original device plus a 7-inch HD version for \$199 and a larger 8.9-inch version for \$299. Meanwhile, Microsoft is preparing to launch the Surface tablets, and Apple also may make some market waves with the rumored launch of a 7-inch iPad “mini” tablet in the fall 2012.

Also, as noted, the ongoing patent war between Apple and Samsung could impact overall tablet sales and market share numbers. The case will likely drag out for a year or more, but if Apple is successfully in gaining a permanent ban on Samsung Galaxy Tabs (and it also has petitioned the court to add the Galaxy Note tablets to the list of devices that violate its patents), Samsung, in a worst case scenario, might exit the tablet market altogether, at least until it can create a design that works around the protected Apple tablet technology.

Overall, it is likely the penetration of tablets will continue to rise beyond the 29% rate in 2012. Market research firm Strategy Analytics predicted that by 2012 10% of the world population will own a tablet device, totaling 780 million devices in use among a projected 7 billion world population.

Elsewhere, there are strong indications tablet owners are increasingly using their devices to watch video. NPD DisplaySearch’s annual Global TV Replacement Study for 2012 found that the percentage of users who turned to tablets to watch TV and video jumped more than threefold from 2011 to 2012, from about 3% to 10%.

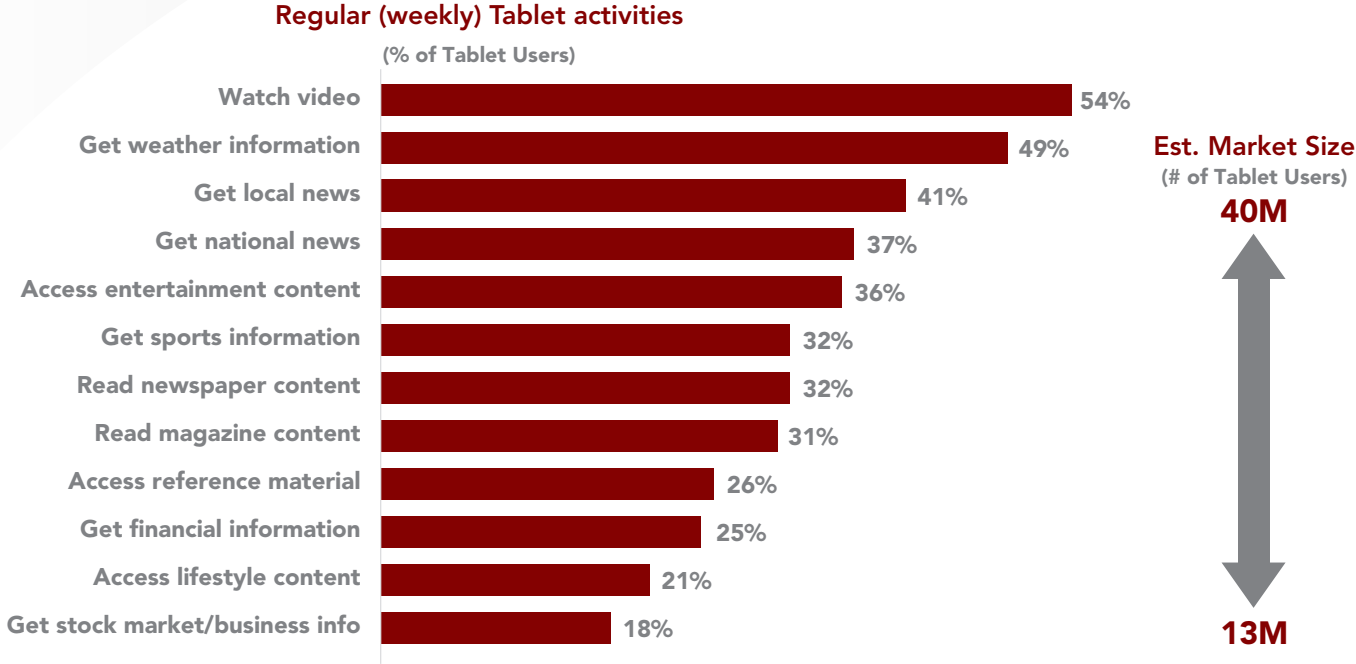
This is still a relatively small number and still includes non-TV video content. A host of other research and user surveys indicate tablets are more commonly being used to access e-mail, surf the web and communicate via social networks. And to some extent, video usage on Wi-Fi-only tablets also is gated by the availability of an adequate connection, while users with tablets using a cellular wireless connection are limited their data plans’ usage caps.

Nevertheless, the video usage growth rate as indicated by the NPD study is notable, in that it could indicate users are becoming aware that there is TV content available on their tablet and are now beginning to tap that capability.



