

The Rise of the Internet Tablet: The Keys to Success

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Overview

Now that hangover from the 2010 Consumer Electronics Show in Las Vegas has ended, it's time to separate hype from reality, especially in understanding the implications of the new technologies and proposed platforms. One of the platforms that received the most press, and rightfully so, was the Internet tablet, also referred to as a slate. Not only were there a number of new devices on display from industry leaders, but also a number of key enabling technologies, such as new processors from companies like NVIDIA and Qualcomm, and display technologies from Pixel Qi and Qualcomm (Mirasol). Even Apple managed to upstage CES once again with the industry's worst-kept secret about a tablet device, called the iPad, which was recently announced. Like all new technologies that appear at CES, however, it may be several years, if ever, before the platform becomes mainstream. We are already on the second year of the 3D TV hype and will see many more years before it becomes widely adopted (see the report, *3D Coming to a Home Near You* #IN0904469MBS for more research about the 3D TV market).

With our continuing coverage of the mobile market, In-Stat will continue to examine the technologies, platforms, applications, usage models, and business models that drive the highest growth and most dynamic segment of the electronics market—mobile solutions. This report clarifies some of the haze surrounding the tablet category and establishes some reasonable expectations for market development, consumer adoption, and system requirements.

HIGHLIGHTS

- Success in the mobile market requires offering a complete solution, including the device, content/applications, and wireless service.
- The potential unit TAM for Internet tablets is upwards of 50 million in 2014
- While consumer demand is still questionable, commercial opportunities for tablets are growing.
- Based on device BoM estimates, initial pricing of mainstream tablets should be in the \$400–\$500 range.
- New display, sensor, and wireless technologies could further enable tablet devices.
- Thus far, only Apple and ICD have indicated operator strategies, and only Apple offers an entire solution that includes content and applications.
- The silicon TAM is \$4.1 billion in 2014.
- ARM and x86 appear to be the processors of choice for tablets.

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PC, Smartphone, or MID 2.0

What exactly is a tablet, or what we will refer to as an Internet tablet? Unfortunately answering this question is difficult because it really depends upon the configuration of the device and market positioning by the OEM and service providers. In the past, the term tablet has traditionally been associated with PCs. A tablet PC is a notebook that features a touch screen interface with a display that typically turns 180° and folds flat against the keyboard to resemble a tablet, like the Fujitsu tablet PC in Figure 1. These devices were essentially fully functional PCs complete with PC-based processors and operating systems. At CES, Lenovo unveiled the IdeaPad U1, Figure 1, with a pop-out screen that comes complete with its own system (processor, memory, storage, battery, and connectivity) that can operate in conjunction with the keyboard as a fully functional PC or as a standalone tablet.

Figure 1. Convertible PCs



Fujitsu Convertible PC



Lenovo IdeaPad U1

Source: Fujitsu and Lenovo, 1/10

In 2006, mobile Internet devices (MIDs) arose from Microsoft's Origami concept and a plethora of solutions appeared, powered by Intel and its OEM partners, such as the Gigabyte device shown in Figure 2. MIDs are aimed at Internet-based entertainment, communication, and application devices for mobile users. MIDs typically feature physical or virtual keyboards, 5"-7" screen sizes, and although most are shipped with a full Windows operating system, the devices can handle only limited PC functionality.

Fast forward to 2010 and we have a new generation of "tablet" devices that are also aimed at entertainment, communications (particularly social networking), and other Internet-based applications; in other words, a whole new generation of MIDs with larger screens, a variety of design concepts, and powered by not only x86 processors and Windows, but also ARM-based processors and Linux

operating systems. Rather than being positioned as MIDs or all-in-one mobile devices, however, they are being positioned as next-generation e-readers and entertainment devices.

Figure 2. MIDS and Tablets



Gigabyte MID



HP Tablet

Source: Gigabyte and HP, 1/10

In-Stat defines an Internet tablet or slate (from here on referred to as just a tablet) as a mobile device featuring a touch screen display ranging in size from 5" to 12", wireless connectivity, an applications processor capable of handling multimedia functionality, and a programmable software platform.

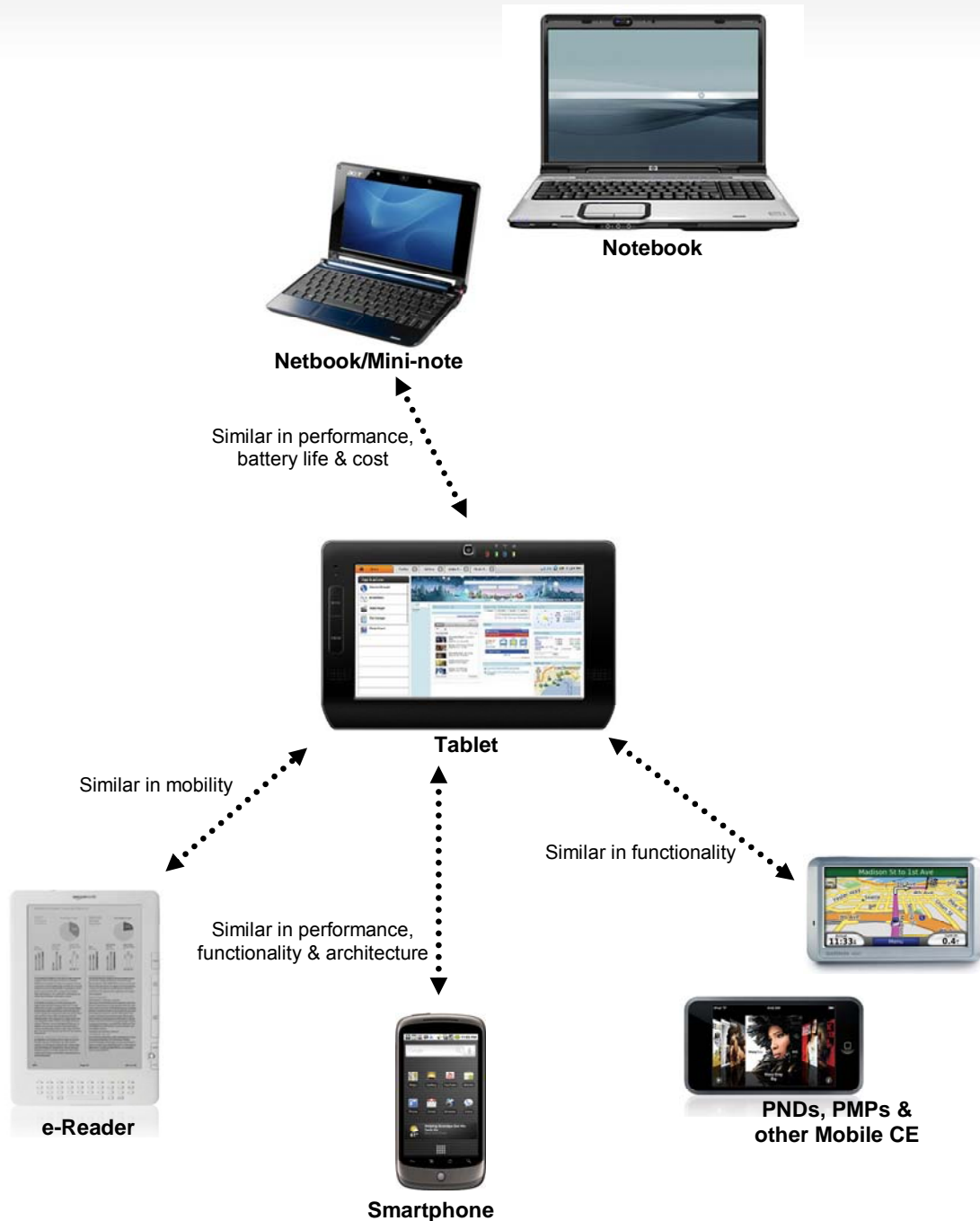
The Crowded Mobile Market

The next logical question is: Do we need another mobile device? The industry has obviously spoken with a resounding yes, but it is not clear if consumers will accept the concept. To be successful, tablets have to overcome the following barriers:

