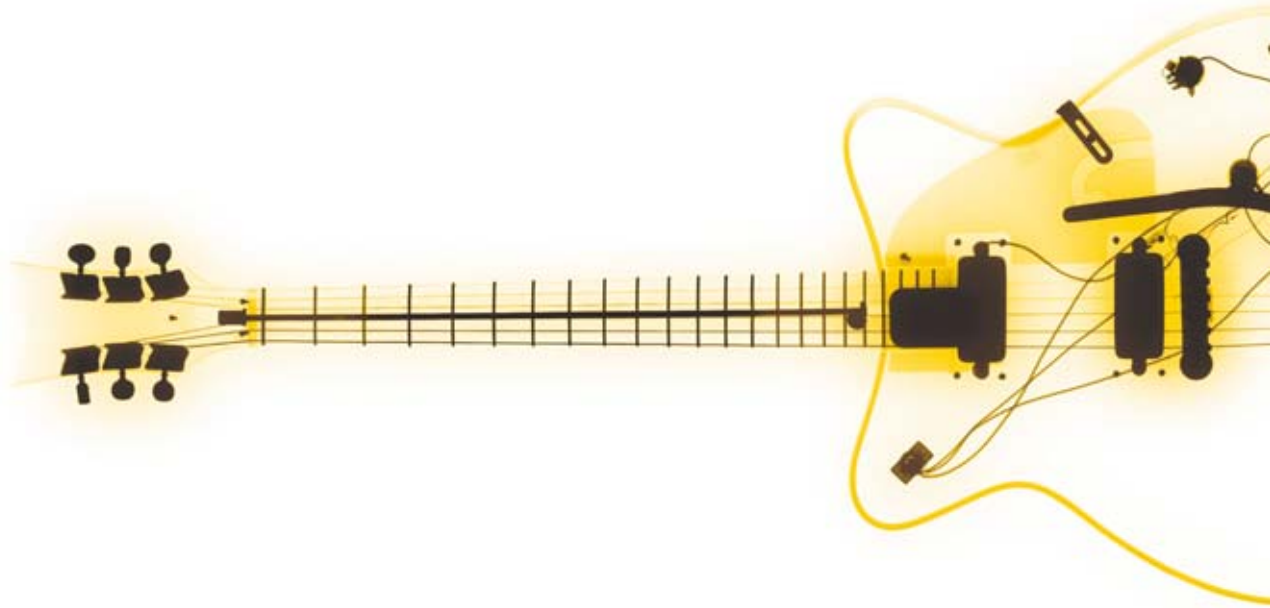
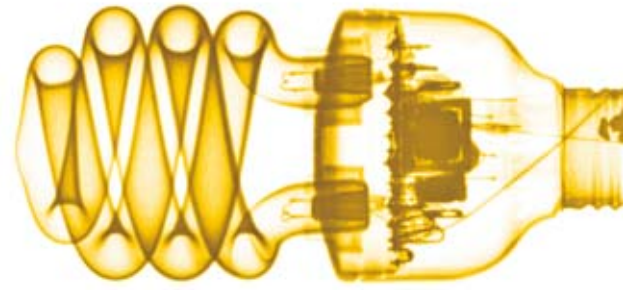
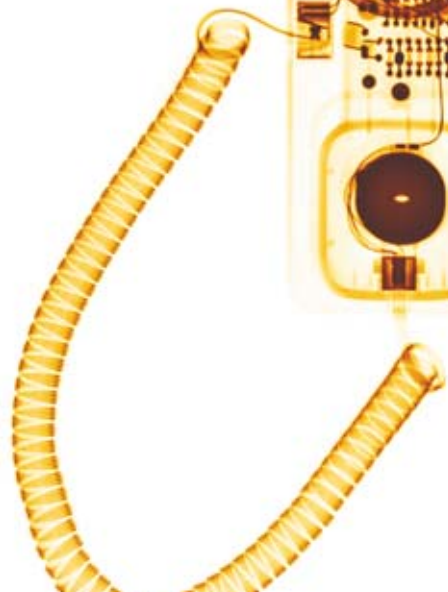
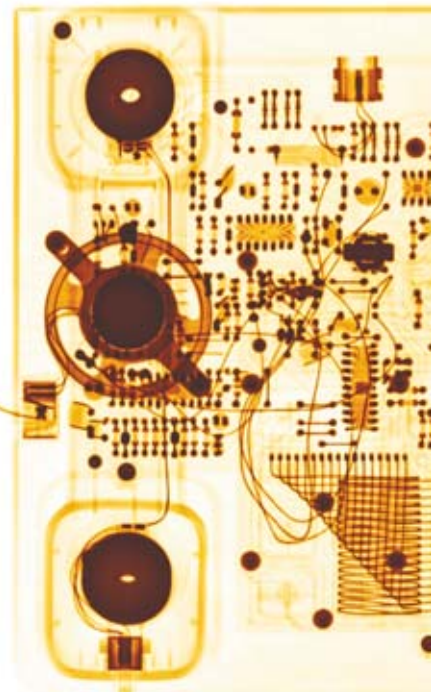


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Technology, Media  
& Telecommunications  
Predictions  
2011



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The goal of Predictions is to catalyze discussions around important topics that may require companies or government to respond.

# Foreword

Welcome to the 10th edition of Deloitte's Predictions for the technology, media & telecommunications (TMT) sector.

This annual publication presents Deloitte's view of the major trends over the next 12-18 months that are likely to have significant medium to long-term impacts for companies in TMT and other industries. For example, two of this year's trends are the evolution of battery technology, and the continuing popularity of television, both of which are likely to be relevant for companies in many sectors.

What makes Deloitte's Predictions different from others?

- **Rigorous research:** We use both primary and secondary sources, looking at both quantitative and qualitative data, including hundreds of discussions, thousands of articles and tens of thousands of survey responses.
- **Innovation:** We publish only perspectives that we think are new or counter to existing consensus. This includes calling a market where most commentators expect there to be none, or identifying markets where the hype is ahead of reality.
- **Accountability:** We try to provide clear Predictions endpoints, so that our accuracy can be evaluated annually.

The goal of Predictions is to catalyze discussions around important topics that may require companies or government to respond. We provide a view on what we think will happen, what will occur as a consequence, and what the implications are for various types of companies. We never presume that ours is the last word on any given topic.

Over the last 10 years, the TMT sector – and its impact on how we work, live, and are entertained – has changed markedly. In fact, there have been too many important developments to list here. But it is worth remembering that the World Wide Web is just 21 years young in 2011, that in 2001 many countries had not yet rolled out national broadband services, and that only three years ago analog cellular networks were still functioning in some of the largest mobile markets.

Another key trend over the last 10 years has been convergence: the technology, media and telecommunications sectors are now more interconnected and interdependent than ever before. With that in mind, this year's Predictions report is for the first time being published as a single report, rather than three separate ones. Deloitte's view is that developments in each sector are now so inextricably linked that TMT executives need easy access to the key trends in all three sectors.

Also for the first time, each of this year's Predictions is available as a video, a podcast and an app as well as written text.

We hope you and your colleagues find this year's Predictions for the TMT sector useful; as always, we welcome your feedback.

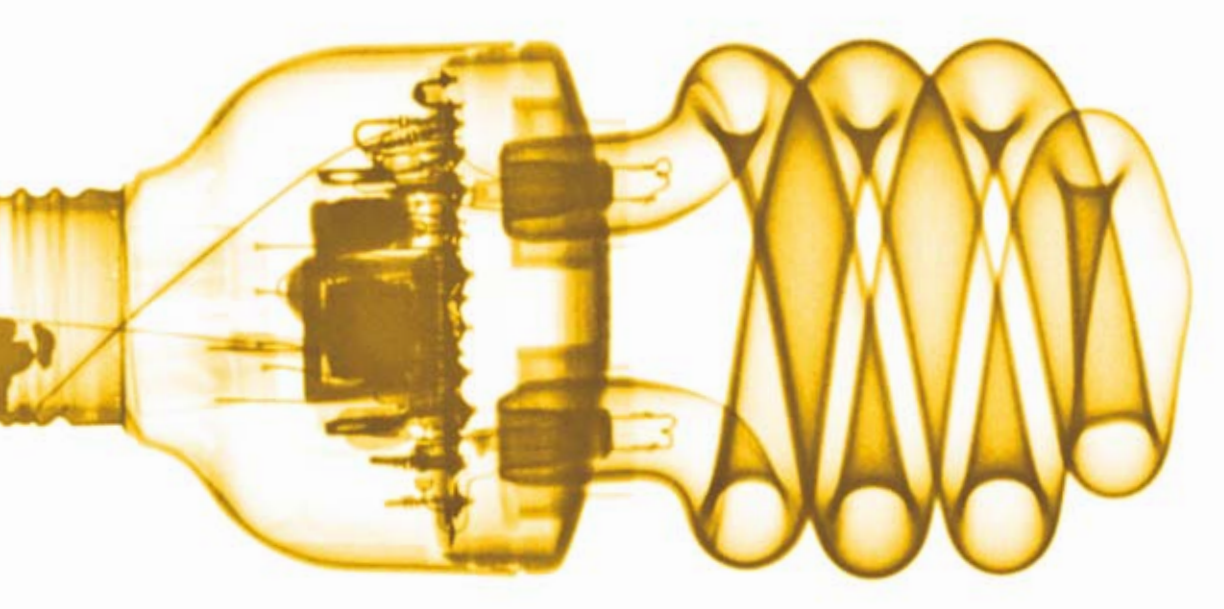
Whether you are new to this publication, or have been following our Predictions for years, we thank you for your interest. And to the many executives who have offered their candid input for these reports, we thank you for your time and valuable insights.

We look forward to exploring the next 10 years of TMT developments with you.



**Jolyon Barker**  
Managing Director  
Global Technology, Media & Telecommunications  
Deloitte Touche Tohmatsu Limited

# Technology



# Smartphones and tablets: more than half of all computers aren't computers anymore

Deloitte predicts that in 2011 more than 50 percent of computing devices sold globally will not be PCs<sup>1</sup>. While PC sales are likely to reach almost 400 million units<sup>2</sup>, Deloitte's estimate for combined sales of smartphones, tablets and non-PC netbooks is well over 400 million. Unlike the 2009 netbook phenomenon, where buyers chose machines that were essentially less powerful versions of traditional PCs, the 2011 computing market will be dominated by devices that use different processing chips and operating systems than those used for PCs over the past 30 years (see Figure 1).

This shift has prompted some analysts to proclaim that "The era of the PC is over"<sup>3</sup>. Deloitte's view is that this is not the case: traditional PCs will still be the workhorse computing platform for most of the globe in 2011. PC unit sales are expected to rise by more than 15 percent year-over-year, and the global installed base of PCs stands at over 1.5 billion units<sup>4</sup>. At the end of 2011, non-PC computers will still represent only about 25 percent of all computing devices.

However, when looking at the future of computing devices, 2011 may well mark the tipping point as we move from a world of mostly standardized PC-like devices, containing standardized chips and software, to a far more heterogeneous environment.

How varied will this new environment be? Deloitte predicts there will be at least two substantially different chip architectures<sup>5</sup> and at least 5 different operating systems that each have more than five percent market share.

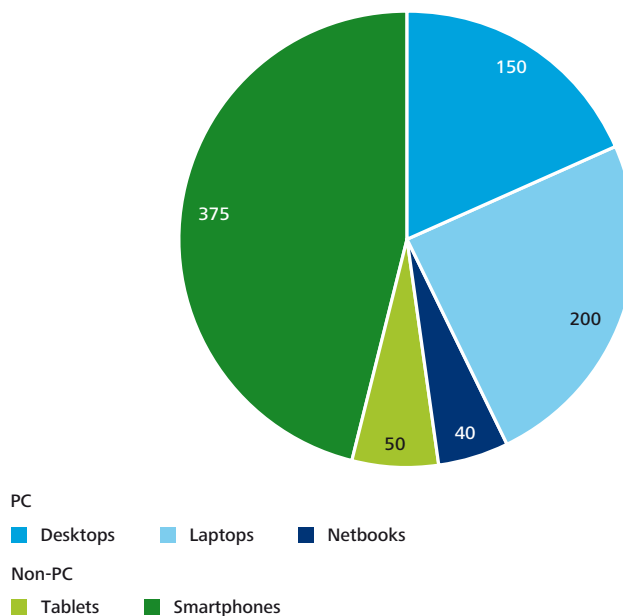
This more diverse computing world is expected to change some of the basic assumptions about the business model for computing devices.

In the PC environment, the average profitability of consumer software companies has generally been lower than for other software companies in recent years: an average net profit margin of less than 10 percent, compared with an average of 21 percent for all application software companies<sup>6</sup>. Also, consumer software companies have been growing more slowly than the overall application industry.

In the non-PC world, although app adoption is still in its infancy, the industry is forecast to enjoy 60 percent growth in 2011 to over \$10 billion<sup>7</sup>. Most of this revenue is expected to come from paid-for apps, with only about 10 percent from in-app advertising<sup>8</sup>. The app industry in aggregate does not seem to be very profitable: one estimate suggests that it takes the average app developer 51 years to break even<sup>9</sup>. However, leading apps companies appear to be significantly more profitable than average. Although many are private and do not publicly disclose their net profits, M&A valuations suggest expected profitability levels much higher than the single digits of PC software companies.

**Figure 1. Computing device market forecast**

PC and non-PC sales, 2011 (millions)



Source: Deloitte Touche Tohmatsu Limited, 2010

Manufacturing non-PC computing devices should also be substantially more profitable than making PCs. PC Original Equipment Manufacturers (OEMs) have averaged 10 percent gross profits in recent years, with 2 percent net margins. By contrast, the leading smartphone and tablet makers generate gross profits of 40-60 percent and operating margins of 25-40 percent<sup>10</sup>.

Distribution is expected to become more profitable as well. Traditional PC distribution gross margins average about 5 percent<sup>11</sup>. Although separate figures for the entire tablet and smartphone distribution industry are not public, some distributors are reporting operating margins of 15 percent, which imply gross margins over 30 percent<sup>12</sup>.

There will also likely be expanded service opportunities. Although many of these non-PC alternatives are marketed as “easy to use”, the bewildering array of hardware and app choices makes it more likely buyers will be willing to pay for help selecting the best or most industry-appropriate devices and apps – along with subsequent integration, maintenance, and support<sup>13</sup>.

#### Bottom line

In 2011, buyers of computing functionality, whether in the enterprise or consumer sector, will face some interesting choices. In the past, most computer buyers purchased similarly configured machines at similar prices on similar replacement cycles. Although not quite as limited as the infamous paint options on Henry Ford’s Model T – “any color so long as it’s black” – the range of variation for PCs was quite narrow. But in this new era where more than half of all new computing devices sold are non-PCs, the ranges of price, performance, form factor and other variables will be at least an order of magnitude wider. Choosing will take longer, and will need to be done more carefully.

For IT departments, the cost of managing a mixed network of both PCs and non-PCs is likely to be much higher than standardizing on one or the other. Yet employees are increasingly being allowed to pick their own devices, and tens of millions have already done so – especially smartphones<sup>14</sup>. If given a choice, some employees will pick PCs, some will pick non-PCs, and some will pick both! Reconciling these two trends and determining the true total cost of ownership will present a significant learning curve.

There will also be major challenges for software and peripheral developers. In the traditional PC world, software that ran on one machine generally ran on billions of others. The same was true for peripherals, as long as they complied with standard APIs. But in the more fragmented world of 2011 and beyond, software and hardware will likely require more customization, and developers may need to pick and choose which platforms they develop for, knowing that they cannot afford to address all markets simultaneously.