And if there are more tablet owners, it is likely the march of apps offering wider access to TV content will continue, particularly given the rise of the authentication access model. With ESPN, Turner, HBO and others now tying access to full-length TV episodes and even live TV content to the user's pay TV subscription, it is likely tablet TV video usage will continue to rise.

**Tablet users are accessing a variety of content**



\*Source: U.S. Census Bureau eMarketer.

**Smartphones**

Another distribution source for television content is the smartphone, a device roughly half of all U.S. mobile adults now carry. As of the second quarter 2012, smartphones now outnumber feature phones among U.S. mobile customers, according to reports from Nielsen as well as wireless analyst Chetan Sharma. Compared to the 331.6 million total mobile customers according to the CTIA wireless association, that works out to about 166 million smartphone users.

Given the myriad models available it would be too time-consuming here to delve into specific smartphones in terms of capabilities. But it also isn't entirely necessary; by definition, all smartphones are Internet capable, have some video display and playback capabilities and are managed by a full operating system.

In contrast to tablets, smartphones have more limited access to TV content, particularly live TV feeds. There are many reasons, starting with the bandwidth available on wireless networks to transmit live video feeds.

ESPN's WatchESPN app, Dish Networks' Dish Remote Access and DirecTV's NFL Sunday Ticket apps — all available for the iPhone and Android smartphones — are among the few that offer live TV feeds on an authenticated basis.

Then there is Dyle TV, a free live TV service fielded by the broadcast TV-backed Mobile Video Coalition. Dyle TV uses a portion of local broadcasters' spectrum to provide a mobile live TV feed beamed to smartphones with special built-in antenna chipsets. The service involves 72 stations in 32 markets, and as of this summer is available through the Samsung Galaxy S Lightray 4G handset offered by prepaid mobile provider MetroPCS.

Give the need for a modified smartphone device and the lack of ubiquitous availability, we don't expect Dyle TV to have a significant market impact in the coming years.

Overall, while smartphones have the Internet connectivity and video display capabilities to render TV content, because of the relatively small viewing screen size it is likely they will be less of a focus for full-length TV programming and movies compared to tablet devices.

## Summary

The evolution of today's media landscape presents both perils and opportunities for content providers seeking the best tools for return path data measurement.

No sooner had the set-top box appeared as a promising device from which to capture measurement data than a myriad of other devices appeared in the marketplace, muddying the waters for programmers.

The range of options for consumers — gaming consoles, smart TVs, Blu-ray players, Internet video set-tops and tablets — presents challenges for MVPDs and programmers alike, especially as it relates to measuring viewership on these devices.

Here's an estimated breakdown of devices across the top 10 markets based on national penetration averages:

	DIGITAL SUB	HD/DVRS	GAMING CONSOLE	SMART TV/ BLU RAY	OTT STB	TABLETS	TV HOMES
<b>New York</b>	5,192,511	3,240,268	4,147,542	1,620,134	777,664	1,036,886	7,387,810
<b>Los Angeles</b>	2,306,782	2,442,886	3,126,894	1,221,443	586,293	781,724	5,569,780
<b>Chicago</b>	1,610,339	1,532,228	1,961,252	766,114	367,735	490,313	3,493,480
<b>Philadelphia</b>	1,872,919	1,312,882	1,680,488	656,441	315,092	420,122	2,993,370
<b>Dallas</b>	986,251	1,127,768	1,443,542	563,884	270,664	360,886	2,571,310
<b>San Francisco</b>	1,323,681	1,099,346	1,407,164	549,673	263,843	351,791	2,506,510
<b>Boston</b>	1,621,831	1,043,724	1,335,966	521,862	250,494	333,992	2,379,690
<b>Washington</b>	1,370,337	1,035,167	1,325,013	517,583	248,440	331,253	2,360,180
<b>Atlanta</b>	995,636	1,005,544	1,287,096	502,772	241,331	321,774	2,292,640
<b>Houston</b>	858,059	958,447	1,226,813	479,224	230,027	306,703	2,185,260
		<b>44%</b>	<b>56%</b>	<b>22%</b>	<b>11%</b>	<b>14%</b>	
<b>U.S. Total</b>		<b>50,000,000</b>	<b>64,000,000</b>	<b>25,000,000</b>	<b>12,000,000</b>	<b>16,000,000</b>	
<b>U.S. Total homes</b>		<b>114,000,000</b>	<b>114,000,000</b>	<b>114,000,000</b>	<b>114,000,000</b>	<b>114,000,000</b>	

The good news is that no matter the end device, much of the transmission path for these devices is largely uniform across the universe, which will make it easier to define places along that path where measurement can take place.

Additionally, the evolution of authenticated content (including live TV) to new devices will take time, giving players within the ecosystem a number of years to understand and adapt to these new delivery systems, and put in place reliable return path measurement strategies.



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