

What to Watch For in 2013 and the Years Beyond

ABI Research is back again with this year's installment of predictions; however, this year's edition comes in a new form, with even bolder forecasts. Broken down by Research Practice, analysts at ABI Research have predicted what is to come. While the future is always murky, even more so in a world where technology makes leaps and bounds in a miniscule amount of time, ABI Research's analysts have managed to make audacious, but educated predictions on what will happen in their respective industry.

This year's newly minted edition is split by the following Research Practices:

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Devices, Applications, and Mobility

Watch for Augmented Reality to Continue its Progress through Smartphones – Not Eyewear

The wide press coverage of certain new consumer eyewear gadgets – most notably including Google's Project Glass and Vuzix Smart Glasses M100 – has led

some technology observers to speculate that 2013 might be a year when Augmented Reality (AR) finally breaks out of its predominantly gimmicky niche territory. For ABI Research, that level of development would equate to running a proverbial marathon before learning to walk. Yes, AR will continue to progress toward its hitherto elusive *raison d'être*, but it is a journey that will still take place in smartphones and, to a lesser extent, tablets. ABI Research's educated guess is that about 95% of the mobile AR apps that were installed in 2012 were opened only once or twice and a good user-retention milestone would be to lift that rate closer to 90% in the course of 2013.

In 2 years' time, AR should reach a level where we start to see more than a few consumer apps that are marketed, and downloaded, simply as compelling apps and not only as wow-inducing bells and whistles. More robust image-recognition technologies and cloud-based image libraries will be the primary enablers for this stage of the journey and, in terms of devices, it will still be driven mainly by smartphones.

In 5 years' time, utility-like AR apps will be rather commonplace and AR-based social "scavenger hunts" will be an emerging form of gaming and entertainment. Eyewear will have gained quite some traction, but that will be mainly in the business-to-business (B2B) domain where the cost of adequately sophisticated hardware is less an issue. That is not to say that consumer eyewear products – especially when paired with smartphones – will not be reality by then, but it is unlikely that they will, at this stage, be mostly about enabling AR. (Remember that viewing video or messages does not, as

such, augment anything.) The Internet of Things (IoT) will advance AR, and *vice versa*.

In 10 years' time, we will be on the verge of a paradigm shift in personal computing. There will still be time and place for clicks, taps, and swipes, but visual and aural AR has, by now, become an everyday interface. Mobile apps, as a whole, will be able to tap to vast amounts of data that is fed from an ever-growing network of sensors and, equally importantly, to analytics that allow them to make sense of all that data. This will result in a high level of contextual awareness, which will be crucial in preventing the information overload (and the related user inertia) that would otherwise undermine the adoption of AR. You will be able to augment much of the reality, but if you don't want to, you won't have to.

Computing and Device Form-Factor Boundaries to Crumble in Coming Years

The mix of personal computing and mobile communications devices that an individual interacts with on a typical day varies greatly depending on the market, job function, and ranges of activities being performed. It is commonly accepted that the number of devices continues to deepen in both choice and adoption. Ultra-portable computers, smartphones, tablets, and a plethora of consumer electronics (CE) solutions are all vying for an individual's attention. Each of these systems has historically been distinct in shape, weight, and interaction with users. However, this design element and the ecosystem of vendors developing solutions are creating new ways for people to engage with computing technology that does not require carrying multiple devices.

In the next 2 years, computing will happen in a range of shapes and sizes depending on the nature of the activity performed. In this same timeframe, we expect the ID cards used in home broadband services, office access, and mobile communications to start converging. While it is unlikely that it will neatly merge into one set of credentials, we expect to see movement in common locations, such as home, office, and on-the-go, begin heading in this direction. As a result, content ownership and subscriber ownership will become the most significant challenge for managing the convergence, with standards efforts beginning within each of the location domains.

History suggests that standardization efforts in technology markets rarely result in one unified outcome. More likely, two to three regional scenarios will emerge for coordination and ownership of subscriber relationships. ABI Research anticipates a similar outcome in this case with standardization taking hold in about 5 years.

In this timeframe, the key device and system venues will expand to include personal vehicles, broader transportation systems, and perhaps even the hotspot model currently used in airports, hotels, and coffee shops – places where people aggregate and will likely want to “connect” to their data, content, and services. Instead of docking a personal device in the vehicle, a subscriber's ID card will bridge service permissions with the location and on-board communications systems.