- Providing a cost-effective solution, in terms of the device, wireless services, applications, and other premium content
- Providing a quality experience, in terms of battery life, display resolution, and Internet connectivity
- Differentiating enough from existing devices to create a perceived need in the minds of consumers or taking market share away from other applications

While the first two may be in the control of the device OEMs and their partners, differentiating from other mobile devices is likely to be very difficult, as each platform continues to increase in functionality and increasingly encroach on the applications of other devices. Figure 3 provides an overview of the mobile landscape, as it applies to tablets. Tablets are targeted at the center of the market, between PCs and other handheld mobile devices, but they face challenges in terms of functionality from both directions.

Figure 3. Tablet Positioning in the Mobile Market



Source: In-Stat, 1/10

In terms of mobility, the tablets are generally on par with e-readers, which is likely one reason they are being positioned like e-readers. They are more mobile than netbooks and notebooks, which must be set down to effectively operate, but they do not offer the pocket size and mobility of other handheld devices, like smartphones. In terms of performance, they are most similar to smartphones and netbooks, offering some PC-like programmability and performance. The one limitation is the lack of full Windows support for

Windows 7 on devices not using an x86 processor, but as most of the market has discovered, the overhead of Windows is not necessary for mobile devices that are targeted towards Internet applications. As In-Stat has indicated before, the Internet is communications, OS, and hardware agnostic. Going with a Linux-based OS is also better suited to a software stack dominated by browser functionality and applications, while providing much shorter boot times.


In terms of battery life, tablets are likely to be comparable to netbooks. Even if the device does use an ARM processor and the latest display technology, the larger screen, graphic-intensive applications, and wireless connectivity are likely to drain more battery life than other handheld mobile devices.


Finally, in terms of price, tablets are likely to be initially more like netbooks or notebooks without some subsidies from operators. This is a result of the cost of the device and software IP. Unfortunately, if devices are not subsidized, the market opportunity is likely to be limited to the early adopters and commercial applications, much like the MIDs and UMPCs, which is why the business model for these devices is so critical.


Although tablets are likely to vary in terms of features, functionality, and price for some time, Table 1 provides a summary of how tablets are likely to stack up against other mobile devices initially. The green spaces indicate an advantage, the yellow indicates parity, and the red indicates a disadvantage compared to the competing mobile device

Table 1. Comparison of 2010 Tablets to Other Mobile Devices

	PMP	PND	Handheld Game	Smartphone	e-Reader	MID	Netbook	Notebook
Application Support	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Red
Battery Life	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Connectivity	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Displaying Graphics	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Displaying Text	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
I/O	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red
Internet Experience	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Mobility	Red	Red	Red	Red	Yellow	Yellow	Yellow	Yellow
Multimedia Functionality	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red
Price	Red	Red	Red	Yellow	Yellow	Yellow	Yellow	Yellow

 Tablets rank lower

 Tablets are comparable

 Tablets rank higher

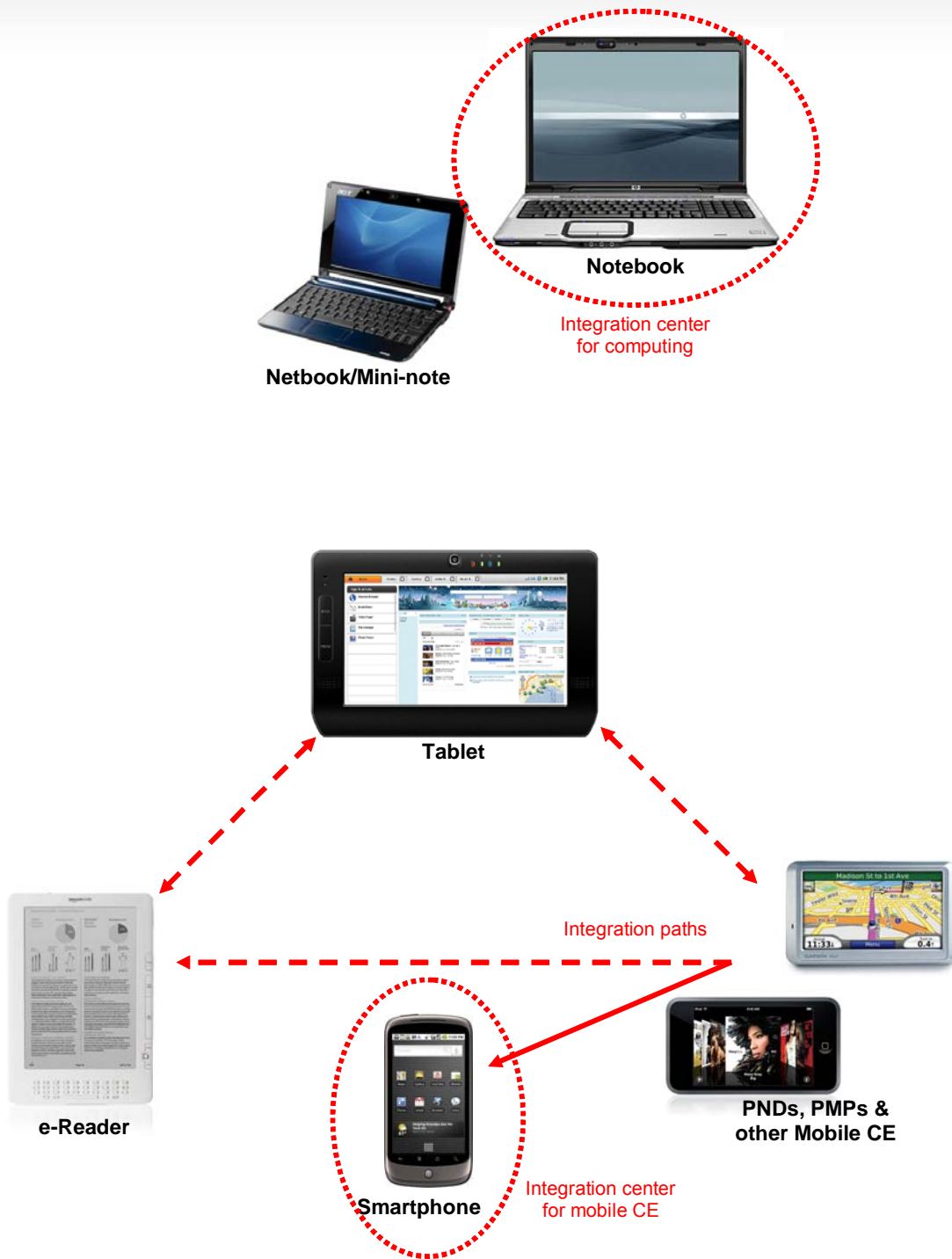
Source: In-Stat, 1/10

Market Migration

The other aspect to consider is not only where the market is today, but where it is likely to be in three to five years; the typical time it takes for a new platform to reach mass market appeal. Key trends in the industry point to where the market is likely to be by that time frame.