# Operating system diversity: no standard emerges on the smartphone or tablet

Smartphones and the new generation of tablets have three things in common: (1) they use similar, low-powered 1GHz processors; (2) they are being used like personal computers, although they are not personal computers; and (3) Deloitte predicts that by the end of 2011 no operating system on these devices will have a dominant market share. Some will have more than a 5 percent share, but no single player will have yet become the *de facto* standard, as has been seen in other computing ecosystems in the past.

The emergence of a *de facto* standard is very important to everyone involved in the smartphone and tablet markets (i.e., “non-PC computing devices”). Technology industries with a single dominant provider of hardware or software tend to have economics very different from those with multiple providers.

Moreover, the non-PC computing market is becoming increasingly important: Deloitte predicts that in 2011 more than half of all computers sold – over 400 million units – will be devices that are not PCs<sup>15</sup>. In 2012 and beyond, non-PCs’ will likely extend this lead. Being the dominant operating system (OS) provider for non-PCs would be a tremendous prize; however, a clearly dominant OS seems unlikely to emerge in 2011.

The obvious value of being the standard OS for non-PCs is one reason why a single player is unlikely to dominate. The company that popularized the PC was very adept at making both operating systems and central processing unit (CPU) chips. But when it decided to launch its new computing device, it did not source its OS or CPU internally; neither did it select other large OS or CPU manufacturers. Instead it turned to companies that were relatively small at the time<sup>16</sup>. No one expected that PCs would sell in their billions generating trillions of dollars over the next three decades<sup>17</sup>. In contrast, the potential value of the non-PC market is already obvious.

In the history of computing devices, no company has ever become the standard OS **after** it was clear that the value of the technology involved was likely to be tens of billions or more. The smartphone and tablet markets are already generating hundreds of billions in revenues, and are expected to keep growing rapidly: everyone knows there is “gold in them thar hills.”

Equally important, existing competition in the non-PC market seems unlikely to fade any time soon. In both the smartphone and tablet markets, the top five OS companies based on market share each enjoy annual revenues in the tens of billions: have billions in cash: are growing their top and bottom lines: and are gaining ground with consumers. Even companies that are losing market share are still growing in absolute terms. None appears ready or willing to abandon the market, there is no shareholder pressure to exit, and all should have more than enough resources to develop new products and market them to mass audiences.

Mobile network providers seem as unlikely to allow a dominant OS as the OS competitors themselves. Providers appear to actively encourage OS diversity, even if they seldom state this explicitly. Whenever any operating system or device maker, in any geography or segment, approaches 50 percent market share, the carriers seem to deploy their marketing muscle, retail presence, and subsidies to push one device or OS over another. There is even a name for this strategy: carriers pick “hero” devices and push them hard. This approach can cause major swings in market share within a single quarter<sup>18</sup>.

Device manufacturers also seem to believe that a diverse OS ecosystem is in their best interest. Perhaps seeing the commoditization of some technology industries where *de facto* standards do exist has shown them that having different operating systems to choose from allows them to differentiate their products more effectively, strike better deals with network providers, and generally achieve higher margins.

With all of these major players fighting to prevent an industry-wide standard OS from emerging, it seems that only a nearly irresistible force could make it happen.

One possibility for such a force is the “network effect.”<sup>19</sup> As an emerging standard becomes more and more prevalent, it can rapidly reach a tipping point where the number of users on its platform relative to others gives it overwhelming momentum. Software developers embrace the platform because it has the most users, which leads to new apps that attract even more users, and so on – creating a virtuous circle that eventually locks the platform in as the *de facto* standard.

However, unlike other markets where network effects have created industry-wide standards, both smartphone and tablet devices are highly fragmented at the hardware level, and are likely to remain so. The variety of screen sizes, CPUs, text inputs, form factors, and other configurations means that no single OS version addresses a sufficiently large percentage of devices to create a powerful network effect.

A market that revolves around a standard OS offers the advantage of simplicity: if an application works on one device, it can be counted on to work almost everywhere and with nearly all devices. The current non-PC market is more complex and fragmented, but looks like it may be the new reality. With fewer than half of all new computing devices being PCs, and if no non-PC OS becomes dominant, it is mathematically impossible for any OS to have more than a 75 percent share of all new computing devices.

#### **Bottom line**

Many stakeholders would be affected if a standard tablet or smartphone OS does not emerge in the near term. As noted earlier, mobile network providers, device makers, and software companies are all intimately involved and all have a keen interest in the battle. However, there are three other groups with a significant stake as well.

Application developers might need to get comfortable in a world where they must pick and choose their platforms. If a clear standard emerges, then their choice is made for them. But in the more fragmented OS world that seems likely, no app developed for a single platform can address the entire market. Developing customized apps or versions for each OS requires significant time and money (typically \$5,000-500,000, depending on complexity<sup>20</sup>), so it is likely that many smaller developers will not be able to address all markets.

Media companies face a similar challenge. In general, ad-supported media are looking for the largest possible audience. In the PC market, the platform with the largest audience was clear. However, in a diverse, non-PC computing market, publishers will probably need to prioritize some audiences over others, or even exclude some entirely.

Finally, IT departments are likely to face significantly higher costs to support this new, more diverse technology environment. Administering a traditional PC computing ecosystem centered on a single OS can cost thousands of dollars per employee per year<sup>21</sup>. Supporting five times as many operating systems is unlikely to require fewer people and less money. Yet telling employees to go back to the days when they had to standardize on one OS or device seems impossible: that particular genie left the bottle long ago. Given these trends, the cost of IT support seems set to rise.

# Tablets in the enterprise: more than just a toy

Deloitte predicts that in 2011 more than 25 percent of all tablet computers will be bought by enterprises, and that figure is likely to rise in 2012 and beyond.

Although some commentators view tablets as underpowered media-consumption toys suitable only for consumers<sup>22</sup>, more than 10 million of the devices will likely be purchased by enterprises in 2011. Consumer demand for tablets is forecast to remain strong; however, enterprise demand is likely to grow even faster, albeit from a lower base.

Four main factors are driving tablet adoption in the enterprise market.

First, and already the most apparent, many consumers initially buy tablet computers as personal media devices, but quickly discover they are also useful for work. Employees are asking their firms to support tablets for various work tasks, including accessing the enterprise network. And some people who end up using their tablets predominantly for work are asking their employers to cover the cost of their data plans, or even the cost of the device itself.

It appears that by the end of 2011 a significant number of firms may be willing to pay for their employees' tablets and data plans. By some estimates, 70-80 percent of Fortune 500 companies will support at least one tablet variant for some portion of their workforce<sup>23</sup>; millions of prosumers will have their tablet data plans at least partially subsidized by their employer; and millions more tablets will be purchased by companies as PC alternatives<sup>24</sup>.

Second, certain industry verticals seem poised to start using tablets in fairly large numbers over the course of the year; in fact, trials are already underway. The retail, manufacturing, and healthcare industries are considered the most likely early adopters, primarily owing to the tablet's ease of use, long battery life, lack of moving parts, minimal need for training and rapid app development environment. Deloitte predicts that during 2011 up to 5 million tablets could be deployed in retail and healthcare alone.

In retail, a tablet can serve as both an easy-to-use, constantly updated catalog, as well as a point-of-sale terminal (when equipped with an optional card reader). These compelling applications make it likely that retail will be the largest enterprise tablet market in 2011<sup>25</sup>. Healthcare will probably see a number of trials, but the traditional conservatism of healthcare authorities, administrators, and practitioners will likely mean that fewer than one million devices will be deployed in healthcare environments by the end of the year<sup>26</sup>.



Third, enterprise software providers are rapidly responding to Fortune 500 customer requests for tablet-specific software. Large players in ERP, ECM, CRM, and other enterprise applications are combining with desktop virtualization providers to create secure enterprise-grade apps that can seamlessly and rapidly be deployed into even the largest company's existing IT environment<sup>27</sup>. Enterprise software providers are also embracing the new technology themselves, with one company rolling out tablets to 35 percent of its employees in 2011<sup>28</sup>.

Fourth, the tablet form factor itself is driving adoption in the boardroom. Unlike laptops and smartphones, both of which create an obvious physical barrier between the user and others in the room, a tablet can be placed flat on a conference table and accessed unobtrusively<sup>29</sup>.

These four growth drivers are likely to foster significant tablet diversity. Although certain form factors and operating systems dominated the market initially, the different requirements of various enterprises mean that one size will probably not fit all. Fortunately, tablets will be offered in multiple sizes in 2011. For use as catalogs in retail, a 10 inch diagonal display might be optimal; but for processes requiring portability, such as accident inspection, a smaller 7 inch device would be lighter and probably less expensive.

Some enterprises and their IT departments have strong preferences for certain operating systems (OS), and strong aversions to others. Assuming that tablets will be connected to the rest of the enterprise IT environment, it is reasonable to expect that OS market shares in enterprise tablets might closely mirror OS market shares in smartphones and PCs.

#### **Bottom line**

For an enterprise, a key challenge will be deciding whether to support multiple types of tablets or standardize on a single type. Employees often prefer to choose their own devices; however, IT support costs rise with device diversity. Balancing the IT department's desire for a single, cost-effective solution against employees' desire for freedom of choice will likely be just as challenging with tablets as it is with smartphones.

Price is a very important issue for enterprises, especially in the current economy. Enterprises (and tablet manufacturers) will need to carefully weigh the various trade-offs. Do enterprise tablets need cameras? Do they need to have the largest possible screen? Is Wi-Fi good enough, or do they need a more expensive 3G radio – and the data plan that goes with it?

The new breed of tablets is not designed to be particularly rugged. In the past, a variety of ruggedized tablets<sup>30</sup> were available; however they tended to be 2-3x heavier than the new tablets and 3-5x more expensive<sup>31</sup>. Although they continue to have their devoted fans, they were not mass market devices. For those who worry that the new tablets might not be tough enough for constant use in the field, it is worth remembering that workers sometimes treat ruggedized devices less carefully, which can make such devices even more prone to damage. Ultimately, the most effective "ruggedization" is to produce a machine that the workforce values and takes care not to break.

Security is already being discussed as a potentially big issue for enterprise tablets. In some ways tablets are more secure than PCs – at time of writing no tablet-specific virus has been reported, and most don't even have USB ports, eliminating a common security weak point. On the other hand, tablets are small, portable and a popular target for thieves. As a new device, tablets should probably be presumed insecure until proven otherwise.

App development will need to be monitored closely. Cost per app can range from \$5,000-\$500,000 (depending on complexity), so not all enterprises will be able to develop an app for every type of tablet; nor will they be able to fund a large number of custom apps for employees. Although some firms are proposing the deployment of web apps that run through a browser and therefore work on any tablet, the likely reality in 2011 is that only native apps will provide the full tablet experience and be capable of interacting with the devices' built-in cameras, radios, calendars and push capabilities<sup>32</sup>.

# eGov: from option to obligation

In 2011 Deloitte predicts e-government (eGov) usage will reach an inflection point. Across developed countries, the proportion of businesses that use eGov services for at least one process is expected to average over 90 percent, up from 75 percent in 2010. Similarly, the proportion of citizens that use eGov in industrialized countries should rise by at least 10 percentage points. In some countries, the importance of eGov as a way to boost public sector productivity and efficiency may even prompt the appointment of a national Chief Information Officer (CIO) where one did not exist previously<sup>33</sup>.

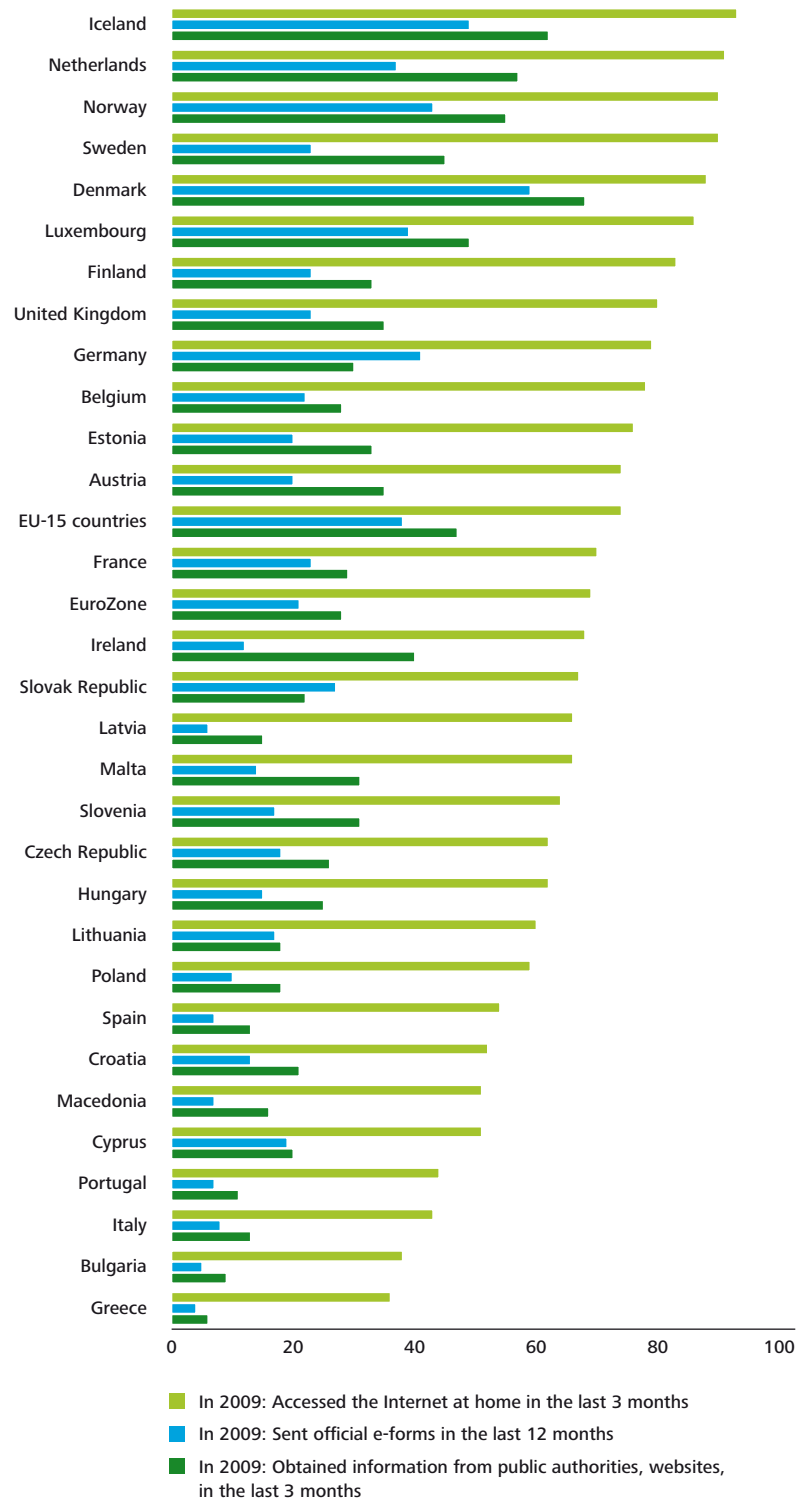
Rising demands for government efficiency and productivity will likely provide a major push for greater adoption of existing eGov platforms and, in some countries, increasing e-government roll-out<sup>34</sup>. Use of online channels may increasingly be mandatory;<sup>35</sup> this should boost the return on investment for e-government infrastructures. For example, according to one estimate, mandating electronic invoicing could save the equivalent of 0.8 percent of GDP annually<sup>36</sup>.

Over the last decade, governments around the world have collectively invested billions of dollars to deploy an array of e-government infrastructure, from tax returns to building permits<sup>37</sup>. However, use of these portals varies considerably. In most cases, eGov has been positioned as an additional channel for citizens and businesses to interact with the government<sup>38</sup>. Only rarely has it been mandated<sup>39</sup>.