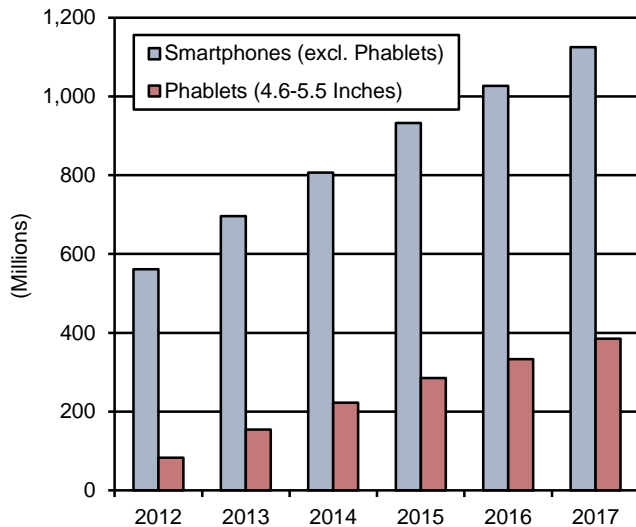
As subscribers continue to decouple device and system functionality from the subscriber credentials – consisting of identity, authentication, security, storage, communications networks, and more – the shift away from personally identifiable information (PII) maintained within the device continues. Looking out over a 10-year window, we believe that credentials will continue to be carried on the person. Personal credentials can be associated with the systems and services that one encounters at home, in the office, and on-the-go, maintaining a level of control, security, and ease of use. At this stage of device evolution, the concept of a form-factor for computing and communications becomes less relevant.

Phablets and Gesture Recognition Technology Will Be Hot in the Device Domain

Earlier this year, ABI Research produced a report about hybrid smartphone and tablet devices and the dawn of the phablet era. Stepping back to late 2011, Samsung introduced a new smartphone model, the Samsung Galaxy Note. The device had an outrageous 5.3 inch touchscreen and many people within the industry mocked the smartphone's size and included stylus. Most smartphone screen sizes were around the 3.5 inch mark and 4.3 inches was considered a big smartphone. Fast forward 13 months to today and smartphone form factors have changed significantly. Samsung's bestselling smartphone is a phablet, the Samsung Galaxy SIII with a 4.8 inch touchscreen. Additionally, HTC, Sony, and

LG also sell phablets. It is estimated that 83 million phablets will be shipped annually by the end of 2012, almost four times more than previously projected.

Smartphones and Phablets
World Market, Forecast: 2012 to 2017



Next year will see the mid-morning of phablets. If 2012 is anything to base forecasts on, almost 25% to 30% of smartphone shipments could be phablets. Web browsing and watching multimedia on mobile devices are almost considered as critical as making a phone call and text messaging nowadays. Dare it be said, it is highly likely we will see Apple join the ranks of phablet smartphone OEMs in 2013 with the iPhone 6. From a 2 to 3-year perspective, the proportion of phablets to smartphones may not change significantly; however, we will also see a host of new mobile technologies that larger devices may enrich.

Gesture recognition is likely to be a big market differentiator for smartphones and media tablets next year. The technology is an exciting prospect and will offer a new interesting communication interface for mobile device users. Gestures are ingrained in human communication and, soon, devices will be able to understand and take action from this communication method. The technology could be a massive hit with gamers on smartphones and other mobile devices, or simply turning a page of an eBook without touching the screen. Moving beyond 2013, in 5 years, ABI Research predicts 600 million smartphones will have vision-based gesture recognition features. In 10 years' time, we may see the complete elimination of touch-based mobile phone.

Speech recognition and gesture recognition through hand signals and phone movement may be the only way to operate a smartphone. It is even possible segments of the mobile phone market could be replaced with smart glasses, which offer mobile device capabilities combined with AR. A simple example of the experience would be Tony Stark from *Iron Man*, except for the metal suit, jet boosters, rockets, and Ms. Pepper Potts in tow.

Increased Usage of Mobile Devices for Data Communications Could Lead to the Death of 2G - Finally!

Many 1G analog networks, such as NMT, AMPS, C-Netz, and RC2000, were still operational 7 to 8 years after the first commercial, 2G digital GSM call was made on June 1, 1991, between Finland and Sweden. However, they soon winked out of existence once GSM really started to grow exponentially. GSM has also become a default roaming standard for voice and text messaging. For voice communications, it still is an efficient communications technology, although it is less effective at handling data. Proportionately, as our mobile devices are increasingly used for data communications rather than voice communications, the longevity of 2G's GSM, and even 3G, has to be questioned.