First, cellular handsets are likely to continue to dominate the market, in terms of numbers of units shipped annually, because of the relatively low price (due in some part to operator subsidies in certain regions), the mobility, the communication functionality (voice, text, and, now, social networking), ease-of-use, and broad third-party application support. As with the PC, the handsets are also a central point of feature integration (Figure 4). Much like handsets have already integrated the features of personal data assistants (PDAs) and digital cameras, handsets are now integrating the functions of personal navigation devices (PNDs), digital camcorders, handheld games, and portable media players (PMPs), particularly in the fastest growing handset segment—smartphones. In fact, smartphones will use the same wireless technology and processor architectures, particularly ARM and x86, as tablets and netbooks. The smartphone, however, is also a key segment of innovation for semiconductor packaging, battery technology, and display technology.

Figure 4. Functional Migration in Mobile Market



Source: In-Stat, 1/10

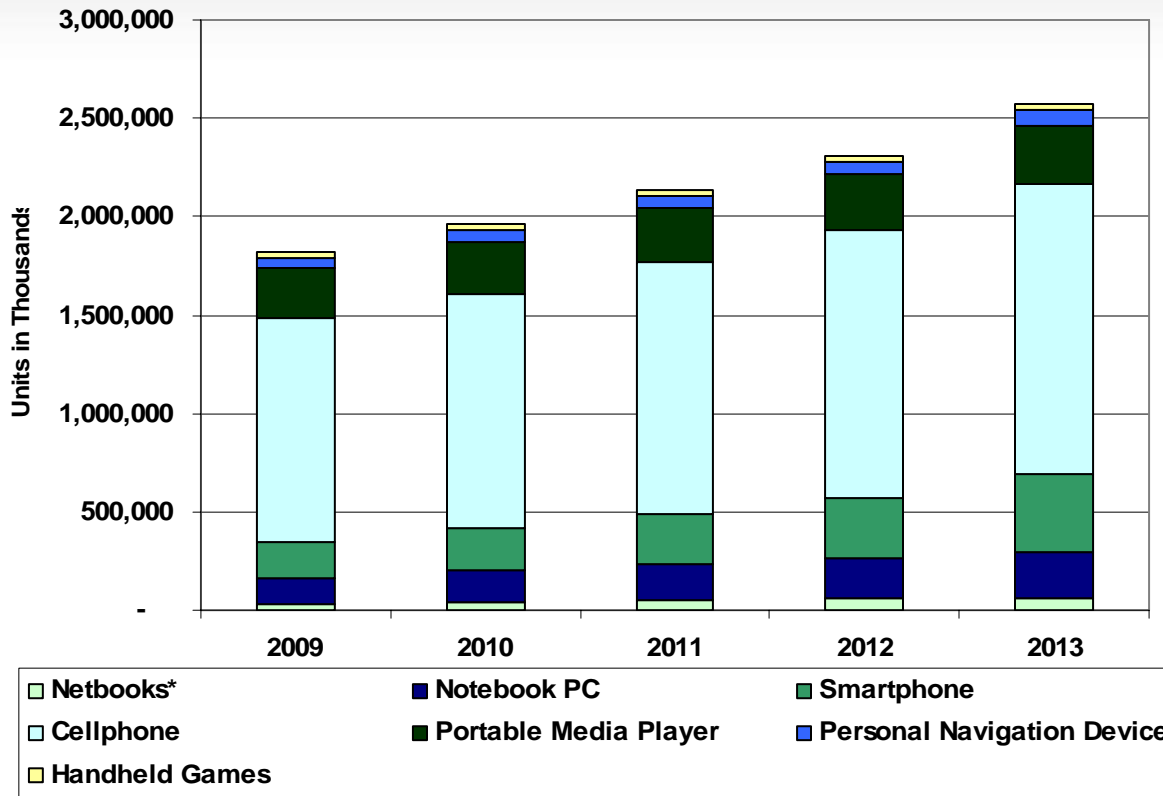
In comparison to future handsets, tablets will offer a larger display for viewing and interactivity. However, the smartphones can, and likely will, offer a quality experience with larger and higher resolution displays. The new LG smartphone, the GW990, due out mid-2010, will feature a 5" display, as well as Intel's latest Moorestown-generation Atom (x86) processor. Although many factors will determine whether tablets will be successful, it may be difficult to convince consumers to use a tablet over a smartphone for many applications.

In regard to netbooks, tablets will offer more mobility. In addition, tablets are likely to be perceived more as an Internet-only device than netbooks because tablets do not look like a PC. If something looks like a PC, consumers will expect it to act like a PC, which is a perception that has plagued netbooks. Also, because of the intended low-cost of the netbooks, netbooks are unlikely to be the center of integration for new features in computing. Traditional notebooks and ultra thin notebooks are likely to be the key integration points for computing in the future.

The one device that stands out as a key competitor to tablets is e-readers. E-readers have a similar size, similar processors, and are evolving to include additional functionality and advanced display and I/O technologies. So, are tablets just an evolution of e-readers? There is no clear answer at this point. E-readers have distinct usage and business models that are likely to continue into the future, even with additional functionality. However, the lines between the two devices will blur. New usage or business models for the tablets, if they emerge, will be the key differentiator. Currently, however, the e-readers are gaining significant momentum and are drastically changing the future of the publishing industry.

Figure 5 and Table 2 provide In-Stat's current forecasts for the various mobile devices, excluding tablets, which are included in the outlook section of the report.

Figure 5. Forecast for Mobile Devices (Units in Thousands)



* Includes netbooks, smartbooks, and UMPCs. MIDs are included in the tablet forecast.

Source: In-Stat, 12/09

Table 2. Forecast for Mobile Devices (Units in Thousands)

	2009	2010	2011	2012	2013	CAGR
Netbooks*	31,787	42,527	50,889	57,856	63,337	18.8%
Notebook PC	131,777	156,000	181,800	203,600	236,400	15.7%
Smartphone	184,564	214,240	253,254	305,282	386,780	20.3%
Cellphone	1,134,141	1,191,814	1,280,293	1,365,238	1,480,362	6.9%
Portable Media Player	260,400	268,800	275,000	280,420	297,767	3.4%
Personal Navigation Device	52,100	59,600	64,000	67,200	75,086	9.6%
Handheld Games	27,500	29,300	28,700	27,000	28,500	0.9%
Total	1,824,278	1,964,291	2,135,947	2,308,608	2,570,245	8.9%

* Includes netbooks, smartbooks, and UMPCs. MIDs are included in the tablet forecast.

Source: In-Stat, 12/09

Keys to Success

So what will be required to make tablets a success? The first requirement is to follow other successful devices in the market by offering a complete solution that includes the device, the wireless service, and the content. The best and most recent successes in mobile devices highlight the value of the device and the wireless service—the Amazon Kindle. The success of the Kindle, and subsequent successes of the entire e-reader market, is tied to creating a device that fits a particular usage model, which is reading. By using e-ink technology, the device provides an advantage over LCD displays in being able to read, even in direct sunlight. In addition, providing features like text resizing, bookmarks, and notes is geared toward the targeted usage model. However, bundling the wireless service into the device without the requirement for the user to establish a new or additional cellular account was probably the most critical feature. The bundled service eliminated a monthly service cost and the hassle of configuring the device. In other words, the device appears to be no more than an e-reader that has access to a large online library.