In the past, one of the main problems with mandating eGov was the risk of excluding certain segments of society, such as those without Internet access or those who might find online self-service portals too difficult to use. However, now that most consumers and almost all businesses are active online, in some countries eGov use needs to catch up with the times, and start being positioned as the primary channel, not an optional one. For example, Figure 2 shows household Internet use compared with the use of eGov in Europe. In all countries there is a significant gap, with Internet use outpacing eGov use by an average of more than 20 percent. And in some countries, the gap is as large as 50 percent.

Use of e-government by businesses has also been limited – albeit not necessarily due to business’ reluctance: in some cases online channels were simply not available. For example, in some territories it has only been possible to submit an electronic invoice since February 2010<sup>41</sup>.

Figure 2. Internet access, use of e-forms, and use of government websites, Europe, 2009 (percent)



Source: Deloitte Touche Tohmatsu Limited, 2010, based on data from Eurostat, 2010<sup>40</sup>

In other cases, the ability for agents to submit returns on behalf of their clients has been complicated by the assignment of a single sign-on and password per company, making it impossible for agents to submit accounts online for multiple clients. In many cases, the ability for government agencies to correspond by email with companies and their agents was still either “scarce” or “unavailable” at the end of 2010<sup>42</sup>.

For central and local governments, eGov has tended to create additional costs, as it was often layered on top of existing communication channels. In addition, potential eGov savings were sometimes reduced through flawed internal processes that required data to be transcribed manually by one department’s staff and then re-keyed manually by another department’s staff just to get information flowing<sup>43</sup>.

For citizens, eGov is most likely to gain traction for services used predominantly by younger age groups, such as student loan applications and temporary driver’s licenses<sup>44</sup>. But over time, use of traditional channels such as walk-in centers and call centers may be restricted to exceptional cases only: there will always be citizens who cannot afford to go online, or else are unable to use online channels. Also, governments will likely insist that digital data be usable across departments. This will require standardized processes for electronic data gathering, as well as consistent formatting standards, such as extensible business reporting language (iXBRL)<sup>45</sup>.

As for emerging countries, deployment of eGov is typically limited by two key constraints: technology roll-out and literacy. For example, only 15 African countries have an Internet penetration higher than 10 percent. However, in emerging countries that have limited fixed broadband infrastructure, mobile communications could play a key role, as the latter tends to enjoy greater penetration. For example, in India in H1 2011 the mobile subscriber base is expected to be in the region of 800 million<sup>46</sup>. This compares with 11 million broadband subscribers<sup>47</sup>. In such contexts, focusing on eGov via mobile is likely to be a key way forward, particularly in the medium-term.

One Indian state, Rajasthan, has launched an eGov service that relays essential information to the public, including rural pensioners, the elderly, and disabled via mobile phone. Updates on everything from approval of pensions to information alerts are provided via this channel<sup>48</sup>.

The system also includes text to speech conversion to address the needs of those with low literacy.

Emerging countries that already have eGov portals in place are likely to expand the range of citizen online services to include ancillary services such as healthcare<sup>49</sup>. In 2011, foreign aid and investment in developing countries may also help drive eGov projects<sup>50</sup>.

#### **Bottom line**

While mandating use of eGov is mostly about improving productivity of existing technology assets, administrations should not overlook technology’s capability to improve a country’s attractiveness to foreign investors and key talent. Efficient digital communication and transaction channels can position a country positively, much in the same way that leading physical infrastructure can. While many governments, particularly those in industrialized countries are likely to remain focused on cost, the medium-term strategic benefits of digital government should remain on the agenda.

In emerging countries where pressures on local and central government budgets may be less severe, administrations should use eGov solutions to enable rapid economic growth without having to create an equal or greater expansion of government infrastructure and bureaucracy<sup>51</sup>.

The fact that some segments of society are not computer-literate or lack online access should be viewed as an important but not insurmountable barrier to eGov. In fact, a principal enabler of any new process or application is accessibility, which itself is a function of good design<sup>52</sup>. If eGov applications are available in versions designed to maximize accessibility, they could actually serve as an entry point to get more people to use computers and the Internet. In some cases the entry point is likely to come via Internet connected mobile phones – each country needs to assess which technological platform is most pervasive and fit for use.

Governments should also consider whether social networks could provide one channel for communicating with citizens.

Migration to electronic filing of company reports, based on the iXBRL standards, will likely require tax collection agencies to develop new skill sets. For example, there might be less need to review documentation and make basic calculations, but greater need to analyze complex patterns of data and identify situations requiring investigation across companies.

Leaders in emerging markets should consider treating eGov and e-commerce infrastructure projects as prerequisites for economic growth, on par with roads and ports/border security. This may provide their countries with real opportunities to accelerate the pace at which they close the gap with developed economies.

# Online regulation ratchets up, but cookies live on

Deloitte predicts that during the course of 2011 online privacy will provoke more irate headlines and exasperated calls for action than ever before. However, by year-end a torrent of criticism directed at online privacy is likely to result in only minor legislative and regulatory changes to the way websites gather, share, and otherwise exploit user information. Such changes are unlikely to challenge the fundamentals of the online business model.

Cookies, which are the small files of personal information that websites create on a visitor's computer, are very likely to remain core to the online user experience. Similarly, IP (Internet Protocol) addresses will likely still be shared among multiple online companies.

A flood of news stories about digital privacy invasion – combined with the launch of websites created to show exactly how compromising online information disclosure can be<sup>53</sup> – are unlikely to dissuade Internet users from knowingly or unknowingly sharing their information, some of which may be personally identifiable<sup>54</sup>. A campaign in 2010 that encouraged users to quit a particular social network *en masse* in response to its revised privacy policies was taken up by only a tiny fraction of its members<sup>55</sup>.

But despite a lack of significantly harsher regulations, and the fact that just a small (but vocal) minority of the public is expected to clamor for more protection, the online industry will likely undertake increasingly robust measures to regulate itself, building on steps that have already been taken over the past few years<sup>56</sup>.

The underlying rationale for gathering personal information is that companies – be they traditional retailers, business to business specialists, or online pure plays – like to know about their customers. Knowledge is power, and understanding the customer is generally good for business. Sharing leads, reselling customer data, and analyzing consumer behavior are all ways to boost revenue and help make a sale. Passing along customer data is considered a fair practise if permission is given. So is aggregating customer data and reselling it – as long as permission is given and the user cannot be personally identified<sup>57</sup>.

Malpractice related to information sharing is common in all types of businesses. But in 2011, online privacy breaches – both real and perceived – are more likely to make the news than are offline breaches.

Some of the reasons for this are contextual. First, online companies are simply more effective than their offline counterparts at generating, accumulating, and exploiting vast quantities of data – and at using the data automatically in real time. Second, online privacy issues are currently more newsworthy, partly because the online environment is newer and less understood, and partly because of the number of people who are affected. Web-based businesses seem subject to heightened economies of scale. Market leaders tend to dominate on a global basis, and when problems arise they can affect hundreds of millions of users.

One privacy challenge unique to the online world is the use of personal information in the form of cookies and IP addresses. New legislation to be enacted in 2011 aims to clarify what, how, and with whom data can be shared. Some of this legislation, if enacted in its current draft form, could profoundly change the way that people use the Web<sup>58</sup>.

Many of today's websites share IP addresses with dozens of other sites. However, one draft law would require user approval every time an IP address is to be shared<sup>59</sup>. Similarly, a European Union (EU) directive<sup>60</sup> passed in 2010 and due for implementation in 2011 will require websites to obtain consent from users whenever cookies are installed<sup>61</sup>. The EU has also proposed that Web users have the right to be forgotten: historically a user's Web trail has been nearly indelible<sup>62</sup>. The proposed changes would require websites to delete all personal data on request. In addition, there have been calls for "do not track" buttons to be made prominent on websites<sup>63</sup>.

These new principles, if applied to the letter, could have a major impact on online businesses. Consider, for example, what it would mean if websites could not use cookies. Recommendations would be impossible, and credit card information would need to be re-entered for every transaction, no matter how small.

However, there are two reasons why it is likely that only moderate online privacy legislation will be enacted in 2011. First, the legislation that currently exists to protect personal information – both online and offline – is considered generally robust<sup>64</sup>. Most discussions about new legislation focus only on the narrower category of *personally identifiable information* (PII) – and specifically whether a unique identifier to a computer, like an IP address or cookie should fall into this category. Second, the Internet has become a fundamental part of the economy. New legislation that might have a significant adverse impact on economic growth and tax revenues seems quite unlikely.<sup>65</sup> Tens of billions of dollars could be put at risk<sup>66</sup>, and many governments are simply not in a position to threaten those revenues at this time.

For instance, the U.S. Commerce Department recently released a draft report providing recommendations for promoting online privacy. However, the recommended policies are likely to be enacted in a moderated form that also emphasizes information innovation, jobs, and economic growth.<sup>67</sup> In the EU, probably most member states will determine that users should provide permission within browser settings and that the default position in the browser be set to “off” – as suggested by the directive<sup>68</sup>. Consent will **not** need to be given every time a cookie is used<sup>69</sup>.

In 2011, new online privacy legislation is expected to be modest and will likely draw upon fair information practices that are already generally accepted. At the same time, online companies are likely to become far more proactive when tackling privacy issues – expanding their efforts to influence legislation, and increasing their level of self-regulation with the goal of avoiding new legislation altogether.

#### Bottom line

Although changes related to online privacy may not markedly affect revenue in 2011, companies should consider increasing their investments in online privacy infrastructure, leveraging industry tools and initiatives to improve self-regulation, and getting in front of future legislation.

Nearly all of the new and proposed privacy requirements are based on generally accepted fair information practices. However, businesses should stay abreast of changes in public opinion and regulatory policy, including the policies proposed by the Federal Trade Commission in its Staff Report on online consumer privacy released in December 2010<sup>70</sup>.

In particular, businesses that operate online might want to invest in programs and industry tools that:

- integrate “Privacy by Design”<sup>71</sup> principles, including data security measures, reasonable collection limits, sound retention practices and data management procedures.
- provide consumers with simple choices about data handling practices that are not “commonly accepted”.
- establish greater transparency about how data will be collected and used – providing simple and easy to understand notices and education, and giving customers reasonable access to their own personal information<sup>72</sup>.

These types of actions can help organizations stay ahead of the curve, create competitive advantage, and strike an appropriate balance between protecting consumer privacy and fostering performance, innovation and growth.



# Squeezing the electrons in: batteries don't follow Moore's Law

Deloitte predicts that battery technology will make progress in 2011 and 2012. Energy density should rise and prices should fall. Plus, batteries should become more durable and charge faster. Unfortunately, even in a good year, advances in battery technology are slow compared with advances in the devices they power. Battery technology rarely attains anything resembling Moore's Law, which correctly predicted that computer processing power would double every 18 months. For batteries, a mere 5 percent performance improvement is a good year.

The one big exception is when the battery industry changes its underlying technology. For example, the leap from nickel-based technology to lithium ion technology nearly doubled battery energy density<sup>73</sup>. Annual improvements within the same battery technology are generally modest.

Nothing seems to beat lithium as a base material for batteries. Lithium is the third lightest element and is highly reactive, making it the best lightweight, high-density solution for the near term. Lithium is usually paired with cobaltate. Other possible partners, such as titanate and iron phosphate compounds, offer some advantages but deliver significantly lower voltages and energy yield. One scientist summed it up: "It will be refinement of existing chemistry from now on. There are no new compounds that will give higher energy density."<sup>74</sup>

In future years, it is possible that a 1 percent annual improvement in lithium battery performance may become the norm. Some scientists believe that the lithium ion, which has been worked on for decades, may be close to peaking<sup>75</sup>. Changing the electrolyte, usually to a polymer, may offer some advantages but doesn't appear to provide a significant improvement in energy density or cycle issues, which are the key attributes.



There are other views. Some commentators trumpet 10-fold<sup>76</sup>, or even 100-fold, improvements to lithium technologies<sup>77</sup>. However, even if these claims prove true, there is a long way from the laboratory bench to the consumer. Because refinements in battery technology are based on applying new materials and chemistry, “overnight” technology breakthroughs usually take decades. Research initiatives that have identified potential improvements that could improve energy density and longevity of lithium batteries are based on laboratory findings. These new approaches would still need to be assembled into batteries and moved into commercial production, which could take years<sup>78</sup>.

Although there have been hopes of new electrical storage technologies, such as ultra-capacitors, their availability does not appear to be imminent according to the energy storage and venture capital communities<sup>79</sup>.

Even if some entirely new and cost-effective non-lithium electric storage technology was developed, the industries that use batteries typically require years to revamp their manufacturing processes, integrate at the system level, prove reliability and establish safety. For example, the adoption of lithium was delayed by years due to runaway heating problems, which forced extensive engineering and safety tests<sup>80</sup>.

Utility and transportation markets would take the longest to adopt breakthrough battery technologies, but even adoption by consumer product and computer markets would take years, not months. The biggest challenges for any energy storage solution are usually reliability and durability. The only way to determine ten-year reliability is to do a ten-year test; there are no short cuts (although some scientists are working on it)<sup>81</sup>.

The availability of lithium is another issue. Although it is the sixth most abundant element in the Earth’s crust, concentrated deposits that can be extracted in an economical and environmentally clean way are rare and found in only a few locations. South American salt lakes are the primary source of lithium deposits. At one time there was some concern that a large increase in battery consumption would create a shortage, resulting in “peak lithium.”<sup>82</sup> However, further studies found that although the price might need to rise to make less-accessible deposits practical, the supply is more than adequate to support even very large growth<sup>83</sup>.

#### **Bottom line**

Although progress in battery technology may seem slow, even 5 percent annual improvement can lead to significant gains over time. The industry will need to keep innovating, both with lithium and non-lithium technologies. Maintaining realistic expectations and timelines will likely be key.

For those who want and need better batteries, it may prove useful to focus on reducing power consumption rather than increasing energy storage. Making more efficient devices may be easier to achieve than trying to force battery technology to improve at greater than its historical rate of progress. Many of the technologies behind efficiency do improve in line with Moore’s Law or offer the potential of rapid breakthroughs.

Some older or alternative energy storage technologies (such as nickel and lead acid batteries, compressed gas or liquid, miniature fuel cells, and flywheels) may remain viable choices if lithium technology continues to progress slowly. For example, lead acid batteries can be combined with newer technology, such as super-capacitors, to produce surprisingly good results using core technology that is 150 years old<sup>84</sup>.

# Hydrogen comes out of hiding: the alternative alternative energy source

Deloitte predicts that hydrogen will enjoy tremendous success in 2011. However, this success will not be seen in the automotive market as expected, but in other applications, such as clean standby power generation in the telecom industry<sup>85</sup> and indoor forklifts<sup>86</sup>, where hydrogen's energy density and environmental benefits outweigh its current limitations of high cost and lack of fueling infrastructure.

A decade ago, hydrogen (H<sub>2</sub>) and hydrogen fuel cells (HFCs) were seen as the most likely technology to displace the internal combustion engine in vehicles. Hydrogen-powered cars were expected to be in showrooms by now, and some even said that millions would be on the road by 2010<sup>87</sup>. Engineering difficulties, costly fuel cells (more than \$1000/kw in 2002), and a drop in oil prices contributed to hydrogen disappearing from the front pages.

However, probably the biggest reason why thinking about HFCs changed in 2002 was due to the nature of hydrogen itself. At first glance, hydrogen looked like an ideal, safe fuel. Although it was not very dense, and so needed more compression than natural gas, this obstacle could have been dealt with.