GSM occupies prime wireless spectrum real estate, such as 900 MHz, 1800 MHz, and 1900 MHz. There used to be talk of an orderly re-alignment where "some" GSM spectrum bands were refarmed for 3G use, but the expectations for 4G LTE are redrawing the wireless cellular landscape. Four years ago, even 3 years ago, the presumption was LTE would be deployed in metropolitan areas to serve the data hungry needs of urban center business users and prosumers. Those deployments would be primarily on macro, and some micro base-stations, in the early stages as operators strove to keep LTE CAPEX costs down. Then about a year-and-a-half or so ago, we started to hear that operators in certain markets were keen to deploy LTE in very dense, small cell configurations, such as in Japan and Korea. But we are seeing indications that 4G LTE may go "edge-to-edge" where virtually the whole country's population could be covered by LTE.

In 3 to 4 years, it is likely that deployment configurations and technologies will allow LTE to cover urban population centers and rural populations, too. If the operators can encourage high handset to LTE

smartphone replacement rates, is it conceivable we will witness an accelerated path toward shutting down 3G and possibly even 2G spectrum? Certainly, operators will be keen to free up the spectrum and that might just be worth paying for a fully subsidized LTE handset for the remaining 3G diehards.

At present, we currently forecast a 61%, 32%, and 7% split at the “+2 years” (2014) mark for 2G, 3G, and 4G, respectively. At the “+5 years” (2017) mark, 20% of subscribers are expected to be 4G, 41% 3G, and 39% 2G. While we do not officially release a quantitative “Today + 10 Year Mark” forecast, ABI Research is seriously evaluating the scenario of a number of developed countries ditching 2G and 3G outright. The pressure to achieve the maximum efficiency from all spectrum assets will only intensify.

Increased Competition and Challenging Economic Environments Will Spur Continued Carrier Consolidation

Owing to global economic uncertainty, fierce competition within the industry, compressed profit, and investment in new technology, such as 4G licenses and spectrum, consolidation can help operators meet cost-saving goals through network sharing, outsourcing of network operations, and other means. The industry’s own growth stage is determining the industry reorganization, which can revitalize the developed market, especially for Western Europe and will certainly benefit both larger and smaller operators.

On Oct 2, 2012, U.S.-based MetroPCS issued a statement confirming talks with T-Mobile USA about a merger. One day before, Softbank Corp announced its plan to buy eAccess, Japan’s fourth largest mobile operator in terms of subscription. Just 10 days later, Softbank said it would buy a 70% stake from the U.S. operator Sprint. On October 15, 2012, French Vivendi was interested in merging its SFR with Numericable. On October 18, U.K.-based Cable & Wireless Communications (CWC) confirmed its plans to sell a 51% stake in its Macau-based network subsidiary. On November 27, Telekom Austria Group said it received approval from Cartel Court for its acquisition of Yesss! Telekommunikation. The acquisition was dependent on the completion of Hutchison 3G’s acquisition of Orange, which was still under investigation by the European Commission.

It is also known that Netherlands-based KPN attempted to sell its Belgian and Germany subsidiaries before, but finally canceled due to disappointing offers. Better offers will likely be made for KPN in the future, making it quite probable that KPN will be merged into other groups.

Carriers Will Be Faced with a Strategic Choice; Full-service Model, Service Enabler, or Network Provider

Carriers will continue to face the stark choice of a future that is defined by a strategic approach that can be grouped into one of three buckets: full-service operator (applications and services right through to network management); service enabler (create a best of breed network, expose application programming interfaces (APIs), and enable over the top (OTT) services and third-party apps vendors with a view to a more equitable revenue sharing); and network provider (create the best and lowest cost network in terms of cost-per-bit-per-hertz and care little about what gets pushed through).