In terms of content, the Apple iTunes store, as well as Amazon's book library, exemplifies the value of the content. And even more recently, the Apps store for Apple's iPhone and iPod touch further provide additional value for consumers, as well as adding versatility to the device. Consumers view these as highly flexible devices with access to applications and content rather than dumb devices that have to be configured like a PC, not to mention the process of cleaning all the useless third-party applications that are preloaded on a new PC.

In conjunction with the device, the service, and the content, there is also the potential for a fourth key contributor in today's high-tech market—a new business model. iTunes and Amazon changed the way and amount we pay for movies, music, books, and other content. A key example is the average price of an e-book on Amazon is only \$9 to \$12, a fraction of a typical printed book. Amazon can accomplish this by cutting out the printing, distribution, and retail overhead associated with traditional print media. The Internet and the innovative companies that can exploit its capabilities continue to change traditional business models. Likewise, a successful tablet is likely to build upon, or even change, the electronic business models we have today.

The second requirement is to find the right combination of new technology, content, applications, and services that provide a unique usage experience and then combine it with the appropriate business model. As highlighted above, the business model has become a critical element in successfully launching new platforms.

Technology

While the technology innovation is important for all electronics categories, it is critical for tablets to ensure a good usage experience. Display technology will play a critical role in the success or failure of tablets in the market place. To provide consumers with an immersive multimedia usage experience, which they expect with a larger screen size than a smartphone, the displays must be usable in all indoor and outdoor environments. Unfortunately, most of today's LCD technology is not well suited for direct sunlight. The e-ink technology used in most of the e-readers is well suited for direct sunlight, but

has limitations in providing color and handling advanced multimedia applications, particularly video. So the optimal solution is one that combines the benefits of both LCDs and e-ink technologies. Fortunately, there are many companies developing more advanced technologies, such as OLEDs, quantum dots, e-ink, and MEMS-based solutions. These include companies like Samsung, LG, Pixel Qi, and Qualcomm, respectively. These same technologies are also focused on reducing the power consumption of the display, which is critical in providing a minimum of eight hours of battery life, especially as other features and applications are added to the device.

Other components that will play key roles in the performance and functionality of tablets will be the processors, I/O, sensors, and RF. In regard to processors, the mobile market has become the most competitive of any electronics segment with growing representation from several architectures, including ARM, MIPS, SH, and x86. Beyond the core architecture, however, mobile processors are all highly integrated system-on-chip (SoC) solutions that combine multiple processor cores with multimedia accelerators and other highly optimized functional blocks into a single piece of silicon. Optimizing each of these functional blocks, balancing the use of dedicated silicon versus software emulation, and utilizing the latest manufacturing process technology are all critical in providing unique processor solutions that increase performance and functionality while maintaining or even decreasing power consumption.

I/O can be a critical distinguishing factor in the use of devices. In addition to the display, development continues into new ways to allow users to both input commands and information and output content from the devices. Some of the innovative I/O solutions include gesturing, the use of movement as commands; augmented reality, the combining of images captured by the device with database information to provide real-time information to the user; pico projectors for projecting images from the device, and touch screen controls, such as an application from Swype that allows users a new method of typing on electronic keyboards. Working in conjunction with the I/O technologies are sensors that can provide information on location, movement, speed, and temperature, as well as capturing video and still images.

Finally, the use of wireless technology is also critical for mobile devices. Today they are used for peripheral connectivity, as well as network connectivity. While it will be important to continue advancing these solutions for higher levels of integration and support for future technology standards, using RF in other innovative ways could also provide a compelling experience, such as wireless charging so that mobile devices are truly untethered.

Table 3 provides an overview of the primary components for a tablet and an estimated average cost for each major component. Note that these prices can vary widely, but, ultimately, the device must meet the power, performance, and price expectations of the consumer. According to In-Stat's estimates, the average cost would allow for a retail price, after assembly and distribution costs, of a tablet in the US\$400–US\$500 range, which appears to be acceptable based on the prices of competing devices. The final price could also be reduced through subsidies to make tablets even more competitive with other devices.

Table 3. Estimated Tablet Bill-of-Material (BoM) Cost Forecast (US\$)

Device Components	Description	Estimated Cost					
		2009	2010	2011	2012	2013	2014
Touch Screen Display Assembly	Minimum: LCD display Optimal: Advanced display (OLED, Pixel Qi or Mirasol) that combines the benefits of LCDs and E-ink	\$ 110.20	\$ 104.20	\$ 98.30	\$ 91.70	\$ 83.70	\$ 74.90
Processor	Low-power w/graphics & multimedia acceleration (e.g. ARM, MIPS, SH, x86)	\$ 24.60	\$ 23.80	\$ 22.96	\$ 22.04	\$ 21.10	\$ 20.09
Connectivity	3G, Wi-Fi, USB, Bluetooth (GPS optional)	\$ 48.23	\$ 45.51	\$ 41.80	\$ 38.00	\$ 34.70	\$ 32.00
Memory*	512MB+	\$ 1.83	\$ 1.82	\$ 1.74	\$ 1.62	\$ 1.49	\$ 1.37
Integrated Storage*	16MB+ NAND Flash	\$ 34.20	\$ 33.62	\$ 30.55	\$ 31.45	\$ 32.09	\$ 29.62
Miscellaneous Silicon	Power management and charging, discrete components, sensors, etc.	\$ 18.40	\$ 18.96	\$ 19.64	\$ 19.18	\$ 18.10	\$ 17.10
Battery	2000mAh+	\$ 17.90	\$ 17.48	\$ 17.07	\$ 16.70	\$ 16.35	\$ 16.12
Casing/Mechanicals	Case, SSD slot, connectors, switches, etc.	\$ 24.62	\$ 23.67	\$ 22.66	\$ 21.65	\$ 20.64	\$ 19.72
Total Cost		\$ 279.98	\$ 269.06	\$ 254.72	\$ 242.34	\$ 228.17	\$ 210.92
<i>% growth</i>			-3.9%	-5.3%	-4.9%	-5.8%	-7.6%

* Density will increase over the forecast period.
Source: In-Stat, 1/10

Among the prices it is important to note the following trends:

- Displays are expected to see more rapid price degradation later in the forecast due to volume ramping of newer technologies and increased competition.
- Processors will remain highly competitive and continue to see steady price reductions. Tablets will be using the same processor technology also used in many of the other mobile devices, particularly smartphones, MID\$S, and netbooks.
- Connectivity options will experience minimal price reductions due to the continued integration of additional technologies and the migration to new standards.
- Pricing in DRAM and Flash will vary over time as devices shift to higher memory capacities and the memory market continues to experience the traditional capacity surplus and constraint swings.
- Battery technology, while critical to tablets, is not likely to advance significantly over the forecast period and will likely only experience minimal price reductions resulting from increases in order volumes, manufacturing improvements, and contractual terms.

This is just a glimpse of the technologies that are likely to impact the potential for tablets. In-Stat's Mobile Technology Service takes an in-depth look at each of these technologies individually.