The bigger problem was the lack of naturally occurring sources of H<sub>2</sub>. It can be extracted from water by electrolysis or processed from natural gas or ammonia, but free hydrogen does not exist in an economically useful resource. Unlike coal and petroleum, there are no hydrogen mines or wells. Instead, hydrogen is a substance that stores energy: the only energy you get out of it is what you put into it. This makes an HFC more like an H<sub>2</sub>-powered battery than a traditional fuel-burning engine.

There are many applications where hydrogen's battery-like power is preferable to a combustion engine.

Two examples include forklifts used inside warehouses and remote generators that supply backup power for telecom equipment.

Forklifts are often used in large enclosed spaces like warehouses where combustion engines, which produce carbon monoxide, would be unsafe. Batteries have been the preferred solution for years, but have several drawbacks: batteries don't last an entire shift, their power output drops as they discharge, and stacks of charging batteries take up a lot of floor space. In this niche environment, an HFC can offer a full shift's worth of power, refuel in one to three minutes and pays for itself in two years<sup>88</sup>.

There are many places in the world where back up power (for infrequent emergency outages) or standby power (for more frequent outages related to a less reliable grid) is needed. Many of these locations are not amenable to traditional power sources, such as lead acid batteries or diesel generators. In particular, the telecom market requires power sources that can be located in harsh environments with extreme temperature fluctuations, which reduces the usefulness of lead acid batteries, or in urban areas where diesel exhaust is restricted. Hydrogen is a reliable and environmentally friendly substitute. As more countries mandate eight-hours of backup operating time to maintain wireless emergency communications service, this market is likely to grow<sup>89</sup>.

There are other near-term hydrogen applications, such as distributed energy generation for factories or residences<sup>90</sup> and fleet fuel, including urban buses, where cost is less of a concern than air quality. Across all applications, 10,000 HFCs may be sold, representing revenues of \$250 million, up 200% from 2009<sup>91</sup>.

Some analysts are expecting H<sub>2</sub> to make headlines again in the automotive space<sup>92</sup>. High oil prices, carbon-related environmental concerns, and the automotive industry's willingness to consider alternative fuels are driving the revived interest in H<sub>2</sub> technology. Several large auto manufacturers continue to fund tens of millions of dollars in HFC R&D spending annually, although the amount is declining. Government support is also declining: North American HFC research for the transportation market was slashed (non-transportation HFC research was also reduced, but not as sharply)<sup>93</sup>.

Despite R&D investments, the H<sub>2</sub>-fueled vehicle has yet to be commercialized, and some pessimistic analysts say commercial adoption could be decades away<sup>94</sup>. The energy density is acceptable and the environmental benefits are obvious: you put hydrogen in, and water vapor is the only exhaust. But the cost of an HFC remains high compared to other power plants: current (non-production) vehicles are estimated to cost \$300,000 each<sup>95</sup>. The cells are vulnerable to damage from fuel contaminants such as carbon monoxide, and they do not start well in cold temperatures. These problems are likely to be solved over time, but commercial availability appears to be at least several years away.

#### **Bottom line**

Although HFCs remain a niche, their near-term applications could easily create a billion-dollar market by 2015. The forklift and standby power markets alone are worth over \$5 billion; hydrogen could likely capture at least 20 percent of these markets.

Plus, there are many other possible applications for the technology, such as portable electronics. These energy-hungry devices are pushing the limits of lithium ion battery technology; a refuelable energy source might be a welcome alternative<sup>96</sup>. Military and space organizations are also likely to continue using HFCs for demanding and high-value applications, although generally in small numbers.

The HFC sector seems worthy of ongoing R&D support. Current technologies can be made less expensive, more easily manufactured and more resistant to damage from environmental causes. Research will be needed in the areas of membranes and catalysts, with a special focus on reducing the amount of platinum needed: platinum costs are one reason HFCs are so expensive. Also, those involved in the production, transportation, and storage of hydrogen should consider improving their products and economics: as hydrogen demand increases, supply and distribution will need to become more widespread and economical.

# Media



# Television's "super media" status strengthens

Deloitte predicts that in 2011 television will solidify its status as the current super media, defying some commentators' prophecies of imminent obsolescence<sup>97</sup>. Viewers around the world will watch 140 billion more hours of television, revenues from pay TV in the BRIC<sup>98</sup> countries will rise by 20 percent<sup>99</sup>; worldwide TV advertising will increase by \$10 billion, 40 million new viewers will be added; TV chefs will sell tens of millions more cookbooks than their non-televised peers<sup>100</sup>; TV shows will be the most common conversation topic around the world and the subject of more than a billion tweets<sup>101</sup>. In short, television will likely continue to command a growing share of the world's attention and pocketbooks.

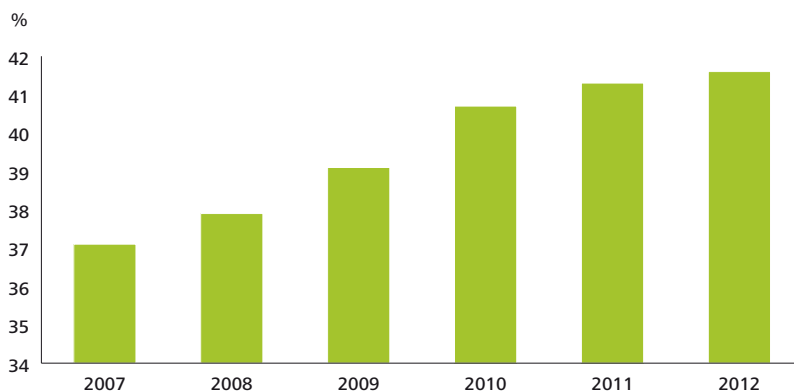
Deloitte expects television to retain its leadership among all media in terms of total revenues, which include advertising sales, subscriptions, pay-per-view, and license fees. Television's strength as an advertising medium is likely to be once again proven by a second year of solid growth and a fifth consecutive year of increased share of advertising revenue (see Figure 3). Television's five-year growth in advertising revenue, from \$174 billion in 2007 to \$191 billion in 2011, contrasts sharply with newspapers' decline in advertising revenue from \$126 billion to \$93 billion over the same period. A forecast 6 percent increase in 2012 would take TV advertising revenue beyond the \$200 billion mark: more than twice as much as for newspapers, the number two advertising medium<sup>102</sup>. Forecast TV advertising revenues for 2011 should discourage any lingering doubts that the 30 second spot is in structural decline.

Deloitte also expects television to grow its share of audience attention, despite competition from many other existing and emerging distractions – both online and offline. In 2011, aggregate television viewing will likely reach 4.49 trillion hours. The global television audience is expected to grow by 40 million to 3.7 billion viewers; yet half of the world's population will remain untapped, leaving significant headroom for the television market to grow. Viewing per person is forecast to rise modestly to 3 hours and 12 minutes per day. This compares very favorably to the 15 minutes per day per member spent on social network sites<sup>104</sup>, and to the 33 minutes per day spent on the Internet per U.S. citizen<sup>105</sup>.

Television is likely to retain its status as the media that most powerfully influences content creation in other media sectors. Television should remain, for example, a key driver of the book trade. Bestseller lists will likely be well represented by television celebrities and television chefs<sup>106</sup>. Television is also likely to drive tens of millions of magazine sales, including magazines whose principal purpose is to provide a printed TV schedule. In the UK, a country with 23 million households, sales of TV listings magazines are likely to reach several million copies per week<sup>107</sup>. Television should also remain a key sales driver of children's toys around the world: Thomas the Tank Engine is the number one pre-school toy in China<sup>108</sup>. And it seems fair to assume that some of the best-selling music artists of 2011 will have been part of a televised talent contest<sup>109</sup>. In today's world, TV is the medium around which all others revolve.

Television's "super media" status is further reinforced by its impressive ability to sustain momentum.

Figure 3. Television's share of all advertising revenues, 2007-2012



Source: Deloitte Touche Tohmatsu Limited analysis, ZenithOptimedia, Advertising Expenditure Forecasts, December 2010<sup>103</sup>

For example, the most successful global TV franchise, *Strictly Come Dancing*, currently reaches 250 million viewers in 38 markets<sup>110</sup>. This leaves scores of countries and more than 3 billion potential new viewers for television to target. China is of particular interest, as Chinese consumers have just begun to purchase various formats of television content in earnest<sup>111</sup>. In 2011, Chinese broadcasters may become increasingly enthusiastic about new formats as a means to compete against Internet television<sup>112</sup>. Creating local variants of formats that have succeeded in other markets may be a way to win back viewers who had turned to the Web for the content they wanted to watch<sup>113</sup>.

Television seems to be gaining popularity in emerging markets. In 2011, TV advertising spend is expected to grow 16 percent in China and 14 percent in India<sup>114</sup>. In the BRIC countries, in 2011 pay TV revenues are forecast to rise by 20 percent to over \$17 billion<sup>115</sup>.

All the while, television technology continues to improve. The steady migration to high definition should provide significant opportunities for up-selling to premium television subscribers. The growing penetration of large flat-panel televisions should increase the visual impact of programming and advertising (in effect, 50-inch digital billboards within our homes are proliferating). Also, 3D technology may provide an additional revenue stream in the medium to long term.

#### Bottom line

Television's overall trajectory looks to be strong in 2011 and, most likely, for a few years beyond. But allocation of the industry's spoils may vary widely for different players.

The outlook for smaller content producers could be challenging. These companies lack the scale and reach to launch global formats. They may even struggle to upgrade to high definition (HD) production, which could be a major problem if HD becomes the new table stakes for earning a share of subscription revenues. Consumers' growing expectation for HD quality may also make life difficult for terrestrial broadcasters whose typical spectrum allocation only enables them to offer a handful of HD channels. By contrast, the growth of HD strengthens the hand of cable, satellite and certain telecommunications providers.

In developing countries, one of the key challenges is likely to be how to increase revenues. A television subscription that only costs a few dollars a month might sound like exceptionally good value to U.S. subscribers accustomed to paying much more. But to consumers in developing countries, it can represent a huge portion of their income.

Technological innovation has so far seemed to bolster the television sector; for example, DVRs and online TV content have tended to boost overall viewing. But as technological innovation increasingly drives viewers to consume multiple media simultaneously, its ultimate impact is unclear. It might reduce the attention paid to advertising. Or it might make television advertising even more powerful, by enabling viewers to take immediate action on their buying impulses.

As for other forms of media, television could prove to be a significant enabler – both directly (through advertising) and indirectly (as a source of new ideas, celebrities and content). Other media sectors should look for creative ways for television to help sell their products. For example, a TV documentary of a band rehearsal could help promote a forthcoming tour. The music sector might also find television to be a growing source of direct revenues from licensing songs for use in commercials and TV programs.

# DVRs proliferate! The 30 second spot doesn't die!

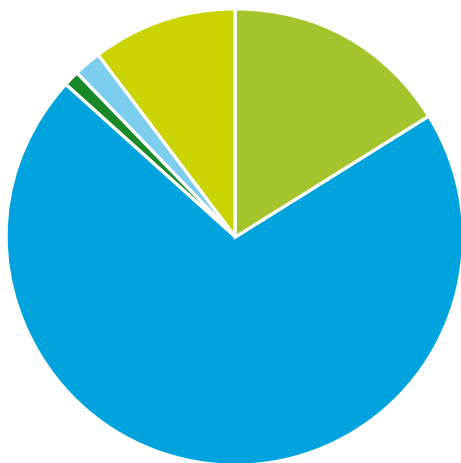
Deloitte predicts that digital video recorder (DVR) penetration in two large markets will exceed 50 percent of TV households by year-end 2011<sup>116</sup>; but also predicts that TV advertising will be almost entirely unaffected despite that level of penetration. While DVRs provide the technological capacity to skip ads, the majority of DVR owners are likely to continue watching the vast majority of their television live. TV ad rates may go up or may go down for various reasons this year but DVR penetration probably won't be one of them.

A decade ago, as DVRs became more affordable and widely adopted, industry commentators claimed that the television commercial was in trouble<sup>117</sup>. Their reasoning was that as DVR owners could readily fast forward through all advertisements, this would reduce the value of TV advertising<sup>118</sup>. Initial surveys of DVR owners tended to bear this out: self-reported ad-skipping was high<sup>119</sup>.

Whether or not ad-skipping was as high as was being claimed, the DVR threat remained only potentially devastating while very few viewers owned them. This remained the case for the first half of last decade: DVR ownership was only 17 percent in the United States in 2006<sup>120</sup>.

However, DVR ownership in many major television markets took off in the last five years. The falling prices of DVRs have enabled existing pay TV broadcasters to subsidize the entirety of their cost for a growing proportion of their customer base; new pay TV entrants have typically had no option but to offer a DVR to attract customers. DVRs have also entered homes "through the back door", via the tens of millions of hard-drive equipped games consoles possessing full DVR functionality that have shipped in recent years. And the price of non-subsidized DVRs has been dropping steadily to the point where entry models are available for \$100<sup>121</sup>.

Figure 4. Viewing behaviors of DVR owners



- I always check to see what I have recorded on my DVR first
- I always check to see what is on broadcast television first
- I always check to see what DVDs I have to see first
- I always check to see what's available on on-demand television websites
- None of these

Source: Deloitte LLP UK, July 2010. Sample: 958 DVR owners in the United Kingdom

The growth trajectory in DVR ownership suggests that penetration among television owners in the United States and United Kingdom should cross 50 percent in 2011-2012 making it theoretically possible for half of all households in these markets to avoid television commercials altogether.

However Deloitte's view is that the DVR, even in markets where the devices are in the majority of homes, is unlikely to have a material impact on the value of television advertising in 2011<sup>122</sup>. This is principally because the majority of viewing in these households will be "appointment to watch" television, be this sports, a talent show, a soap opera, reality TV, a game show or a news bulletin. This type of programming usually crowds out time available to watch pre-recorded content.

Further, viewers are likely to attach increasing value to "first broadcast programming" in the next few years as the volume of social commentary, both that occurring organically as well as that encouraged by the broadcaster, steadily grows<sup>123</sup>: viewers are likely to become even more locked into the schedule and therefore less able to skip advertising<sup>124</sup>.



The 15-25 percent of programming that is fast forwarded through is not necessarily a squandered resource. Studies show that even ads viewed at 12x speed are still retained by viewers, and by including more distinctive imagery advertisers can further enhance the impact of fast-forwarded ads<sup>125</sup>. Programs that have a higher incidence of pre-recording (often programming targeted at younger audiences), advertising at the end of breaks can be sold at a premium as recall for such slots is likely to be highest<sup>126</sup>: fast forwarders will be concentrating hard to spot the last commercial to ensure they do not miss the resumption of the program.

These trends notwithstanding, there are likely to be some programs that are watched mainly on a pre-recorded basis, just as there will be some DVR owners who only watch pre-recorded content. But such programming and such behavior will not represent the mainstream. The type of programming that is watched mostly pre-recorded will typically be non-mainstream content scheduled outside of peak hours<sup>127</sup>. DVR owners who watch everything pre-recorded are likely to be individuals who watch just a few hours of content per week, rather than the typical average of 25-35 hours per week<sup>128</sup>.

In 2011 (and beyond) DVR owners are likely to default to the schedule when turning on the television, and only resort to the menu of pre-recorded content after a few minutes of channel surfing have proved fruitless<sup>129</sup>. In one study of DVR owners in the United Kingdom, 70 percent always checked to see what was on broadcast first; only 16 percent checked out their pre-recorded options first (see Figure 4).

In 2011 and beyond many surveys of consumer behavior are likely to indicate rampant advertising skipping; measured data, rather than self-reported data paint a different picture. The television industry needs to be alert to wherever respondents may distort – deliberately or subconsciously – their response.

#### **Bottom line**

Even though DVRs offer the ability to avoid all television advertising, it would require two fundamental changes to viewing behavior to happen: viewers would need to pre-record absolutely everything; and they would need to keep their eyes closed while fast forwarding. Neither is likely.