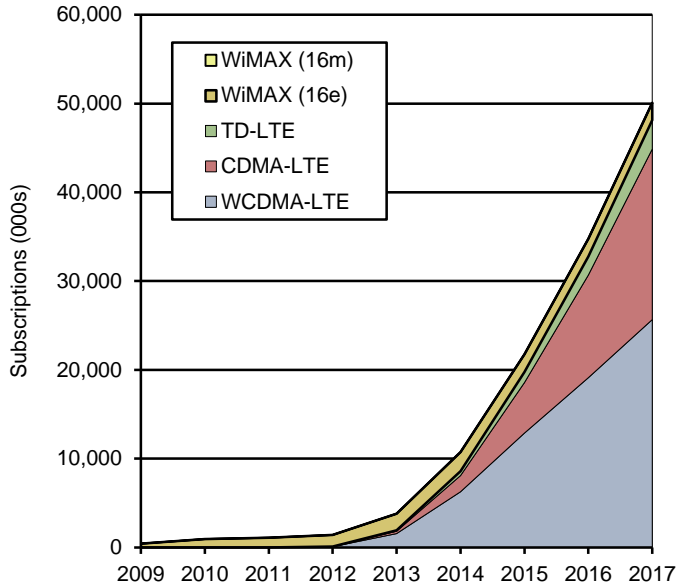
The full-service operator choice is dangerous in that carriers are bad at non-voice services past mere communication and innovation in terms of content is out of their hands. The network provider model is great for disruptors, but will not work for incumbents. The model that is becoming more attractive is that of service enabler. Carriers will increasingly look to leverage their key differentiators: consumer trust, network, spectrum, operations support systems (OSS), and business support systems (BSS) to remain relevant in a service domain that is dominated by third-party content owners and providers.

Latin American LTE Will Be a Hot Market to Watch

Latin America will be one of the most exciting regions in 2013, insofar as the wireless industry is concerned. By the end of next year, almost half of the independent states in the region will have commercial LTE service. This is incredibly early in terms of 3G maturity, and in view of 3G’s economic status. To put things into perspective, only 19.7% of the subscriptions in Latin America were 3G at the end of 3Q 2012, which is significantly lower than the 71.7% 3G ratio in North America when LTE was first launched in September 2010. Furthermore, indications are that the network deployments will be aggressive. Considering the two largest markets, LTE population coverage will be at least 18.7% in Brazil by December 2013 and an impressive

65% in Mexico by March, which is well ahead of many advanced countries, such as France, Italy, and the United Kingdom. The Latin American carriers mean business.

Annual Regional 4G Subscription Trends
South America, by Technology, 2009 to 2017



One of the chief reasons that Latin America is so “happening” is competition, as operators fear losing out when rivals gain a first-mover advantage. Two mechanisms are involved: some operators intend to capture market share by building an expansive network, as 4G presents a new arena for competition; others merely want to secure spectrum, but are required by rollout obligations to provide a wide coverage.

ABI Research does not expect LTE adoption to be rapid in the region initially. However, other developments should be watched in 2013 and beyond. It will be interesting to see whether 3G prices will fall as LTE is introduced, leading to a migration from 2G to 3G and an increase in mobile Internet usage. While the 4G data plan offered by NTT DOCOMO in Japan is 20.3% more expensive than its 3G data plan, for instance, some operators do not distinguish between 3G and 4G plans. Higher adoption of 3G plans could help accelerate the general decline in prepaid ratio in the region, which will be good news for mobile carriers. A caveat is that the migration to higher technology generation depends on economic growth. A major risk comes from Europe,

which has consistently underestimated the effect of its obsession with a concerted austerity program in the region – even in countries experiencing historically low interest rates, at the same time that households are deleveraging, in the face of a very depressed economy.

LTE-only Mobile Devices Will Become More Common

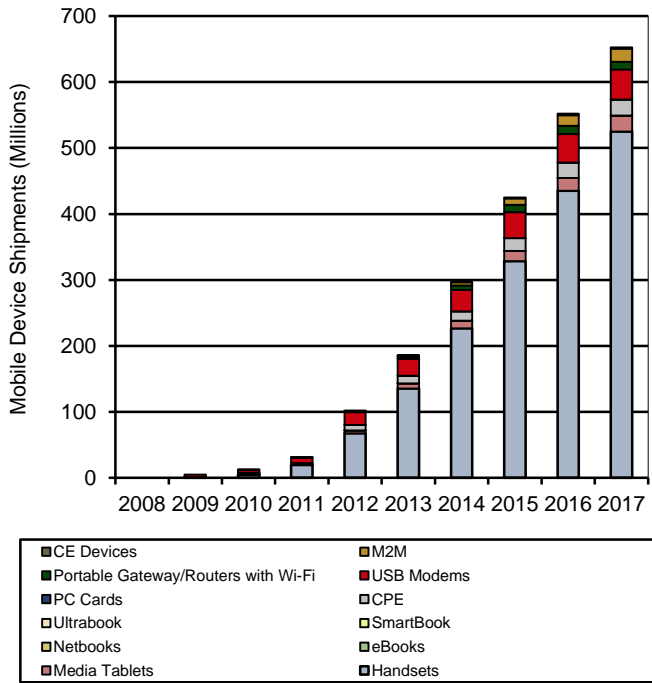
In the history of mobile wireless air interface solutions, only a gradual and careful phasing out of older mobile technologies has occurred. Usually, if a mobile air interface is phased out, the next generation up would have been well-established, with perhaps the generation after starting its rollout in urban areas. For example, Verizon Wireless phased out analog (1G) when its 3G (CDMA) network was well-established. In some countries and with some devices, 2G (GSM) has been phased out as 3G (HSPA/HSPA+) networks were highly established in many countries. Still, many devices have 2G/3G/4G (GSM/WCDMA/LTE). What makes 4G so different? The unprecedented deployment speed of 4G networks is one difference. And if you have LTE coverage everywhere, then you do not need to fall back on another technology. This is where Verizon is leading the way and AT&T and Sprint are following in the United States. South Korea’s big three carriers have all achieved nationwide LTE coverage. Japan will have close to complete LTE coverage from at least one mobile operator soon.