Applications/Content

The mobile market, more than other segments in high-tech, has evolved into a solutions market, meaning that you cannot just provide a device to consumers and expect them to figure out what to do with it, like PCs. Consumers expect mobile devices to work without problems and to provide the information they need in a simple and seamless manner. As indicated earlier, this "solutions" concept has contributed to the success of companies like Apple and Amazon, and the devices they offer. In addition, being the content provider or aggregator provides the OEM or service provider with another

avenue for generating revenue around a unique device, a slice of an industry that has higher annual revenues than the device market.

More recently, applications have also become a critical differentiator. When Apple grudgingly opened the iPhone platform to third-party applications, they unlocked an untapped market created by an army of professional and amateur software developers. Apple also created a competitive barrier to other operating systems and smartphone platforms that competitors have been trying vigorously to crack. Likewise, on tablets, the platform and applications for that platform could create a significant opportunity. This is one reason an Apple tablet is of so much interest to the market. If Apple can merge the tablet platform with the iPhone, Apple would have an instant competitive advantage over other vendors, plus a growing global customer base that are fans of the iPhone.

Wireless Services

Wireless service for a device that is intended to be used for communication purposes or Internet access is also critical. There are many different methods of providing access to wireless. In terms of internal or external modems, tablets will require integrated connectivity solutions, similar to cellphones, because of the mobile form factor. The services, however, can vary from 3G service for consumers to just Wi-Fi and LAN access for commercial tablets. In addition, the wireless access standards vary by region. As a result, OEMs face a challenge configuring devices for different regions and target customers.

Even more challenging than the connectivity is the cost of the service if they are used as a mobile device. Smartphone and netbook users typically have to sign-up for a data plan with a service provider, while e-reader users have it added into the cost of the device and/or the content accessed. Downloading large amounts of content for e-readers, however, is typically scheduled over a period of time using available packet slots, not on demand. With tablets targeted at a richer multimedia experience, operators will not be able to use the same service or communication model as e-readers. However, consumers are unlikely to pay for additional services that they already receive on a handset or computing device. Operators will have to design business models around letting consumers connect multiple devices through the same service for tablets to be a success. Some ideas, such as swapping SIM cards between devices have been suggested, but for mass market acceptance In-Stat believes that each mobile device must be able to have wireless services without the need to swap hardware between devices or paying for multiple service contracts, which leads into the value of an effective business model for the success of tablets.

Business Models

Poor or ineffective business models have been the downfall of many high-tech companies and products. In the case of tablets, business models are likely to determine the success or failure of vendors, as well as the entire category. In some manner, the ODM or OEM, operator, and content provider/aggregator must determine a business model that offers both an attractive price and ease of use to consumers. Consumers could potentially pay for the device, the wireless service, and the content and applications all separately, like they do with smartphone or netbooks today, but if they already use those other platforms, then consumers are unlikely to adopt tablets as a third option without giving up one of the other platforms, which also brings up the potential for cannibalizing other mobile platforms.

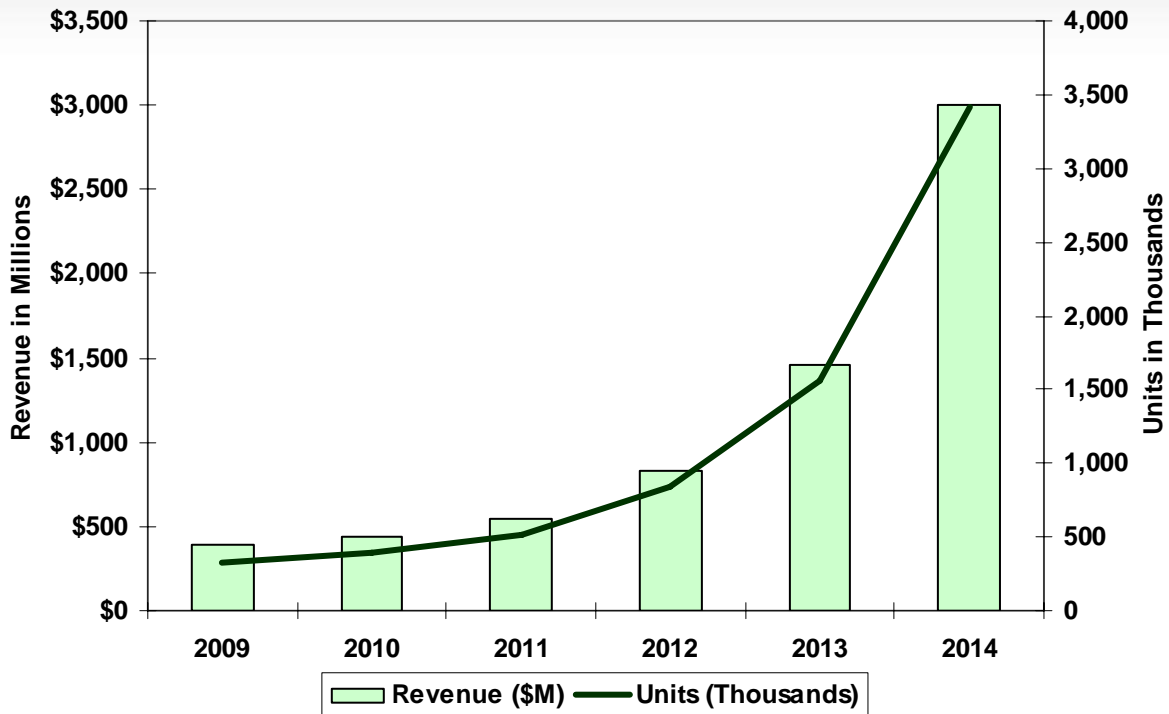
With the potential bandwidth requirements of tablets, operators must aggregate the services and costs between devices to attract consumers. In addition, subsidizing the cost of the devices will also likely entice consumers to consider tablets as an additional solution to the devices they already use or as an alternative. Without this aggregation, In-Stat believes tablets will be relegated to being a niche market with limited potential, which it has been in the past.

Outlook

As with previous tablets and MIDs, In-Stat sees significant potential for the new generation of tablets. However, the opportunity can range from niche markets to mass market adoption depending on the solution being offered. As a result, we have broken the forecast out into different scenarios to reflect the potential for the different market segments and business models. The first is commercial. As with other portable solutions, particularly MIDs, In-Stat believes that there is a strong potential for handheld devices that fit the tablet form factor in commercial applications, such as industrial controls, manufacturing, and medical. Because these are confined environments that would likely require significant interaction and portability, a large touch screen interface is ideal when combined with other distinct or specialty features, I/O, and software targeted towards the specific environments and usage models. Even though a few companies, like TabletKiosk, are already targeting these applications with tablet solutions, most of the high-tech community has decided against pursuing these opportunities because of the smaller growth rates and potential TAM as compared with the potential of the consumer market. These applications, however, can produce many benefits, including improving the quality of the devices through use in more controlled environments, more steady growth not subject to economic or market fluctuations, and seeding for possible consumer devices with those accustomed to using the devices in a commercial manner.

In-Stat believes that this segment will offer a strong growth opportunity throughout the forecast period, with a 60% unit CAGR (Figure 6 and Table 4), but growth will accelerate towards the latter half of the forecast offering even stronger growth and high volumes in the future.