In an industry adept at creating live television and among a viewership that consumes an average 20 hours per week (and over 35 hours in some markets) pre-recording everything is nigh impossible. Secondly skipping through every advertisement, including the end “bumper” ad, requires a precision that most of us lack. The ad based funding model is not broken, at least by the DVR.

Even if DVR users only occasionally watch pre-recorded content, this does not mean that the service is not valued or that the devices should not be subsidized. Occasional usage will engender loyalty. So if a DVR allows a viewer to watch both his or her simultaneously-broadcast favorite shows or if it means that going out does not mean missing out on the latest episode of a preferred soap opera, this is good for the broadcaster, for the program maker and for the advertiser.

Indeed the television industry should constantly look at ways of making their DVRs easier to use, for example by integrating remote recording of programs with Web-based television schedules or program reviews<sup>130</sup>.

The television industry should also focus on how the DVR can enable it to add value for advertisers: is it doing enough to harness data on which ads are watched, which are always fast-forwarded, and which are rewound and watched again? This data could be combined with repositories of pre-loaded advertisements stored on the DVR that could allow a degree of personalized advertising to be provided. Further, programs watched several days after first transmission could be combined with updated advertising, with a new commercial, for example, replacing an advertisement for a one-day sale.

The rise of the DVR may however pose more of a threat for other parts of the entertainment sector. The ability to record with ease may well pose a threat to DVD sales and rentals. Making it easier to record films, regardless of the time they are shown, may well lessen a user’s perceived need to rent or purchase a DVD. Making it easier to record television may crowd out the time available to watch any films, including those rented or purchased in DVD format. According to one survey, of DVR owners who were recording more programs than a year back, 40 percent were purchasing fewer DVDs and 38 percent were renting fewer DVDs<sup>131</sup>.

# Push beats pull in the battle for the television viewer

Deloitte predicts that in 2011 despite the sale of tens of millions of television sets that offer a form of built-in search capability for television programming, the vast majority of viewing will be delivered on a traditional “pushed” basis, in other words the schedules will be determined by channel planners. And a growing number of selections may be pushed via recommendation engines built into the television or set top box. However the “pulling” of television content by viewers beyond the selection of a television channel is likely to remain an exceptional behavior.

Searching will be available to varying degrees of sophistication, ranging from simple search apps selectable from an on-screen menu, to powerful functionality that enables searching across a wide variety of broadcast, streamed and stored content.

Yet adoption of program searching is likely to remain modest, largely because of a lack of need. Although today’s viewers may value the ability to pull content, pushed content remains their default choice. This could be attributable to the inherently passive nature of the television medium. Marshall McLuhan famously suggested in *Understanding The Media* that television was a “cool” medium that would require audience interactivity; however, remote control and other innovations have made TV viewers infamously inert<sup>132</sup>.

Indeed, some argue that on-demand content, delivered by any technology, may never represent the bulk of viewing for the majority of viewers. Since the time that video rental stores first gave viewers the ability to opt out of scheduled programming, picking and choosing what to watch on TV has remained for most people an occasional activity. The monetary cost of selecting *à la carte* is one issue: but even as prices fell for purchased or rented video cassettes (in the 90s) and DVDs (over the past decade), demand did not rise commensurately. Typically households still rent at most a few DVDs per month. The biggest barrier might be the time and attention required to select content. Having choices is wonderful, but choosing can be a chore.

Actively “pulling” content may be even less compelling in 2011 owing to growing availability of recommendation applications built into TVs and set top boxes<sup>133</sup>. Many of these applications will use previous viewing behavior to conveniently recommend new content.

Aside from the behavioral challenges involved in pulling content, price is likely to be a major obstacle in 2011. Television sets and set top boxes that incorporate the most advanced search capabilities must factor in the cost of additional processors, memory and storage, which typically add at least \$50 (or 10 percent) to retail prices<sup>134</sup>. For low-end units, this additional cost will likely create a significant drag on sales. Customers pondering the selection of their next television set may well choose a larger screen rather than paying a premium for enhanced search capabilities<sup>135</sup>.

For consumers buying Internet-ready televisions that support advanced applications, a major barrier to search adoption is likely to be the required peripherals and user interface. Such televisions are likely to ship with a standard numeric keypad that makes it hard to enter search text. Upgrading to a full QWERTY keypad might be too expensive given the expected benefits, and current keyboard designs are not generally seen as elegant, convenient, or easy to use<sup>136</sup>.

When it comes to television in 2011, the only pulling that most viewers may want to do is pulling up a chair.

### Bottom line

Technology has always played a fundamental role in television. Since the first TV broadcast, the technology has shifted from black and white to color, screen size and resolution have grown by a factor of 10, and thousands of new channels have emerged. Yet one thing has remained constant: for most people, television continues to be a passive experience. Viewers value the option to choose, but often do not exercise it. Interaction – even among those with multiple ways to control what they watch – has generally been limited to choosing channels on a remote control or, for the most sophisticated users, selecting from a DVR menu of pre-recorded content. Technological progress is unlikely to shift these ingrained habits any time soon. Technology enables. But it cannot oblige.

Younger generations, having grown up searching for content on computers, may bring their search habits into the living room. But this is not likely to become mass market behavior for many years.

Television is – and will likely remain – more than just a piece of technology or portal to a library of content. For many households, it is a focal point for family gatherings. For many individuals, it is the principal topic of water cooler conversations with friends and colleagues. In 2011, mountains of newsprint and terabytes of online chatter will likely continue to focus on TV shows, pushing and cajoling people into what to watch. And the best search algorithm in the world is not going to change that behavior. At least not in 2011.



# Social network advertising: how big can it get?

Deloitte predicts that in 2011 social networks are likely to surpass the breathtaking milestone of one billion unique members<sup>137</sup>. Also, they may deliver over 2 trillion advertisements<sup>138</sup>. Yet the advertising revenues directly attributable to social networks may remain relatively modest compared to other media, at least in the short term. With per member annual advertising revenue of about \$4, that implies total 2011 advertising revenues of about \$4 billion (see Figure 5). Despite social media's large and growing audience, its advertising revenues still represent less than one percent of the worldwide advertising spend total. Other sources of social network revenues, such as payments systems and e-commerce, might exhibit faster growth.

Nevertheless, thanks to a low cost base, social networks might still achieve impressive gross margins despite their relatively low revenue per user – particularly when compared with the traditional media companies they are competing against. A social network's cost of content is close to zero since it merely provides the infrastructure, while its users and third party app developers provide all the content<sup>144</sup>.

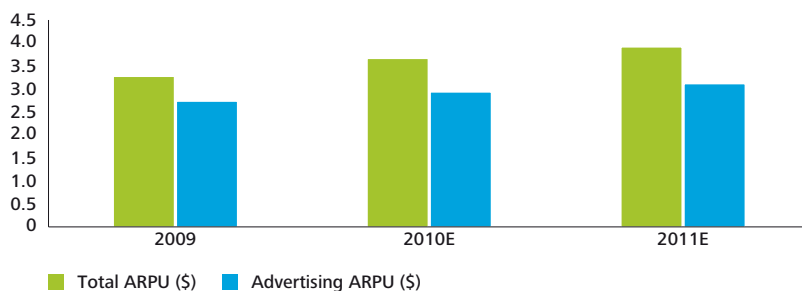
An assessment of social networks' potential hinges on three metrics: subscriber growth, time spent on the network, and CPMs. Many social networking companies have been recording impressive gains in some of these metrics, but it is worth examining how much additional growth they can achieve.

When social networks attain the billion unique user milestone, nearly half of one global user base – computer-based Internet users – may be signed up by year-end 2011. This could put a ceiling on future growth if global Internet adoption continues to expand at the pace that consensus analysts expect<sup>145</sup>: it might be increasingly difficult for social networks to sustain their impressive subscriber growth trajectories.

Mobile data might offer a better opportunity, particularly in developing countries where mobile penetration continues to rise steadily: there are far more global mobile users than those with access to computers. However, delivering display advertising to mobile phones at volumes and prices sufficient to create a significant multi-billion dollar business may not be likely in 2011<sup>146</sup>. In 2010, mobile advertising revenues for the United Kingdom – the largest market in Europe – were only about \$40 million<sup>147</sup>. As smartphones and 3G networks become more widespread, the base of active social network users should rise accordingly.

Social networks' growth trajectory is often compared with that of paid-for search, which in just 15 years grew from almost nothing into a \$30 billion plus market that continues to expand. However, a decade ago broadband penetration in most countries was still in the single digits and some markets had no broadband service at all. The growth of search was at least partly fueled by significant growth in online use – a trend that social media has already capitalized on.

Figure 5. Social networks' average revenue per user (ARPU) in \$



Source: Deloitte Touche Tohmatsu Limited, 2010, based on data from: eMarketer, 2010; NeXt Up Research, 2010; Business Insights, 2010

In 2011, it is likely that social networks' long-term market value will continue to polarize opinions<sup>139</sup>. Some view social networking as the technology sector's "next big thing", promising even greater rewards than the decade-old phenomenon of search advertising<sup>140</sup>. Others compare social networks to the dot com bubble and argue that monetizing their users at dollar levels similar to those of online search has not yet been demonstrated<sup>141</sup>.

Deloitte's view is that the advertising revenues from social networks in 2011 are likely to be very significant in absolute terms: total industry revenues of \$4-\$5 billion dollars and year-over-year growth of 30 percent are impressive numbers; individual companies may experience even higher growth rates. Yet revenue on a per-subscriber basis is unlikely to match search or traditional media in the next year or two. Also, advertising rates, measured on a cost per thousand impressions (CPM) basis<sup>142</sup>, are likely to remain low compared to other forms of online advertising as well as traditional media<sup>143</sup>.

If social networks' advertising revenues are worth only \$4 billion in 2011 with half the potential user base already signed up, or if future growth is largely restricted to the low-value mobile ad market, most of the upside for social networks would need to come from increased time spent on the network, or from improved CPM metrics.

The amount of time spent on social networks rose sharply in 2010. In fact, according to one analysis, a popular social network enjoyed a 66 percent increase between Q3 2009 and Q3 2010<sup>148</sup>. Yet even if the time spent on social networks grows by a factor of three, that might not necessarily translate into a threefold increase in advertising revenue<sup>149</sup>. Increasing inventory could cause CPMs to fall even further<sup>150</sup>.

If there are limits to audience growth and time spent, then the burden would primarily fall on CPM to drive revenue growth. Social networks' understanding of individuals' backgrounds, preferences, social groups, activities, and behaviors are without equal. There have been hopes that this would enable social networks to deliver superior advertising results: but paradoxically, social network CPMs remained among the lowest of all forms of online advertising<sup>151</sup>. That could well change, as the ability to mine the myriad data grows or as social networks may find new business models that allow for much higher advertising revenues, but for 2011 it is difficult to find the levers that would cause social network ad revenues to accelerate from their already rapid pace.

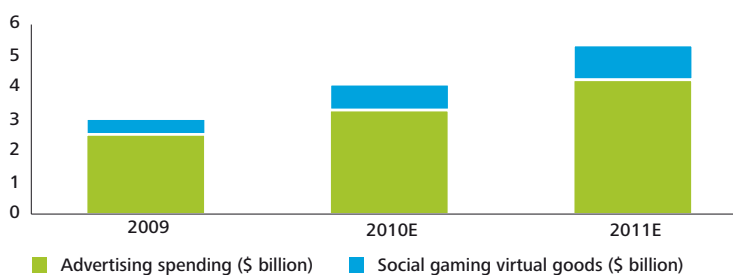
Perhaps the vastness of social networks' repository of user information is itself a limiting factor; as of 2011, it remains a challenge to economically extract useful insights from the volumes of user data that social networks generate. The billions of stated "likes" may not all necessarily signal an intent to purchase. Also, in 2011, as in previous years, privacy concerns may constrain the ability to collect the most valuable data<sup>152</sup>. Nevertheless, once social networks figure out how to rapidly and economically analyze their data, and to monetize the billions of recommendations made, a new seam of valuable customer insights will be available to mine and exploit.

### Bottom line

In 2011, the story of social networks will continue to be written with no clear conclusion in sight. Social networks remain an emerging business founded on innovation; yet they have already achieved levels of market acceptance that might have seemed inconceivable just a few years ago. The question now is whether social networks can sustain their growth trajectory and find better ways to monetize value.

Even if social networks' 2011 ad revenues only meet industry forecasts, they may still have other valuable ways to generate revenue. For example, they could serve as a payment platform for the hundreds of thousands of application providers in their ecosystem. Or they could adopt a blended e-commerce department store model, where they charge for online floor space and earn a commission on any sales. Yet in 2011 these additional revenue streams, although very profitable, are unlikely to surpass advertising in importance to social networks (see Figure 6).

Figure 6. Global social network revenues



Source: Deloitte Touche Tohmatsu Limited, 2010, based on data from eMarketer and NextUP Research

If low CPMs are expected to be the norm, social networks should consider how media agencies – particularly those paid by commission – are likely to respond. Agencies might conclude that commissions based on modest CPMs are less attractive than other potential clients, and could begin pushing other forms of advertising. Or they might decide to sell high value advisory services, such as public relations and reputation management, to help a brand manage its presence on social networks.

Advertising firms and their clients will likely need to expand their use of social media to protect their image and reputation in a world increasingly influenced by personal opinions and grassroots communications. Studies have shown that word-of-mouth feedback and peer reviews exert tremendous influence on purchasing decisions; in fact, one survey found that up to 78 percent of people trust peer recommendations, compared to just 14 percent who trust advertisements<sup>153</sup>.

Throughout 2011, it seems likely that the forecast for the social network sector will continue to be promising, but unclear. As more information is released and as business models become more developed, advertisers, competitors and analysts will get a better picture of the potential of this industry.

# Games go online and on sale: the audience grows, but at what price?

Deloitte predicts that in 2011 the global computer and video game industry will continue growing but from a more diverse set of revenue streams. The industry is forecast to generate \$52 billion in software revenues in 2011, 6 percent higher than in 2010, while hardware is predicted to generate only \$13 billion, a decline of 19 percent<sup>154</sup>.

An increasingly large percentage of games revenue is likely to come from monthly subscriptions, peripherals, fees for services and in-game purchases and advertising in the free-to-play (F2P) and "Freemium" markets. Deloitte forecasts that the total revenue from these relatively new sources could be as high as \$10 billion, or 16 percent of total game revenues, by the end of 2012, and over time could represent 50 percent of all revenues for the industry.

The existing PC and console game business is confronting various challenges. Increased software piracy has had a profound effect on sales over the past few years, costing the industry billions<sup>155</sup>. Meanwhile, the higher costs and lengthening development times for high-end games have made game development riskier (publishers need blockbusters) and has reduced profits across the industry as a whole<sup>156</sup>. For PC game developers and publishers, more and more computing devices are being sold – but many of them are smartphones, tablets and netbooks that do not have the hardware to support conventional high-end games.

Console revenues and profits tend to be highly cyclical as both hardware and software purchases are linked to the console upgrade cycle<sup>157</sup>. Five years have passed since the current generation of consoles was released; the result will likely be relatively flat growth in 2011. Moreover, there are some concerns that the console refresh cycle, which has averaged five years for almost two decades, is about to lengthen into a 10-year cycle, as existing games are not yet putting stress on the hardware capabilities of existing consoles. This would delay the next expansion phase. Console makers hope to bridge the gap by introducing add-on features such as motion control, camera peripherals and 3D.

Three major technological drivers – powerful portable devices such as smartphones, ubiquitous network connectivity, and social gaming – are transforming the industry and creating new sources of revenue. As these new revenue streams emerge, the industry should see growth that is both more stable and more profitable. Also, the global audience of gamers will likely continue to expand rapidly, primarily due to an increase in casual gamers on consoles, web and social networks, and most recently smartphones and tablets. However, worldwide games revenues are forecast to grow more slowly than the number of gamers: revenue per gamer is expected to fall.