You can group mobile technologies by their speed capability, such as IMT-2000 and IMT-Advanced, by the generation of technology in which 3G is CDMA-based and 4G is OFDMA-based, and by their jump from a circuit-switched design to packet-switched design. So, a second aspect that makes 4G so different is that it is all IP-based, making the jump from 3G to 4G different from past generation jumps. This has made certain carriers realize the importance of going all-LTE, phasing out previous technologies as fast as possible (though over years to come), and refarming spectrum for LTE.

A third reason ties into the second – if you have an all-LTE network with LTE coverage nearly everywhere, then you can move to LTE-only devices. This reduces the cost of mobile devices by reducing the cost of the baseband chip as well as the whole RF chain and antennas required. It can also allow the device’s design to focus on supporting more LTE bands instead of just a few LTE bands, some 3G bands, and some 2G bands.

The fourth reason is related to the third – if you only have LTE and no other mobile wireless technologies, then mobile technology royalties will only be on LTE. So, an LTE mobile device will have lower costs for the parts and the royalties.

4G Mobile Devices by Device Type
World Market: 2008-2017



There actually have been 4G-only devices in the past, but there were no break-out devices, they were WiMAX-only devices, and WiMAX network coverage was sparse and spotty. Some WiMAX-only devices exist in the United States, some in Japan, and some in South Korea. In South Korea, these included a few mobile CE devices, such as portable media players and portable navigation devices. Across the world, Samsung has been selling a popular mobile CE device – its Samsung Galaxy Camera with HSPA+. Now, according to FCC filings, Verizon Wireless will be introducing the Samsung Galaxy with only LTE. It will have Wi-Fi and Bluetooth, but no 3G.

In 2 years, the mobile operators that start this will have many more product offerings and other mobile operators will wind up offering LTE-only devices or supporting the addition of them on their networks. In 5 years, many more mobile operators around the world will have LTE more fully built out and will have

started refarming spectrum for LTE, so they will also start pushing LTE-only devices. In 5 years, the market will also see LTE-only handsets start to pick up. This is so LTE handsets can achieve the same costs savings and make room for more LTE bands. In this timeframe, handset vendors will have many more mobile operators available to sell to that will have the LTE coverage it takes to support LTE-only devices. Ten years out, the mobile device market will eye going back to two generations of technology to support as it adds 5G to LTE/LTE-Advanced. While some major executives in the industry think that 5G will come in 2020, ABI Research thinks that it will be later. Each generation had major core technologies being worked on long before even standardization of the technologies. This was true for TDMA-based technologies, such as GSM and its evolution into GPRS and EDGE; CDMA-based technologies, such as CDMA EV-DO (Revs 0 through B) and WCDMA through HSPA+; and OFDMA-based technologies WiMAX and LTE through LTE-Advanced. The industry has yet to rally around a new modulation scheme to attempt to create competing standards for 5G, though it will likely utilize much higher frequency spectrum with much wider channel sizes available. Because of the lack of work around a new modulation scheme, ABI Research believes a 5G technology (or technologies) will be standardized about 10 years out from today.

Consumer Robotics Market Sees Modest Gains while Personal Robotics Comes into Focus

The market for consumer robotics – mostly task robots and entertainment robots (or robotic toys)—continues to move forward modestly in 2013. The personal robotics market consists of more complex consumer robots that target multiple complex tasks and has been ever elusive, but is finally coming into focus. The year 2013 will be one more year closer to the personal robotics market, which will just start to materialize 5 years out, but will really start to pick up between the 5 and 10 year timeframes. What will finally make personal robots a reality in the home? Instead of extremely customized solutions, the personal robotics market will be a convergence of technologies from today’s mobile ecosystem built around a product that will represent the physical embodiment of the Internet.