Figure 6. Commercial Tablet Forecast (Units in Thousands, Revenue US\$ in Millions)



Source: In-Stat, 1/10

Table 4. Commercial Tablet Forecast (Units in Thousands, ASPs in US\$, Revenue US\$ in Millions)

	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	321	390	521	834	1,560	3,414	60.4%
<i>% growth</i>		21.3%	33.6%	60.3%	87.0%	118.8%	
ASPs (US\$)	\$1,214	\$1,120	\$1,055	\$992	\$933	\$880	—
<i>% growth</i>		-7.8%	-5.8%	-6.0%	-5.9%	-5.7%	
Revenue (\$M)	\$390	\$436	\$549	\$828	\$1,456	\$3,004	50.4%
<i>% growth</i>		11.9%	25.8%	50.7%	75.9%	106.4%	

Source: In-Stat, 1/10

The consumer segment is more difficult to predict, and as stated earlier, the success will be highly reliant upon the entire solution and the associated business model. As a result, In-Stat has divided the consumer forecast into three scenarios (Table 5). In the first scenario, the devices are sold separately, like a PC, without the content and wireless services. In the second scenario, devices are sold with associated content or applications, like the Apple iPhone and iPad, but the wireless services are still sold separately. In the third scenario, the device, content, and wireless services are all bundled in some manner, like the Amazon Kindle, or the wireless services between devices are bundled together. Based on these scenarios, In-Stat believes the third scenario offers the highest growth potential (Figure 7). This scenario would also likely see the highest ASP degradation, due to both a larger variety of product offerings in the market and increased competition, but the lower ASPs would be offset by higher potential revenues (Figure 8).

Offered as a complete solution, the tablet market has the opportunity to reach significant numbers (upwards of 46 million units) in the forecast period with accelerating growth in the future. Otherwise, tablets are likely to be relegated to a niche market relative to other mobile devices, particularly smartphones, which will have more than 10x the number units shipped annually during the same period.

Note that the forecast does not start from zero because there are MID's and tablet devices available in the market that meet In-Stat's definition for an Internet tablet.

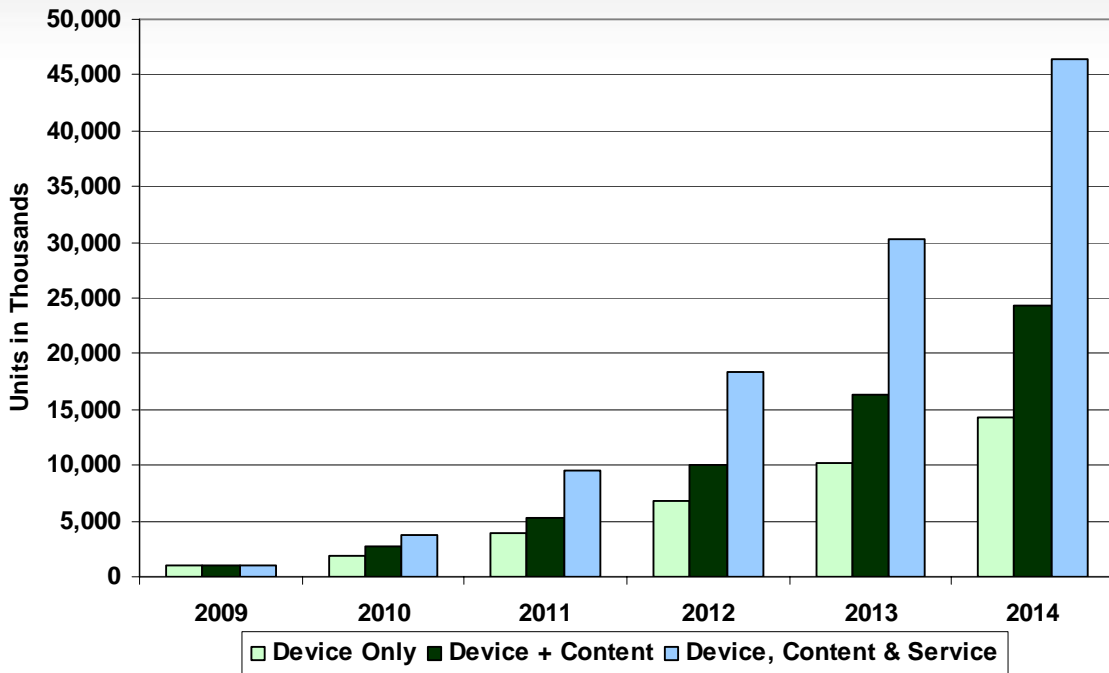
Table 5. Consumer Tablet Forecast (Units in Thousands, ASPs in US\$, Revenue US\$ in Millions)

Scenario 1: Device Only	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	1,041	1,845	3,865	6,843	10,187	14,277	68.8%
<i>% growth</i>		77.2%	109.5%	77.0%	48.9%	40.1%	
ASPs (US\$)	\$790	\$580	\$530	\$491	\$460	\$437	—
<i>% growth</i>		-26.6%	-8.6%	-7.4%	-6.3%	-5.0%	
Revenue (\$M)	\$823	\$1,070	\$2,049	\$3,360	\$4,686	\$6,239	49.9%
<i>% growth</i>		30.0%	91.4%	64.0%	39.5%	33.1%	
Scenario 2: Device + Content	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	1,041	2,700	5,200	10,000	16,300	24,390	87.9%
<i>% growth</i>		159.3%	92.6%	92.3%	63.0%	49.6%	
ASPs (US\$)	\$790	\$644	\$590	\$550	\$513	\$480	—
<i>% growth</i>		-18.5%	-8.4%	-6.8%	-6.7%	-6.4%	
Revenue (\$M)	\$823	\$1,739	\$3,068	\$5,500	\$8,362	\$11,707	70.1%
<i>% growth</i>		111.3%	76.4%	79.3%	52.0%	40.0%	
Scenario 3: Device + Content + Service*	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	1,041	3,800	9,500	18,300	30,200	46,400	113.7%
<i>% growth</i>		265.0%	150.0%	92.6%	65.0%	53.6%	
ASPs (US\$)	\$790	\$681	\$558	\$471	\$429	\$397	—
<i>% growth</i>		-13.8%	-18.1%	-15.6%	-8.9%	-7.5%	
Revenue (\$M)	\$823	\$2,588	\$5,301	\$8,619	\$12,956	\$18,421	86.2%
<i>% growth</i>		214.4%	104.8%	62.6%	50.3%	42.2%	

* The content and/or the wireless service is likely subsidized in some manner.