Only a few years ago, very few gamers were connecting to the Internet for any reason. But today, an estimated 53-78 percent of gamers (depending on their console) in the United States use a connected console to play multi-player online games, download new content and converse with other players while gaming. Connected consoles are also used as PC substitutes for applications such as streaming video<sup>158</sup>. The benefits to the gamer of a connected machine are enormous – but the benefits to the games industry are even greater: the arrival of connected gaming has not only slowed the growth of piracy, but actually reversed it, especially in geographies where piracy was particularly high<sup>159</sup>.

As more of their customer base gets connected, game publishers are likely to see expanding contributions from revenue sources that aren't entirely new, but are becoming increasingly important: micro payments from selling additional levels, characters and costumes; online stores; and, possibly, real-time ads placed in games (although this has not been a big market so far)<sup>160</sup>. Also, some high-end games are being sold as monthly online subscriptions. The cloud gaming market (or GaaS, gaming as a service) is still nascent but could become a significant revenue source for companies that have customers with fast Internet connections – even people with relatively low-powered netbooks or small, cheap thin-client devices that can be connected to TVs should be able to enjoy console-like experiences<sup>161</sup>.

The fastest growing games segment will probably continue to be F2P and Freemium games. These games are typically based on a revenue model where basic game play is free, but a premium is charged for add-ons that enhance the game experience such as extra levels, accelerated progress and special in-game accessories such as weapons, supplies and costumes (micropayments). Many subscription games are converting to F2P and seeing their revenues increase by 100 percent or more<sup>162</sup>. Total F2P revenues in 2009 were about \$2 billion<sup>163</sup>; in 2011, that number could reach \$5 billion.

The upshot of all these trends is that the gaming industry will likely see smoother revenue streams, higher revenues and profitability and massive user growth. The existing market of core gamers isn't about to go away, but the mix of people who play games is likely to shift in many ways: age, gender and income, among others.

#### Bottom line

The games industry appears to be following in the footsteps of the enterprise software market. Two decades ago, 90 percent of enterprise software revenues were one-time license sales – analogous to buying a game disc – and there were virtually no follow-on revenues or service fees. Today, many software companies derive more than half of their revenues from services and subscriptions, and license fees are much less critical.

Although this change was disruptive to the industry, most enterprise software companies found that after the transformation they were still able to grow profitably while enjoying less revenue volatility. The games industry might be able to learn from their experience, leveraging best practices from the enterprise software industry while developing new best practices of its own.

The F2P/Freemium revenue model is interesting and potentially lucrative. However, it could pose a serious disruptive threat to existing console hardware and software manufacturers if they respond too slowly. The new model will likely give rise to new competitors; also, it might reduce the perceived value of all games.<sup>164</sup>

The growing number of non-console and non-PC games and gamers suggests that companies focused on traditional console and PC hardware sales may need to diversify. We are already seeing high-end graphics chip manufacturers use their technology in non-gaming markets<sup>165</sup>. Also, the peripheral market seems to be shifting from single-purpose accessories (musical instruments, etc.) to multi-purpose peripherals that provide image recognition and motion capture. Peripheral manufacturers and game developers alike may need to adapt to this market shift.

# Keeping the life in live: A&R diversifies

Deloitte predicts that in 2011, the live music sector, with festival organizers at the forefront, will start expanding its talent creation and nurturing role, either as individual companies or joint projects. Until now, that role has been left largely to music labels' artist and repertoire (A&R) divisions. The live sector will identify, invest in, develop and commercialize the next generation of stadium-filling artists, using a variety of approaches, from talent contests at festivals to dedicated facilities for nurturing new talent. All aspects of the live music sector may get involved: venue owners, concert promoters, television production companies, ticket sales agencies and even some established recording artists.

The recorded music industry has traditionally built a pipeline of up-and-coming music acts through their A&R divisions. In 2010, the industry spent almost \$5 billion on development and promotion of all acts, with about half going to foster new talent<sup>166</sup>. However, after a decade of declining sales, the labels' A&R spending is shrinking both in absolute dollars and as a percentage of sales. In some countries, A&R investment as a percentage of revenues is down about 25 percent since 2006.<sup>167</sup>

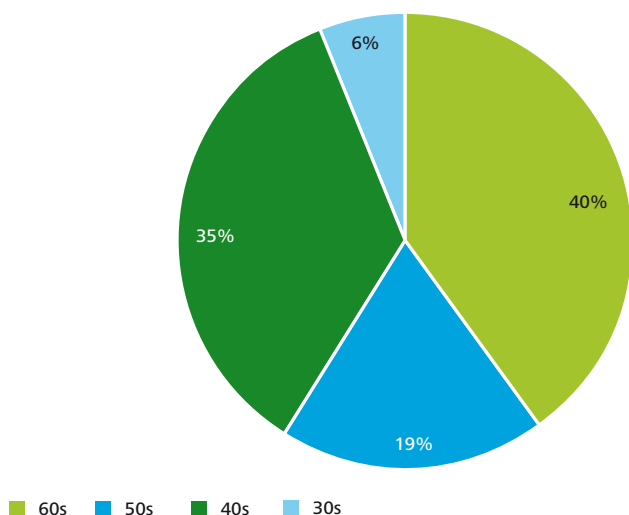
By contrast, the first decade of this millennium has been particularly prosperous for the live music industry. Revenues rose steadily and even fared relatively well during the recent recession<sup>168</sup>. However, the decade ahead looks to be more challenging, perhaps due to the ongoing decline in A&R investment by the labels.

There are two cyclical factors that could soften live music revenues in 2011 and beyond, forcing the live sector to pick up some of the slack in terms of identifying and commercializing new acts.

One factor is the vintage of the current highest grossing live acts. Some of the last decade's biggest draws appear to be approaching the twilight of their touring careers. In 2011 the lead singers for eight of the 20 highest grossing live acts in the United States from 2000-2009 will be 60 or older. Only one of the top 20, Rascal Flatts, released its first album this century (in 2000). Through 2009, Rascal Flatts grossed \$222 million from touring. The other 19 acts, the majority of which rose to prominence on the back of single and album sales (and the associated promotional activity) grossed a cumulative \$6 billion in ticket sales during the last decade: the sexagenarians alone brought in more than \$2.5 billion (see Figure 7).

A second factor is the economy, particularly in industrialized countries. Stubborn unemployment, increases in value added tax, and an austerity-focused public sector might keep consumer confidence low and concert attendance down<sup>170</sup>. In fact, a weak economy might have been one of the key factors behind the 17 percent decline in the U.S. live market in the first half of 2010<sup>171</sup>.

**Figure 7. Share of revenue generated by the top 20 grossing music live acts in the United States from 2000-2009, by age of artist/lead singer in 2011**



Source: Deloitte Touche Tohamtsu Limited, 2010, based on live tour data from Pollstar<sup>169</sup>; ages of lead singers from various websites



While record companies will always exist, they might be unable or unwilling to handle their previous level of investment in new acts. If so, another part of the industry might need to take up the slack of identifying and publicizing new talent to a point where fans are willing to pay \$100 or more per ticket to see them perform. The live music industry will need to build this new role into its long-term business model.

The role of festivals in A&R is likely to increase as festivals rely most heavily on musicians to sell their tickets. This differs from an arena or stadium whose major motivation is to book any act that can fill up its seats, including, for example, stand-up comedians whose staging costs are generally far lower.

Television's role in identifying new talent may start placing an increased focus on acts that are great recording acts but are even better at touring.

#### **Bottom line**

As festivals start to become more involved in nurturing talent, one of the promotional activities they are likely to take on is the release of new albums and singles (and all of the marketing activity that goes with it). This is likely to remain the principal way to raise awareness of bands and their latest outputs; for many fans, seeing a number one single performed live is likely to remain a key selling point<sup>172</sup>.

The live music industry might want to co-invest in the A&R process with companies outside of the music sector that wish to use music to promote their products. Given society's seemingly limitless affection for music, most vertical sectors – from fashion to mobile phones to automobiles – would likely value an association with music. Live music businesses could tap these brands to help pay for part of the talent development process, such as the funding of recording studios<sup>173</sup>.

The record companies' traditional A&R process was very effective, but also very resource intensive. In today's environment where music fans seem to value a live experience more than a recording, the live music industry might be in a better position to identify top talent – specifically, the talent that can really deliver on stage.

The various players in the live music industry must recognize their common need for an ongoing pipeline of new acts to replace the existing big draws – and they must take combined action. Over the next few years, label-sourced A&R is likely to decline by roughly \$500 million per year globally. It seems reasonable to assume that the live music industry – or other source of funding – will need to step in to prevent the well from running dry.

# Pop goes pop-up: music retail goes seasonal and temporary

Deloitte predicts that 2011 revenues for digitally distributed music will exceed physical music sales in at least one major market, most likely the United States. This long-anticipated event will probably be driven by a sharp decline in CD sales, rather than a significant increase in digital music subscriptions or downloads<sup>174</sup>.

This likelihood leads to a related prediction: CD retail will start becoming a seasonal or event-driven purchase. By the fourth quarter of 2011, there could be 1,000 temporary “pop-up” music outlets created to meet occasional surges in demand. Pop-up outlets will be a small, but growing, niche segment<sup>175</sup>.

In 2011, the United States will likely be the first of the big-three recorded music markets to see digital music revenues from downloads, subscriptions and streaming services advertising surpass revenues from physical music. The UK is likely to follow, either in 2011 or by the end of 2012<sup>176</sup>, assuming CD sales continue their steep decline<sup>177</sup>. To put the severity of this decline in perspective, CDs made up 75 percent of record labels’ 2009 revenues in the United Kingdom.

The decline in the CD market is likely to cause a marked reduction in year-round shelf space dedicated to physical music. Even with fewer competitors, dedicated music retailers may decide that their shrinking revenues and profit margins make physical music retailing less viable<sup>178</sup>. Some may diversify, shifting their focus from recorded music to equipment for playing music, concert and festival tickets, or music-related clothing.

Rather than selling popular hits, other music retailers may specialize in music genres that would be harder to discover on the Web. Their aim would be to attract fervent music fans who are willing to pay for music. These niche markets will likely make up only a small portion of total album sales, similar to vinyl record sales. For example, in the United States, vinyl sales grew 250 percent from 2006 to 2009. However, the end result represented only 2.5 million units out of a total album market of 374 million<sup>179</sup>.

Despite the shift toward digitally distributed music, physical music retailing will not vanish: while demand for CDs in the medium term will continue, it will become increasingly seasonal. In 2010, nearly half of all CDs sold in the United Kingdom were expected to be purchased during the fourth quarter, driven by seasonal gifting and the finale of music talent shows<sup>180</sup>.

Retailers will likely respond to variable demand by creating pop-up stores. Current music retailers might establish a variety of temporary stores, including conventional retail spaces with short-term leases<sup>181</sup>, temporary outlets in high traffic locations<sup>182</sup> and small-scale outlets offering curated, exclusive merchandise<sup>183</sup>. These curated outlets could be located wherever and whenever there are people who want to buy CDs, such as at live music venues<sup>184</sup>.

In the medium term, pop-up stores may also be set up to coincide with major record releases. A long line of fans eager to purchase a new release from a pop-up store could generate marketing buzz and increase record sales.

General retailers, such as department stores and supermarkets, may abandon selling CDs year-round if their turnover and margin targets are not met. Instead, they may only stock CDs when demand is stronger, such as during gift-giving seasons or major music events. In some cases, music might be sold from a pop-up outlet physically located within the main store<sup>185</sup>. During the rest of the year, music might only be available from the main store's website<sup>186</sup>.

**Bottom line**

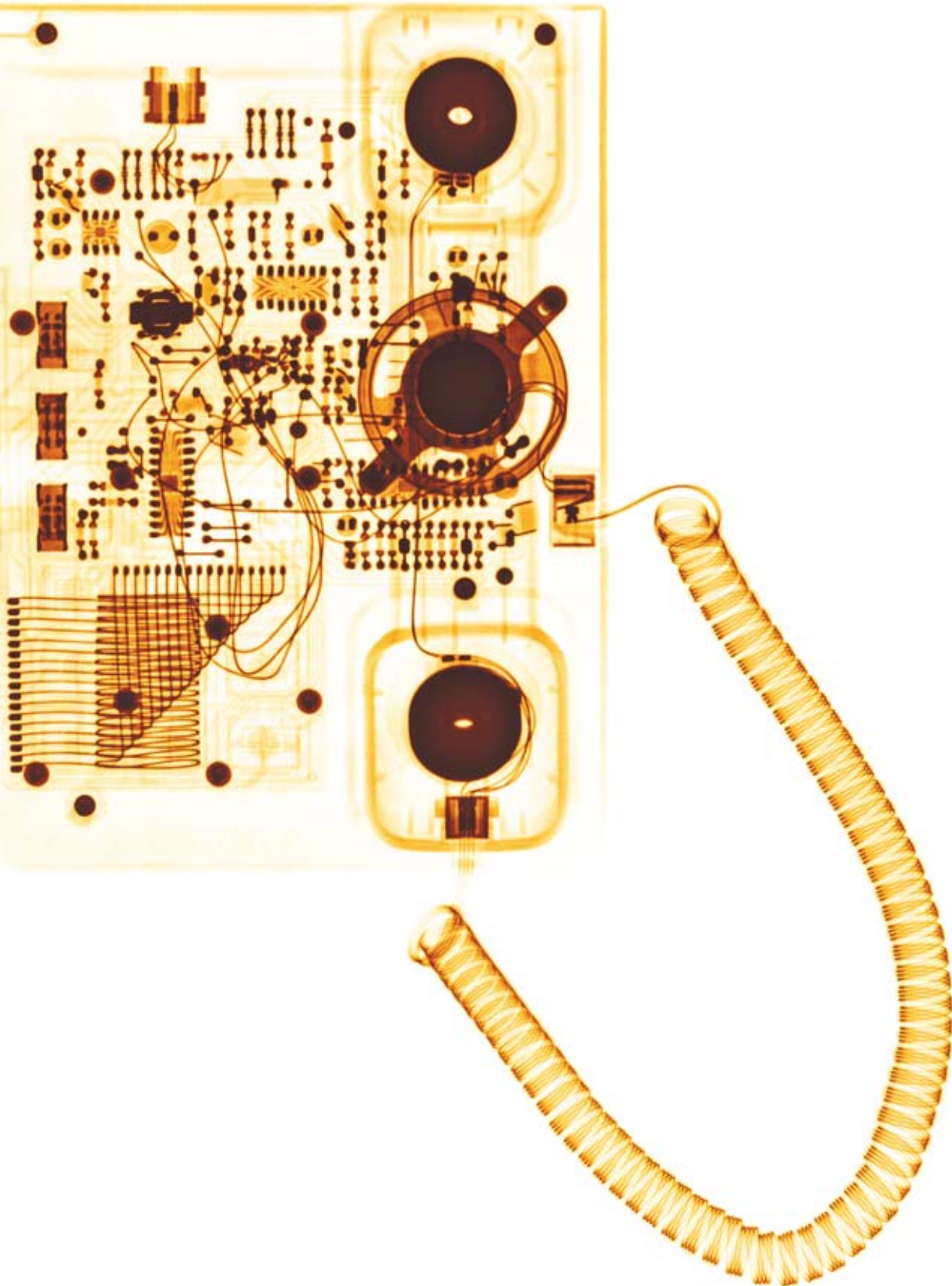
The next few years will probably remain challenging for music retailers. The one bright spot is that CD prices could rise over the medium term as dedicated CD buyers have fewer outlets to choose from. CDs could follow the path of vinyl LPs, which rose significantly in price following their exit from the mainstream.