The Internet began long before the Web took off. Trying to number the phases of the Web is a gray area, but Web 1.0 (1990 to 2000) was the beginning and built on HTML and other programming scripts and languages that moved the Internet from text and sessions to a graphical user interface (UI). Web 2.0 (2000 to 2010) is generally considered to be the social web that we are already familiar with, where in addition to access to information, people are better connected, can share, and content creation is democratized. We are in the early stages of Web 3.0 (2010 to 2020), which is the semantic web that includes semantic search, semantic databases, *etc.* that can make order of big data, natural language search, recommendation agents, machine learning, and artificial intelligence. Web 3.0 is where cloud-based solutions become the norm, where many more devices are connected to the Internet outside of PCs and mobile computing devices, such as bathroom scales and home automation parts like thermostats, locks, and light switches, and where artificial intelligence allows for personal agents. Web 4.0 (2020 to 2030) is even more about highly capable intelligent personal agents – artificial intelligence becomes critical here for services to better serve each person.

The personal robotics market will not be as exciting as what we would like to envision from sci-fi at first, especially since more affordable personal robots will have either one very limited manipulator or even more likely none at all. It will initially consist of a lot of information-centric robots that have mobility for convenience. Without manipulators, they can still do a lot – surveillance of different rooms, another way to access the Internet, although through a combination of many different forms of UI including visual, touch, gesture, natural language, and even social cues, such as facial expressions and mood. Socially aware artificial intelligence will be a big part of both Web 4.0 and the personal robots that are an extension of Web 4.0. This will make using and interfacing with personal robots more intuitive and allow us to retrieve information and complete tasks in a way not so different from the way someone uses a human assistant.

They will start to make their way into the market in the 5 to 10-year timeframe because they will prove the proper value. They will do enough or seem compelling enough, while the price starts to become more

reasonable. Though still very expensive, various financing options and business models including subsidization will go a long way. They will perform useful applications. Today, many of the companies in the space are still struggling with two key aspects: price and application. Personal robots will leverage many of the mobile computing platforms, components (processors, sensors, *etc.*), applications and application stores, and cloud-based services (such as Google Now, Google Goggles, Wikipedia, and new types of shared knowledge and shared learning for robots under the umbrella called cloud robotics). The costs of these robots, time to develop them, and upgradeability of software and capabilities will provide the value people are seeking.

TV, Video, and Broadband

TV Will Be Liberated by Continued Cross-Platform Experiences

Today's content experience is awful, due to fragmentation: live *versus* on-demand; current seasons *versus* previous seasons; release windows; rights vary by device; *etc., etc., etc.*

Technologies available today are increasing in importance and helping liberate content so that you, as a consumer, can get what you want (and pay for) where you want it. These include:

- Authentication (epitomized by Adobe Pass) allows trusted passing of credentials between a multi-channel video programming distributor (MVPD) (*i.e.*, a Cable MSO) and a content provider.
- Aggregation sites and apps, such as Matcha, Fanhattan, and Zeebox, allow consumers the benefit of unified browsing through multiple video services. Every service has a unique take (some start with live TV, while others ignore it, some include heavy social interactions as a cornerstone, and the mix of TV and video as well as breadth of services varies widely).
- Cloud video – typified by video content management systems (CMS) and online video platforms (OVPs) – allow licensing agreements between content owners and MVPDs to include realistic content utilization in a win-win way.

Comcast subsidiary thePlatform plays the most significant role in this market.

- Mirroring, notably Apple AirPlay, but also DLNA and soon Wi-Fi Direct, allows seamless integration of tablets and connected TV devices. Microsoft SmartGlass and Nintendo's TVii service are also offering solutions for tablet-to-TV interaction and control.
- Video Gateways (a super STB) aggregate enough tuners to serve your entire house and support IP devices within the home.

In 2013, day by day, week by week, and month by month, we will see consumers more able to access their content. We expect a continuing steady release of licensing agreements that include rights for tablets, the ability to shift live TV viewing to connected TVs (via IPTV platforms or in-home video gateways), and new platforms (including recently launched Virgin Everywhere as well as soon-to-launch Redbox Instant). Trial and error will continue, along with fights over control of the customer.