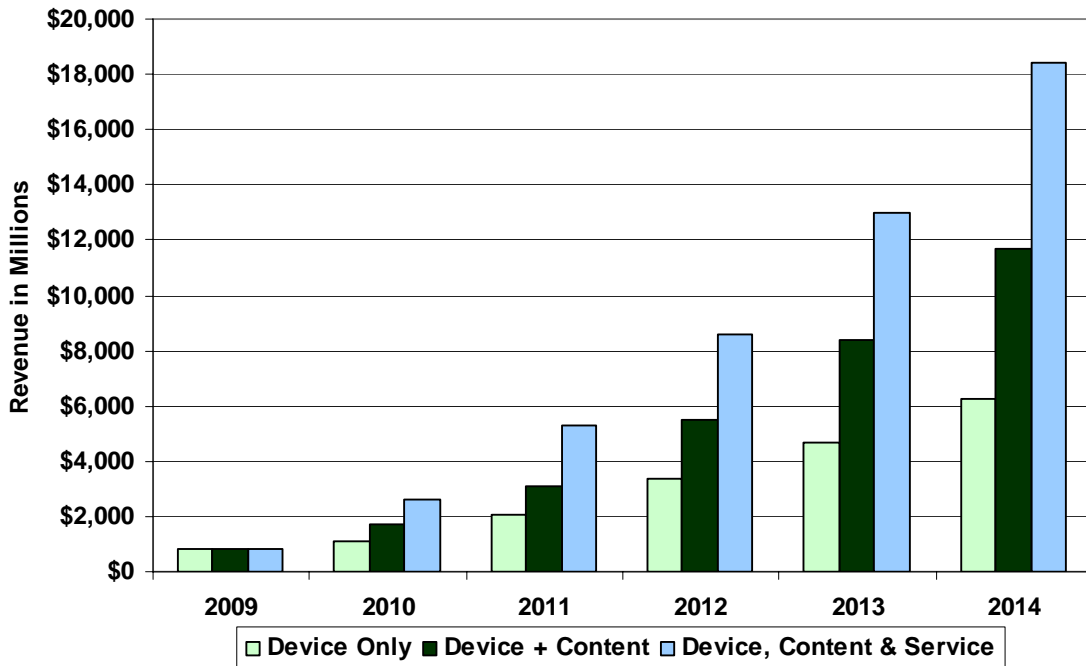
Source: In-Stat, 1/10

Figure 7. Consumer Tablet Unit Forecast by Scenario (Units in Thousands)



Source: In-Stat, 1/10

Figure 8. Consumer Tablet Revenue Forecast by Scenario (US\$ in Millions)



Source: In-Stat, 1/10

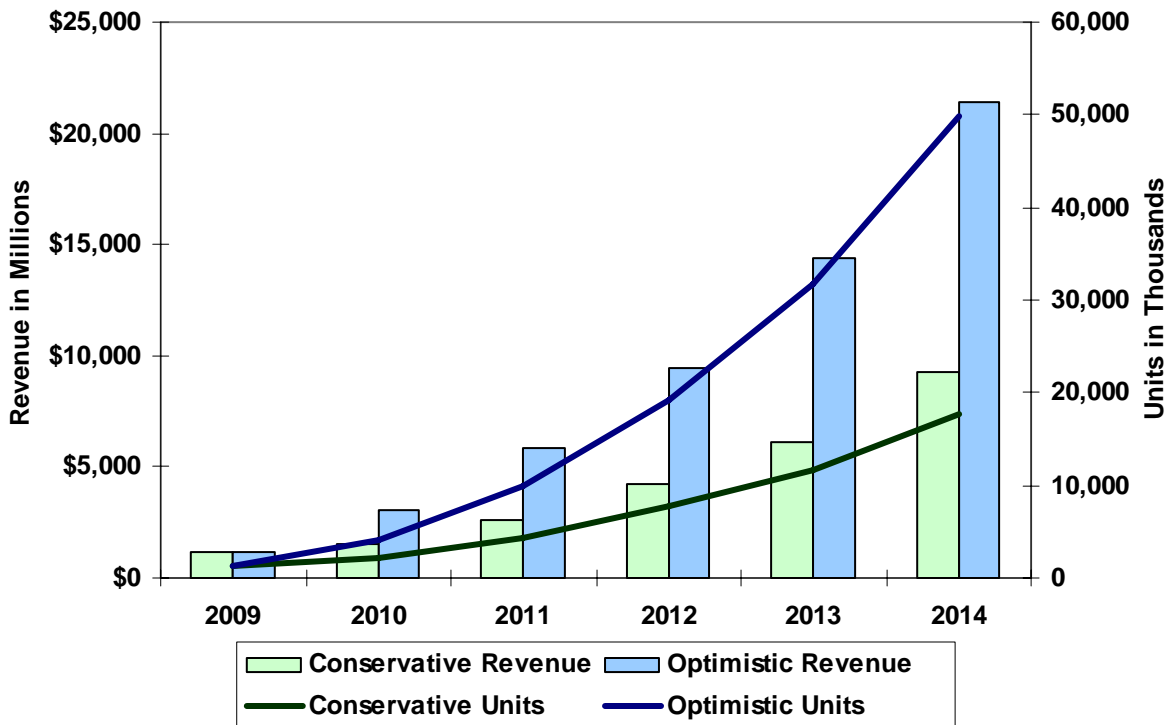
When considering both the commercial and consumer opportunities, the potential could be from less than 20 million units annually in 2014 to close to 50 million units (Table 6 and Figure 9). In-Stat believes that there are vendors, such as Apple, that can put together a compelling solution to attract consumers. However, as with any new mobile platform, there will be strong interest initially by early adopters, but the strongest growth begins around the third year after the platform is introduced. As a result, much of the growth begins in the latter portion of our forecast period.

Table 6. Total Internet Tablet Forecast (Units in Thousands, Revenue US\$ in Millions)

Conservative*	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	1,363	2,235	4,386	7,677	11,748	17,691	67.0%
<i>% growth</i>		64.0%	96.2%	75.1%	53.0%	50.6%	
Revenue (\$M)	\$1,213	\$1,507	\$2,598	\$4,187	\$6,142	\$9,243	50.1%
<i>% growth</i>		24.2%	72.4%	61.2%	46.7%	50.5%	
Optimistic*	2009	2010	2011	2012	2013	2014	CAGR
Units (Thousands)	1,363	4,190	10,021	19,134	31,760	49,814	105.4%
<i>% growth</i>		207.5%	139.2%	91.0%	66.0%	56.8%	
Revenue (\$M)	\$1,213	\$3,024	\$5,850	\$9,447	\$14,412	\$21,425	77.6%
<i>% growth</i>		149.3%	93.4%	61.5%	52.6%	48.7%	

* Includes commercial and consumer tablets.
Source: In-Stat, 1/10

Figure 9. Internet Tablet Forecast (Units in Thousands, Revenue US\$ in Millions)



Source: In-Stat, 1/10

Component TAM

The potential opportunity for the component vendors is also significant, over US\$4.1 billion for silicon solutions and US\$5.5 billion for non-silicon solutions by 2014, with the display accounting for the largest portion at just over US\$3.7 billion. Even more important, however, is that the opportunity in tablets is complementary to other mobile devices, particularly smartphones and netbooks (including smartbooks). With a high degree of focus on the power consumption and functionality of the display, tablets could also become a focal point for future design efforts.