Music fans who prefer CD audio quality might be willing to pay a higher price. However, price increases will not compensate for a continuing decline in unit sales; net revenues from recorded music will continue to decline.

Nevertheless, because recorded music provides crucial exposure for musicians, it is likely that record labels and other music promoters will continue to produce CDs – even at a loss.



# Telecommunications



# Getting to 4G cheaply: will many carriers opt for 3.5G instead?

Deloitte predicts that in 2011 the deployment of next generation Long Term Evolution (LTE) wireless networks will fall short of industry expectations due to the continuing viability of the latest third generation (3G) wireless technologies, such as High Speed Packet Access (HSPA+), and the handsets that work with them.

Spectrum for LTE is currently being allocated, and 130 carriers were running LTE trials at the end of 2010. Many commentators expected widespread rollouts to have happened by now<sup>187</sup>; however, Deloitte expects that fewer than 30 LTE carriers in six countries will offer commercial service by the end of 2011<sup>188</sup>. While a few of the world's largest carriers will likely deploy LTE, most networks will stick with transition technologies for the next year.

## The technology behind 3.5G and LTE

There are three basic tricks that carriers can use to wring more capacity out of their existing cellular spectrum.

- **Place cell towers closer together.** In most big cities, however, tower density has already been pushed to the limit. Cutting-edge innovations such as femtocells and picocells could be used to shrink cell sizes further, but have yet to be widely adopted because of cost.
- **Improve how the RF signal is encoded.** Advanced modulation techniques that squeeze more information into a given frequency band are constantly evolving. However, they require complex chips to implement. The latest is called *64 Quadrature Amplitude Modulation* or *64QAM* (pronounced "kwam").
- **Put multiple antennas on cell towers and mobile devices.** This multiple input-multiple output configuration (known as *MIMO* and pronounced either "me-mo" or "my-mo") used to be found only in advanced military technology. It enables improved wireless communication that uses the spectrum more efficiently, particularly in urban areas, where signals bounce off buildings and suffer from multipath distortion<sup>190</sup>.

Some aspects of the full 4G standard can be found in current LTE implementations, such as the MIMO antenna configuration, QAM encoding and channel allocation and scheduling. However, true 4G must offer mobile speeds of 100 Mbit/second, and fixed access speeds of 1 Gbit/second. At the moment, real-world deployments of LTE are only achieving fixed download speeds of around 10Mbit/s<sup>191</sup>. This is much faster than older 3G technologies, but not nearly fast enough to qualify as true 4G.

The latest versions of 3G, such as HSPA and HSPA+, known as "3.5G" because they are a bridge between generations, use some of the same tricks as LTE. HSPA+ release 8 uses both 2x2 MIMO and 64QAM, and promises real-world mobile data download speeds of 15-30 Mbit/s by the end of 2011.

Many carriers, especially those with weaker balance sheets or less congested networks, are asking themselves why they should move to LTE when real-world deployments of HSPA+ seems to offer comparable speeds (more than 30 HSPA+ networks around the world currently offer 21 Mbit/s downloads).

The decision between 3.5G and LTE turns out to be more complex than it seems. Although 3.5G theoretically offers competitive speeds, it is less spectrally efficient than LTE and therefore uses more radio spectrum to achieve similar data rates. In some real-world circumstances, HSPA+ uses twice as much spectrum as an equivalent LTE implementation. Also, 3.5G lacks some of the architectural efficiencies of LTE to support enhanced features and services such as video.

Carriers that invest in LTE now may enjoy an easier, less expensive transition to true 4G when it becomes available. However, in 2011, 3.5G will likely be the most commonly deployed "next generation" technology as many carriers around the world do not currently have sufficient funding or need for LTE.

Aside from the truism that “everything always takes longer than you think,” there are two main reasons why 4G adoption might be slower than expected. First, not all mobile providers have made full use of their existing 3G spectrum: weak economic growth, low mobile broadband usage and underutilized networks have allowed some providers to defer additional investment.

Second, LTE – as it exists today – does not offer the quantum leap in speeds and features over 3G that previous generational upgrades did.

LTE is likely to be a major success in 2011 and beyond, with hundreds of millions of subscribers around the world gaining access to the benefits that LTE can provide<sup>189</sup>. But rollout will probably be slower than many people expect, especially if some mobile providers that have less congested networks – or that operate in markets with less immediate demand for broadband – decide the need for LTE is not as urgent as they previously thought. Providers that do have a need for LTE need it a lot, and they need it now: the big question is how large that group really is.

Although LTE networks are being marketed as 4G networks, it would be more precise to describe them as “4G ready”. In their current form they do not offer a quantum leap in performance over 3.5G, which is why some carriers have been able to postpone upgrading.

#### **Bottom line**

The global market for deploying LTE networks is expected to be roughly \$10 billion by 2014, and many times higher than that in subsequent years<sup>192</sup>. Most commentators agree that mobile providers will eventually invest heavily in 4G, however, a slower than expected rollout could disappoint some industry observers. Markets where 3G deployment took longer than expected saw significant erosion in equipment prices and margins; in some markets, late-built 3G networks even produced negative gross margins for the equipment vendors<sup>193</sup>.

Mobile providers with severe network congestion and weak ownership of spectrum have little choice at this point: only LTE’s bandwidth efficiency can solve their problems. By contrast, networks with ample spectrum to handle their current and future needs can probably defer LTE for years. In fact, some emerging markets such as rural India and China are still in the process of deploying 3G, let alone 4G<sup>194</sup>.

The more difficult choice will be for providers that fall between the two extremes. Although they might think they can defer LTE investment for 3-4 years, a sudden surge in wireless data devices or usage patterns could create an immediate need for LTE’s spectral efficiency and other features. As the last few years have shown, wireless demand can rise very abruptly. Carriers need to be prepared for data volume growth that is measured in the thousands of percent over three years, as past experience has shown that those rates can occur and even persist over several years.

A provider could spend hundreds of millions on HSPA+ in order to put off a multi-billion dollar investment in LTE, only to find itself facing an immediate need to upgrade to LTE and to have to spend the billions anyway.

Handset vendors also face a difficult choice. Most voice traffic is expected to stay on GSM next year, and a large share of data traffic is likely to be handled through dongles, personal mobile Wi-Fi hotspots and laptops with built-in 3G. Also, LTE networks will probably be more limited than expected in 2011; although they will tend to be available in the most affluent and data-hungry markets. Handset vendors that are thinking about not offering LTE versions of popular phones and tablets must weigh the decision carefully.

Finally, businesses selling services or applications that piggy-back on the network may have to adapt their strategies to a data world where most customers still connect through some flavor of 3G. This could mean deferring launches or finding alternate solutions until the faster networks are ready.

# Wi-Fi complements cellular broadband for “data on the move”

Deloitte predicts that in 2011 the volume of data uploaded or downloaded from portable devices via public Wi-Fi networks will grow at a much faster rate (25-50 percent) than the volume carried over cellular broadband networks. The bulk of this growth will be video data<sup>195</sup>; Wi-Fi is likely to become the default network for video applications.

Wi-Fi's increasing share of the mobile device data load will likely have a ripple effect in moderating the growth rate of cellular broadband traffic, potentially helping improve margins for mobile providers' data services.

Trends that could contribute to increased use of Wi-Fi use include: proliferation of Wi-Fi hotspots, increased penetration of Wi-Fi chips in portable data devices, easier log-in procedures to access hotspots, partnerships between hotspot providers and mobile providers, growing awareness of Wi-Fi capabilities in existing devices, superior battery life in some contexts<sup>196</sup>, and a steady shift toward tiered mobile data pricing<sup>197</sup>.

Cellular broadband will increasingly revolve around specific uses and the users that can take full advantage of the technology's unique strengths – wide-area coverage, mobility and integrated security<sup>198</sup> – and justify the cost premium. These specific uses include:

- Users who need to send a file while actually *moving*<sup>199</sup>. (This differs from being “on the move”, which can include periods when the user is stationary, e.g., standing on a train platform, parked at a highway service station, or dining at a restaurant);
- Relatively price-insensitive users (e.g., business users) who require a more secure connection;
- Locations where public or private Wi-Fi connectivity is too congested and the user is willing to pay a premium for a better connection;
- Low-bandwidth applications such as e-mail or text-based updates to social networks; and
- Geographic regions where it is not commercially viable to deploy a public Wi-Fi network, but where some users might still need a wireless data connection.

Increased focus on these special situations could help boost margins for cellular broadband and reduce the disconnect between volumes carried and revenue generated.

Mobile data's appeal as a like-for-like alternative to fixed broadband may recede if the equivalent fixed broadband offer is cheaper and/or offers higher performance. The number of households that have cut their fixed connectivity cord may reduce as some formerly mobile-only households revert to fixed lines for broadband and voice access.

Wi-Fi's growing appeal for on-the-move data is likely to be based not just on the growing base of Wi-Fi hotspots, but on the appropriateness of their location and pricing<sup>200</sup>. Based on recent growth rates, the number of public hotspots worldwide could increase by 20 percent in 2011, rising to over 400,000. In addition, some fixed broadband providers are enabling customers to use other customers' Wi-Fi connections, creating networks with millions of hotspots<sup>201</sup>.

Meanwhile, the location of public hotspots is becoming more targeted to actual needs; users may no longer be required to seek out a specific restaurant or coffee chain in the hope of finding Wi-Fi<sup>202</sup>. Instead, Wi-Fi providers are likely to locate hotspots where people are known to need high speed data connections. Shopping centers could be designed from the ground up to incorporate Wi-Fi access<sup>203</sup>. Indeed some retailers might make it a standard policy to include Wi-Fi connectivity in their stores to encourage comparison shopping<sup>204</sup>. Photogenic tourist areas also could provide Wi-Fi hotspots to enable photographs to be distributed to friends and family within seconds<sup>205</sup>. In addition, Wi-Fi may become increasingly available on trains and train platforms<sup>206</sup>.

The proliferation of free hotspots<sup>207</sup> and in some cases competitive Wi-Fi hotspot pricing – should drive adoption. Sponsored Wi-Fi could become increasingly common as part of branded marketing initiatives<sup>208</sup>. Also, for some users, hotspot access will be bundled with another service, such as broadband<sup>209</sup>.

As Wi-Fi networks expand and tiered pricing becomes increasingly pervasive, users will become accustomed to waiting until they are at a hotspot before streaming content or transferring large files. This will help limit the use of cellular broadband to specialized mobile applications.

Although cellular data traffic will likely continue to increase, the growth rate should moderate significantly from the levels seen in 2008-2010, when Wi-Fi was a less well-known and less pervasive alternative.

The year 2011 will almost certainly see growing shipments of Wi-Fi only portable data devices – such as eReaders, handheld game consoles, tablet computers, digital photo frames and even voice phones<sup>210</sup> – largely due to their lower cost. 3G versions of eReaders cost up to a third more than Wi-Fi only models<sup>211</sup>; 3G tablets cost up to 20 percent more than Wi-Fi only models. Customers who occasionally need access to cellular broadband can purchase a MiFi device that converts a 3G signal into a usable Wi-Fi connection.

If a growing number of customers opt for Wi-Fi only devices, some manufacturers may decide not to produce 3G versions at all, particularly at the low end of the market. Other suppliers may limit their offerings to Wi-Fi only devices for technical reasons. For example, some video calling services might only be available when connected via Wi-Fi in order to reduce congestion on the cellular network<sup>212</sup>. To promote Wi-Fi use, manufacturers may start to bundle devices with subscriptions for a few free months of hotspot access.

Wi-Fi use – particularly for video applications – will likely also be driven by the shift from all-you-can-eat mobile data plans to capped monthly usage, a move that is already being implemented by mobile providers around the world. With a 200 megabyte cap, just one hour of video streaming at 500 Kbit/s would eat up an entire month's allowance.

The introduction of LTE networks – as well as the ongoing upgrade of existing 3G networks to HSPA+ – will boost the speeds available for cellular broadband. LTE offers higher spectral efficiency and is less prone to interference, but cells may be less ubiquitous and would therefore have higher contention and congestion. Meanwhile, Wi-Fi connections continue to get faster. The wireless link to a Wi-Fi router already exceeds 100 Mbit/s using the latest standard (802.11n)<sup>213</sup>. And the fixed networks that link Wi-Fi routers to the Internet are steadily improving<sup>214</sup>. In the end, LTE is unlikely to compete with Wi-Fi hotspots – unless the latter are congested – but would remain the clear choice for users requiring high speed data access beyond the reach of a Wi-Fi or fixed broadband connection.

#### Bottom line

Mobile providers should view Wi-Fi and cellular broadband as complementary and build out blended networks, or partner with Wi-Fi providers as appropriate. Mobile providers and device vendors should not view the new, more specialized role for cellular broadband as a failure or a defeat. Given the significant cost difference between carrying data over a fixed network versus a 3G cellular network, 3G-based broadband may never be competitive against Wi-Fi on a like-for-like basis for high bandwidth data services.

Indeed, mobile providers could benefit the most if cellular broadband use starts to focus on applications that actually take advantage of its unique strengths – wide-area coverage, mobility and integrated security. Without such a shift, the current growth trend is expected to produce a 25-fold increase in mobile data with only a two-fold increase in revenues over the medium term, which appears to be unsustainable.

The battle between Wi-Fi and cellular broadband should not be seen as a zero-sum game: both can be winners. For example, a service for sharing photos on-the-go could use cellular broadband to immediately upload low resolution thumbnails, with the corresponding high resolution images being uploaded later from a Wi-Fi hotspot or fixed line connection.

In the face of convergence, mobile providers must think more broadly about the range of wireless and wireline technologies that people want to use, and then help their customers tap into the right mix. The idea is to make the entire connected experience as seamless as possible, while charging both business users and consumers an appropriate amount for the privilege of simplified access to a complex set of networks.

IT managers can help their companies keep costs in check by making it as easy as possible for users to log into Wi-Fi networks when available. This is especially important for users who access data while roaming; access to hotspots could represent a major cost saving.

Wi-Fi network providers need to be aware of Wi-Fi's limitations, particularly the issue of radio interference. Wi-Fi shares unlicensed spectrum with a wide range of devices from microwave ovens to Bluetooth devices to wireless game controllers. Connection quality must be continuously monitored to avoid network degradation. Wi-Fi providers must also create networks with sufficient capacity (particularly backhaul capacity) so the networks are not overwhelmed by the increasing volume of users and data traffic<sup>215</sup>.



# What is “in store” for Wi-Fi: online comparison shopping on aisle 3

Deloitte predicts that in 2011, 25 percent of North American big box and anchor tenant retailers will begin offering free in-store Wi-Fi access to shoppers. In 2012, the proportion should continue to rise in North America and start to spread around the world.

Until now, cellular data was the only connectivity available inside most large stores, and many customers did not have a phone or data plan that enabled Internet access. Also, cellular signals can be highly variable: weak signals and low speeds are common, especially deep inside a store. Without Wi-Fi, the in-store online experience is often frustrating and dissatisfying.

Offering Wi-Fi access is not yet an accepted retailing practice<sup>216</sup>. Although Wi-Fi has become pervasive in cafés and in the common areas of malls, individual retailers feared that consumers would use their smartphones or tablets and the Internet to comparison shop. Retailers do not stock flyers or catalogs from their competition...why would they provide a data pipe that tells customers the same or similar merchandise is available at a competitor, possibly for a better price?

Conversations with large North American retailers suggest that this fear may have been misguided. When shoppers do in-store online comparison shopping, preliminary and anecdotal evidence suggests the likelihood of purchasing appears to go up, not down.