Looking to 2014, 2018, and beyond, we hope to see more standardization of metadata publication to support better cross-platform experiences. Larger authentication domains and consumer control will both help this along. The United Kingdom is, perhaps, ahead of other markets here with private broadcasters willing to work with the BBC on iPlayer and now YouView (of course, they cannot risk the ire of Parliament). In the United States, the Consumer Electronics Association (CEA) lacks power against traditional distributors, so things will, no doubt, continue to move slowly.

Hopefully, by 2018 (and if not then, 2023), we should all be able to choose our video experience and content independently. We should have ample opportunities of subscription bundles and *a la carte* offerings. Content owner experiences (such as rich data about filming locations, cast and crew, and deleted scenes) as well as unimagined and immersive experiences that bridge TV and games should flow through a channel and platform in an independent way.

Gaming Market Will Evolve as DLC and UGC Weigh on Consoles, while Multi-platform Approaches and Accessories Change the Immersive Experience

Nintendo kicked off the 8th generation of consoles with the Wii U in 2012, but most of the market developments will occur in 2013. Nintendo has gotten off to a solid start, expecting to sell 5.5 million Wii U's before the close of 1Q 2013, but supply is expected to remain short, at least through the holiday season. However, come June 2013, Microsoft and Sony will all but assuredly announce their respective next-generation platforms at E3.

The 8th generation comes at a critical point in the game console market as competition from mobile devices continues to mount and, perhaps more importantly, it refreshes a market that has extended longer than previous generations. Mobile devices have certainly impacted the game console market, but the 7th generation of consoles, now in its 7th year on the market, simply has less room for growth. Declining shipments, therefore, is likely more indicative of a mature market than competition from mobile devices, but this is certainly a factor.

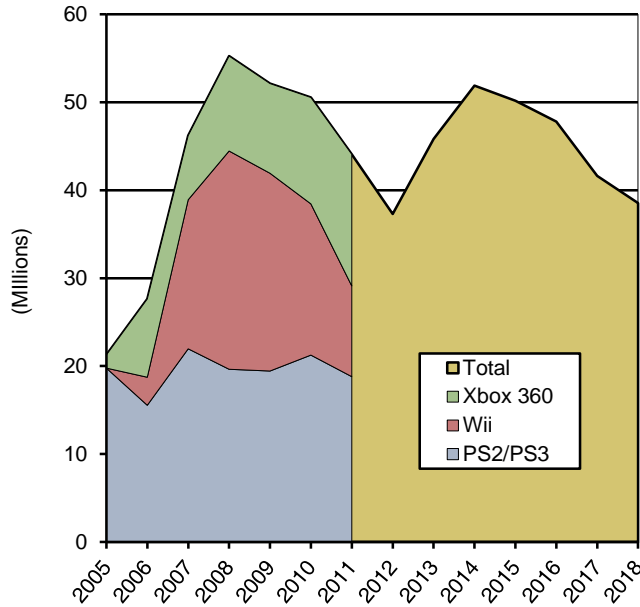
Nintendo's Wii U, like Microsoft's SmartGlass and Sony's Vita/PS3, are integrating a mobile experience into the consoles, but the core gamers will remain a critical factor long-term. In this regard, Microsoft's and Sony's next-generation platforms will likely best establish what the 8th generation will look like, as Nintendo's Wii U platform (at this stage) better matches the current generation than pushing the envelope into the next.

In 2013, we will have a much better perspective on the game console's future potential. While the Nintendo Wii U might remain in short supply through the first half of 2013, if demand falls significantly after the holidays, this could portend significant difficulties for Nintendo and, potentially, for the console market at large; although as stated previously, the Wii U is perhaps not the best representative of the next-generation, despite being the first 8th generation platform.

The continued strong success of key franchises like Halo, Call of Duty, Borderlands, Grand Theft Auto, *etc.* further suggests consumers are still very much supporters of the game console, particularly if the next generation continues to enhance the user experience. The next generation, for instance, will extend the immersive

experience by evolving the Gamepad, Kinect, and Move, and better integrating with traditional media (e.g., pay-TV services). Overall software sales, however, might remain lower than some might expect, as consumers are supporting mobile platforms as well, but perhaps more significantly, downloadable content (DLC) might be serving as a double-edged sword, as it were.