Table 7. Silicon and Non-Silicon Component Total Addressable Market (TAM)
(Units in Thousands, Component Pricing in US\$, TAM US\$ in Millions)

	2009	2010	2011	2012	2013	2014
Potential Unit Shipments	1,363	4,190	10,021	19,134	31,760	49,814
Silicon Components						
Processor (US\$)	\$ 24.60	\$ 23.80	\$ 22.96	\$ 22.04	\$ 21.10	\$ 20.09
<i>TAM (US\$M)</i>	\$ 33.5	\$ 99.7	\$ 230.1	\$ 421.7	\$ 670.1	\$ 1,000.8
Connectivity (US\$)	\$ 48.23	\$ 45.51	\$ 41.80	\$ 38.00	\$ 34.70	\$ 32.00
<i>TAM (US\$M)</i>	\$ 65.7	\$ 190.7	\$ 418.9	\$ 727.1	\$ 1,102.1	\$ 1,594.0
Memory (US\$)	\$ 1.83	\$ 1.82	\$ 1.74	\$ 1.62	\$ 1.49	\$ 1.37
<i>TAM (US\$M)</i>	\$ 2.5	\$ 7.6	\$ 17.4	\$ 31.0	\$ 47.3	\$ 68.2
Integrated Storage (US\$)	\$ 34.20	\$ 33.62	\$ 30.55	\$ 31.45	\$ 32.09	\$ 29.62
<i>TAM (US\$M)</i>	\$ 46.6	\$ 140.9	\$ 306.1	\$ 601.8	\$ 1,019.2	\$ 1,475.5
Total Silicon TAM (US\$M)	\$ 148.3	\$ 438.9	\$ 972.5	\$ 1,781.6	\$ 2,838.7	\$ 4,138.5
<i>% growth</i>		195.9%	121.6%	83.2%	59.3%	45.8%
Non-Silicon Components						
Display Assembly (US\$)	\$ 110.20	\$ 104.20	\$ 98.30	\$ 91.70	\$ 83.70	\$ 74.90
<i>TAM</i>	\$ 150.1	\$ 436.6	\$ 985.0	\$ 1,754.6	\$ 2,658.3	\$ 3,731.1
Battery (US\$)	\$ 17.90	\$ 17.48	\$ 17.07	\$ 16.70	\$ 16.35	\$ 16.12
<i>TAM</i>	\$ 24.4	\$ 73.2	\$ 171.0	\$ 319.5	\$ 519.3	\$ 803.0
Casing/Mechanicals (US\$)	\$ 24.62	\$ 23.67	\$ 22.66	\$ 21.65	\$ 20.64	\$ 19.72
<i>TAM</i>	\$ 33.5	\$ 99.2	\$ 227.1	\$ 414.3	\$ 655.5	\$ 982.3
Total Non-Silicon TAM (US\$M)	\$ 208.1	\$ 609.0	\$ 1,383.1	\$ 2,488.4	\$ 3,833.2	\$ 5,516.4
<i>% growth</i>		192.7%	127.1%	79.9%	54.0%	43.9%

Source: In-Stat, 1/10

Key Players

Not since the smartphone has a market attracted so much attention, and because of its market position between smartphones and PCs, tablets are attracting the interest of both consumer electronic (CE) and computing OEMs. Even the tier-one PC OEMs, which are usually the last OEMs to demonstrate interest in a new product category, have been some of the first to display new products. One reason for the attention is a high level of interest from the leading electronics ODMs, especially those in Taiwan, like Compal, Foxconn, Quanta, and Wistron, who will likely be designing and manufacturing many of the final products offered by OEMs, like Acer, Dell, and HP. Table 8 contains a list of the tablets that have been announced thus far that fit In-Stat's definition of a tablet. Once again, there are tablet PCs, but those are not included in In-Stat's definition of an Internet tablet.

Table 8. Announced Tablets*

Company	Product	Brief Description	Price
Apple	iPad	Apple processor 9.7" capacitive display 30-pin dock connector Microphone & speaker Bluetooth Wi-Fi n Optional 3G Sensors: accelerometer & compass	\$499-\$829 \$14.99-\$29.99 AT&T data plans
Archos	Archos 5 & 7	5" & 7" displays TI OMAP processor 60GB to 320GB HDD Linux OS	\$299+
Archos	Archos 9	9" LED backlit display Intel Atom processor 1GB DDR2 60GB HDD Bluetooth Wi-Fi b/g USB	\$549
Compal	NA	7" resistive display Android OS	NA
Cydle	M7	Android OS 7" resistive display	\$199
Dell	Streak	5" display	NA
Freescle	Smartbook Tablet	Freescle i.MX processor 7" display Wi-Fi b/g/n 3G 3MP image sensor 4GB to 64GB Flash	\$199
HP	Slate	Windows 7 OS	NA

* Some of the units listed are still considered conceptual products and there are many others that have not been announced.

Source: In-Stat, 1/10

Table 8. Announced Tablets* (Continued)

Company	Product	Brief Description	Price
ICD	Ultra	NVIDIA Tegra processor 7" display 4GB Flash 3G Wi-Fi USB Bluetooth FM radio 1.3MP image sensor Dual microphones	NA
ICD	Vega	NVIDIA Tegra processor 15" display 3G Wi-Fi USB Bluetooth FM radio 1.3MP image sensor Dual microphones T-Mobile SIM card	
MSI	NA	NVIDIA Tegra Processor Single 10" display Android OS	NA
MSI	NA	Windows 7 OS Dual 10" display	NA
Notion Ink	NA	NVIDIA Tegra processor 10.1" Pixel Qi display Tri-band UMTS/HSDPA Wi-Fi b/g Bluetooth A-GPS Sensors: compass, accelerometer & proximity 3.5mm jack 3MP image sensor 16GB or 32GB SSD Android OS	NA
OpenPeak	Tablet	Intel Atom processor	NA
Pegatron	NA	11.6" display 1GB of RAM 32GB of storage Image sensor HDMI-out	NA
Sony	Dash	7" display Speaker 3.5mm jack Wi-Fi b/g	\$200
TabletKiosk	Sahara Slate PC	12.1" resistive display Intel Celeron ULV or Core 2 Duo processor 1-2GB of DDR2 memory 120GB or 160GB HDD Biometric fingerprint sensor	\$1795-\$2395

* Some of the units listed are still considered conceptual products and there are many others that have not been announced.

Source: In-Stat, 1/10

From the devices that have been announced, a few key trends have emerged:

- The processors are typically ARM-based processors or Intel's Atom processor
- The operating systems are either Linux-based, primarily Android or Windows 7. There have been no products announced with Windows CE or Windows Mobile.
- Sensors are a key attribute

In addition, Apple and ICD are the only OEMs to announce devices with a service provider already selected, which is a critical element in turning these devices into mobile solutions.

Conclusions

The Internet tablet is entering a crowded market of mobile devices, but has the opportunity to carve out a portion of the fast growing mobile electronics market segment for those that can deliver a complete solution that includes the device, content, applications, and wireless services that offer a unique usage model to users at an attractive price. Accomplishing this also requires a business model that fosters innovation throughout the value chain. Thus far, only two companies, Apple and ICD, have integrated the wireless services into the launch of their tablets, and only Apple provides an entire platform that includes the content of iTunes, applications from the iPhone, and a complete business model, which quickly propels Apple into a market leadership position in the consumer segment with a higher potential market opportunity and a well fortified position.

Although the consumer market is the pot of gold for electronics OEMs, the commercial market also holds strong opportunities for tablets. The commercial market is slower in growth, but offers faithful customers with very specific requirements and usage models, as well as higher device ASPs.

In-Stat believes that there is strong potential for tablets, just as there has been with MIDs and other mobile electronic devices, but market inflection points in the high-tech market are driven by three things: new technology, new usage models, and new business models. There are many new technologies that hold promise for tablets, usage models are highly tied to device features and applications, and business models continue to evolve, especially when tied to the Internet. All hold strong potential opportunity for tablets and the OEMs that can pull all three market drivers together. However, like any new electronics segment, mass market adoption often occurs several years after the initial product introduction.

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