A common reason why shoppers do not make a purchase is that they are paralyzed by the lack of knowledge: “is this item available elsewhere for a much better price?” When an online search reveals that competitors’ prices are similar, many shoppers proceed with the purchase at the store they are in, rather than drive around just to save a few dollars. Although some sales are lost, experiences from early adopters and other comparison technologies suggest that is more than offset by connected consumers being less likely to leave without purchasing, and ending up spending more<sup>217</sup>.

In-store Wi-Fi would enable customers to use the retailer’s digital sales tools to answer basic questions and to find out if the item they want is in stock. This would allow in-store employees to spend their time on more valuable activities such as handling detailed questions and increasing service and sales, instead of responding to routine inquiries. Stores could deploy Wi-Fi tablets as interactive catalogs and order entry systems. And certain products, such as Wi-Fi enabled TVs, could be demonstrated more effectively<sup>218</sup>. Broadly speaking, some retailers view Wi-Fi as a way “to further enhance the customer in-store experience<sup>219</sup>.”

Even if shoppers use a store’s Wi-Fi for personal activities (e.g., checking email, other legitimate web browsing) they are likely to spend more time in the store, perhaps increasing their impulse buying and total spending. Also, very few customers are likely to “park” themselves in the store just to use Wi-Fi, as most retailers do not provide tables and chairs.



In-store Wi-Fi could enable a variety of advanced push applications. Localization would allow for precise targeting: shoppers in the linens section could have information or discounts pushed to their mobile devices. Up-sell offers could also be pushed: a shopper who buys a barbecue grill could be instantly sent an offer on patio furniture that could either be purchased in store or through the website for home delivery.

Another benefit for retailers who offer in-store Wi-Fi is collection of customer data. Depending on Wi-Fi user agreements and local privacy laws, various levels of in-store customer information could be collected, retained and analyzed. At the most basic level, Wi-Fi would enable a retailer to map customers' physical paths through the store<sup>220</sup>. In addition, a retailer could gather email addresses and cell phone numbers to add to its customer database<sup>221</sup>. Some retailers offer customers the option to sign-up for free Wi-Fi access by logging in through third-party social media sites such as Facebook. This enables a retailer to collect other useful data, such as age, gender, birth date, relationship status, occupation and personal interests.<sup>222</sup> However, the availability of such data depends on what users are willing to share publicly via Facebook and in their privacy settings. Once gathered, customer information could be retained and used on future visits to direct the customer to a personalized landing page with targeted promotions.

When customers are logged in to a store's Wi-Fi network, it is possible to track their online activities, including the Web searches they conduct and the websites they view.<sup>223</sup> Doing so can provide useful information about which competitive shopping destinations are most frequently used. Taken to an extreme, the precise content of their activities could even be monitored and acted upon in real time by, for example, delivering a coupon or sales pitch to customers' devices in response to their browsing behavior. This would enable retailers to serve advertisements more relevant to a customer's interests – a practice known as online behavioral advertising (or Internet-based advertising). Retailers could also aggregate data collected from Web based traffic and then match it against real-time in-store purchases and subsequent online purchases.

#### **Bottom line**

In-store Wi-Fi presents retailers with a number of minor challenges. Retailers will probably need to build more and better apps to enhance the in-store experience. They may also need to upgrade their Wi-Fi equipment and network connectivity to support additional connections. However, based on experiences from some early in-store deployments, the costs to address these challenges are not material to most large retailers<sup>223</sup>.

Far and away the biggest challenge relates to privacy and customer data. This is not a new issue for many retailers, but in the context of Wi-Fi it will likely require greater awareness of the changing regulatory and legal environment.

Data monitoring, collection and retention and behavioral advertising have been the subject of much regulatory debate by watchdogs, regulators, privacy advocates, and consumers in the United States, Europe, and Canada alike<sup>224</sup>. For example, two separate privacy bills have been introduced in the United States, with both the Commerce Department and the Federal Trade Commission expected to issue independent reports providing businesses with regulatory guidance on privacy issues<sup>225</sup>. Collection of customer data over Wi-Fi networks has also been in the news recently. Although the story had nothing to do with the retail industry, and involved inadvertent data collection, it demonstrates how sensitive this issue is for regulators and the public.

In providing Wi-Fi services to customers, retailers must understand and stay abreast of regulatory changes and shifting public sensitivities about online tracking practices. This can help them strike the right balance between maximizing data performance and respecting customer privacy.

# Video calling: the base goes mainstream, but usage remains niche

Deloitte believes that in 2011 video calling will be cheaper, better and more widely available than ever; yet a boom in demand is unlikely. Use of video calling will likely continue to grow steadily. However, we expect the vast majority of calls – both for business and consumer uses, and on fixed and mobile networks – will remain purely voice-based, and that most people who really need to see each other will continue to opt for face-to-face meetings rather than video conferences.

There are two main reasons why video calling is unlikely to experience an inflection. First, for conversations that can be handled by phone, a voice-only call will continue to suffice in most cases; video exceeds needs. Second, in situations that require a deeper level of interaction, a video call, despite many recent innovations, still cannot compete with the richness and depth of a face-to-face meeting.

Many commentators have heralded 2011 as a breakthrough year for video conferencing, citing lower costs, higher quality and an expanding range and volume of video-ready devices in the marketplace<sup>226</sup>. In fact, one research firm has forecast that the number of mobile video-calling users in North America will rise by a CAGR of 115 percent through 2015, generating 9 petabytes of additional data traffic<sup>227</sup>. But in our view these advances will likely not be sufficient to catalyze mass market adoption of video calling in 2011.

It is true that television-based video conferencing that offers sufficient quality for business calls should become significantly cheaper in 2011<sup>228</sup>. Television manufacturers and video conferencing specialists are both expected to expand their television-based offerings in the sub-\$10,000 range<sup>229</sup>. This contrasts sharply with the price range for room-based, multiple-screen video conferencing solutions, which can start at more than \$100,000.

Also, many more devices are likely to include built-in video-calling capabilities. Deloitte's estimate is that about 400 million new devices with the required forward-facing video cameras will ship in 2011, including smartphones, tablets<sup>230</sup>, netbooks, desktop computers, laptops, MP4 players and GPS units<sup>231</sup>.

Meanwhile, the quality of video calls – including ease-of-use, image resolution, audio-video synchronization, and reduced jitter and lag – should steadily improve thanks to technological advances such as improved compression software, higher broadband speeds and increased integration with social networking sites<sup>232</sup>. LTE technology – wherever it is deployed in 2011 – should offer a better experience owing to its superior video call handling capabilities relative to HSPA variants<sup>233</sup>.

Despite these broad improvements in video conferencing, as well as the larger installed base of devices that can support video calling, Deloitte does not expect a dramatic increase in the volume of video calls.

For businesses, the use of video calling is likely to remain modest. Most business conversations simply do not require a video call. And despite falling prices, the cost of setting up a video conferencing system and dedicated room may still be prohibitive, even for businesses that are trying hard to reduce their travel costs.

There is also a question of who these businesses can call. A company that is willing and able to invest in a high-end, multiple-screen video conferencing solution to reduce its carbon footprint may find few peers with compatible equipment. In fact, during 2011 there may still be significantly more airports in the world than companies with the ability to hold a high-end video conference<sup>234</sup>.

Business could of course use the embedded cameras within laptops to make video calls. However, the quality may not be acceptable given the typical size and resolution of such cameras; individuals sitting in front of their laptops cannot recreate the feeling of a group meeting. Also, calls from open plan environments and offices not dedicated to video conferencing might require erasing whiteboards or removing confidential materials to prevent them from appearing in the background.

For consumers, the volume of video calls should continue to rise modestly, but a spike in usage seems unlikely. Many consumers see video calling as an undesirable compromise between voice-only calls and in-person meetings. If people just need to communicate, a standard voice call is sufficient. And if they really want to see each other, there is no substitute for an in-person meeting. Can video calls create meaningful value in the no-man's land between these two extremes? To date, video calls have proven popular with families stretched across countries or continents – especially those with newborns; however, market penetration within the segment is already relatively high, which could limit future growth.

Cost is also an important factor. Higher service charges would likely dampen enthusiasm for video calling, as would higher charges and stricter caps for mobile data.

Last but not least, one of the key factors that could limit the growth of video calling is that it tends to make people self-conscious<sup>235</sup>. Many of us are unfamiliar and uncomfortable with seeing moving images of ourselves; this can be distracting and dampen spontaneity. Also, we might feel the need to change clothes or apply make-up before the call, which creates an extra inconvenience. Over time, increased familiarity is likely to boost our comfort level. But it might take a generation for video calling to become pervasive.

The video call, in all its forms, has advanced significantly since it was first demonstrated in 1964<sup>236</sup>. Technologically it has made major strides over the last decade, in terms of quality, functionality and price. But despite these advances, it appears that hundreds of millions of people equipped with video-calling devices are not quite ready to make the video call a regular part of their lives<sup>237</sup>. At least not in 2011.

#### **Bottom line**

In the business world, relationships and trust are often built during conversations at bars and restaurants, during taxi rides, on golf courses, and at the company water cooler. Video calling cannot replicate these kinds of experiences. Moreover, while video conferencing might be price-competitive with business-class travel and five-star hotels, the growing acceptance of low-cost flights and budget accommodations makes in-person business trips more economically viable.

Video calling is generally better for the environment than carbon-intensive travel. However, businesses looking to make a major investment in video calling capabilities should consider all of the factors – environmental and otherwise – including the additional resources required to build a dedicated room for video conferences.

The value of any network is linked to its size, which is why interoperability is critical. Video calling's potential would be severely constrained if users were limited to communicating with others that use the same vendor's equipment.

# Endnotes

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# Contacts at Deloitte Touche Tohmatsu Limited (DTTL) and its member firms

## Global TMT

**Jolyon Barker**  
Managing Director  
Global Technology, Media & Telecommunications  
Deloitte Touche Tohmatsu Limited  
+44 20 7007 1818  
jrbarker@deloitte.co.uk

## Americas

**Alberto Lopez Carnabucci**  
Argentina  
+54 11 4320 2735  
alopezcarnabucci@deloitte.com

**Marco Antonio Brandao Simurro**  
Brazil  
+55 11 5186 1232  
mbrandao@deloitte.com

**Richard Lee**  
Canada  
+1 416 874 3248  
richlee@deloitte.ca

**Fernando Gaziano**  
Chile  
+56 2 729 8783  
fpgaziano@deloitte.com

**Nelson Valero Ortega**  
Colombia  
+571 546 1810  
nvalero@deloitte.com

**Carlos Gallegos Echeverria**  
Costa Rica  
+506 2246 5000  
cagallegos@deloitte.com

**Ernesto Graber**  
Ecuador  
+593 2 2 251319 ext 246  
egraber@deloitte.com

**Francisco Silva**  
Mexico  
+52 55 5080 6310  
fsilva@deloittemx.com

**Cesar Chong**  
Panama  
+507 303 4100  
cechong@deloitte.com

**Gustavo Lopez Ameri**  
Peru  
+51 1 211 8533  
glopezameri@deloitte.com

**Phillip Asmundson**  
United States  
+1 203 708 4860  
pasmundson@deloitte.com

**Juan José Cabrera**  
Uruguay  
+598 2 916 0756  
jucabrera@deloitte.com

**Johan Oliva**  
Venezuela  
+58 212 206 8886  
joholiva@deloitte.com

## Europe, Middle East, and Africa

**Luc Van Coppennolle**  
Belgium  
+32 3 800 8905  
lvancoppennolle@deloitte.com

**Dariusz Nachyla**  
Central Europe  
+48 22 511 0631  
dnachyla@deloittece.com

**Olga Tabakova**  
CIS and its Russian office  
+7 495 787 0600 x 2326  
otabakova@deloitte.ru

**Kim Gerner**  
Denmark  
+45 36 10 20 30  
kgerner@deloitte.dk

**Jussi Sairanen**  
Finland  
+358 40 752 0082  
jussi.sairanen@deloitte.fi

**Ariane Bucaille**  
France  
+33 1 5561 6484  
abucaille@deloitte.fr

**Dieter Schlereth**  
Germany  
+49 211 8772 2638  
dschlereth@deloitte.de

**Cormac Hughes**  
Ireland  
+353 1 4172592  
cohughes@deloitte.ie

**Tal Chen**  
Israel  
+972 3 608 5580  
talchen@deloitte.co.il

**Alberto Donato**  
Italy  
+39 064 780 5595  
adonato@deloitte.it

**Dan Arendt**  
Luxembourg  
+352 451 452 621  
darendt@deloitte.lu

**Saba Sindaha**  
Middle East  
+971 2 676 0606  
ssindaha@deloitte.com

**Karel Bakkes**  
Netherlands  
+31 88 288 0633  
kbakkes@deloitte.nl

**Halvor Moen**  
Norway  
+47 23 27 97 85  
hmoen@deloitte.no

**Joao Luis Silva**  
Portugal  
+351 210 427 635  
joaosilva@deloitte.pt

**Mark Casey**  
Southern Africa  
+27 11 806 5205  
mcasey@deloitte.co.za

**Jesus Navarro**  
Spain  
+34 91 514 5000 ext 2061  
jenavarro@deloitte.es

**Tommy Martensson**  
Sweden  
+46 8 506 731 30  
tommy.martensson@deloitte.se

**Andrew Busby**  
Switzerland  
+41 44 421 64 77  
abusby@deloitte.ch

**Oktay Aktolun**  
Turkey  
+90 212 366 6078  
oaktolun@deloitte.com

**Jolyon Barker**  
United Kingdom  
+44 20 7007 1818  
jrbarker@deloitte.co.uk

## Asia Pacific

**Damien Tampling**  
Australia  
+61 2 9322 5890  
dtampling@deloitte.com.au

**William Chou**  
China  
+86 10 8520 7102  
wilchou@deloitte.com.cn

**V. Srikumar**  
India  
+91 80 6627 6106  
vsrikumar@deloitte.com

**Parlindungan Siahaan**  
Indonesia  
+62 21 231 2879 ext 3300  
psiahaan@deloitte.com

**Yoshitaka Asaeda**  
Japan  
+81 3 6213 3488  
yoshitaka.asaeda@tohmatsu.co.jp

**Sang Jin Park**  
Korea  
+82 2 6676 3821  
sjpark@deloitte.com

**Robert Tan**  
Malaysia  
+603 7723 6598  
rtan@deloitte.com

**John Bell**  
New Zealand  
+64 9 303 0853  
jobell@deloitte.co.nz

**Shariq Barmaky**  
Singapore  
+65 6530 5508  
shbarmaky@deloitte.com

**Philip Chong**  
South East Asia  
+65 6216 3113  
pchong@deloitte.com

**Clark C. Chen**  
Taiwan  
+886 2 2545 9988 ext 3065  
clarkcchen@deloitte.com.tw

**Marasri Kanjanataweewat**  
Thailand  
+662 676 5700 ext 6067  
mkanjanataweewat@deloitte.com



## Researched and written by:

### Paul Lee

Director of TMT Research  
United Kingdom  
Deloitte LLP  
+44 20 7303 0197  
paullee@deloitte.co.uk

### Duncan Stewart

Director of TMT Research  
Canada  
+1 416 864 3536  
dunstewart@deloitte.ca



For more information please contact:

### Amanda Goldstein

TMT Marketing Leader  
Deloitte Touche Tohmatsu  
Limited  
+1 212 436 5203  
agoldstein@deloitte.com

### Catie Chiochios

EMEA TMT  
Marketing Manager  
Deloitte Touche Tohmatsu  
Limited  
+44 20 7007 3509  
cchiochios@deloitte.co.uk

### Yvonne Dow

Asia Pacific TMT  
Marketing Manager  
Deloitte Touche Tohmatsu  
Limited  
+852 2852 6611  
ydow@deloitte.com

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