Game Console Forecast (7th-8th Generation + PS2)
World Market: 2005 to 2018



DLC brings additional revenue to particular franchises, but it might also reduce the number of titles consumers purchase. In other words, instead of spending \$120 on two games, a consumer might purchase one plus \$30 of DLC. This places greater emphasis on key franchises and limits the opportunities for new titles. Multiplayer is also a new element highlighted by the 7th generation that puts emphasis on successful titles (e.g., more people to play with). It is also worth noting the growing importance of user-generated content UGC in the gaming market. More consumers are posting gaming footage, opinions, and game reviews, all of which results in less game experimentation (rental services could also be contributing to fewer new game purchases). None of this will change with the 8th generation.

Over the next 5 years, we expect consoles to sell well, but not reach the same volume as the previous generation, which was highlighted by very strong Wii sales in the early years. New console strategies like multiple

platforms (e.g., a casual gamer/streaming media focused product and core gamer platform from Microsoft) could expand the market, but other connected CE markets are relatively crowded or not particularly strong. New entrants like Ouya could also move the market in new directions, but without the large game franchises, it will likely have little impact on the incumbents.

We would also expect enhancements to the immersive experience, perhaps coming from a solution like the Oculus Rift (virtual reality (VR) headgear) or maybe a combination of glasses/headgear and a camera system like Kinect or Move. In fact, VR might be the next evolutionary step for the game console market, while Microsoft’s Kinect and Sony’s Move are transitional steps toward a more complete VR experience, which could come as early as the 8th generation of consoles. As we venture beyond the 5-year window and extend out by a decade, the picture becomes considerably more obscured.

If subsequent console generations follow the previously common 5-year cycle, this could mean two potential generations within a 10 to 12 year span. Some question if we will see a 9th generation, let alone a 10th. At this juncture, it is highly likely we will see some form of console(s) that we will refer to as the 9th generation, but the 10th might look considerably different.

Nintendo’s future relies heavily on the Wii U being a success, something that might come into question when Microsoft and Sony release next-gen platforms. If key cross-platform franchises eschew the Wii U for more robust hardware, this could cripple Nintendo’s console in the mid to latter years of the 8th generation of consoles (early next-gen titles from key franchises will likely still support the Xbox 360 and PS3, due to the large installed bases, which should bring equal support for the Wii U). In order to remain competitive, Nintendo will likely reverse its stance on mobile platforms and start bringing legacy titles/franchises to other devices, which has been a missed opportunity to date. A fine line exists between pushing platforms like the 3DS and Wii U with legacy titles and losing the opportunity to expand market presence, and Nintendo is quickly coming to that point, if it hasn’t already passed it.

Microsoft’s and Sony’s willingness and likely support for other platforms and devices is a harbinger of things to come, which, in some regards, calls into question the

long-term viability of future console generations (as classically defined discrete devices). In other words, it is quite possible a high-powered tablet could serve as both a portable and fixed game console; Sony's Vita could be an early rendition of this model. A docking station, for instance, could be used to connect the storage necessary to house all of the downloaded games. In this reality, "console gaming" would become almost indistinguishable between mobile and PC gaming – a perfect confluence in gaming markets. Games will be scalable, depending on the hardware used (e.g., PC gaming). This would mean console generations will shift from one to the next more like an automobile's CVT transmission than a manual gearbox – in other words, nearly seamlessly rather than discretely. Microsoft and Sony are already active in the mobile and tablet space, so a transition to this model is quite possible if not likely.

Ultimately, the question "will the game consoles survive?" is perhaps more rhetorical than one might assume. In reality, it is not a simple yes or no type of answer, as the literal question would imply. As we begin peeling back the layers of the gaming market, we soon discover that this question, if taken literally, belies the complexities of the larger picture. We could give the obligatory "maybe" in answer to the question, but in its place, we should consider if gaming will continue to be an important role in consumers' entertainment lifestyles.

The game console as a form factor might not last as a discrete device, but this does not mean the essence of the game console will vanish – if consumers favor tablets over laptops, does this mean the computer ceases to exist? Or is the tablet just another form factor of the same device? Windows 8 certainly seems to be pointing in this direction, understanding that a hybrid mobile device/console platform could still be a console, just not in the form factor we are accustomed to today.

Ten years is a long time horizon in the technology world and to assume a particular device/form factor will still be the best way to deliver a product/service is foolhardy. Consumer behavior, however, is longer standing, with no evidence suggesting that consumers will abandon gaming, so we should allow ourselves the freedom to envision what a 10th generation of consoles might look like, because a future without games is harder to imagine.

Bandwidth, OTT Service Support and QoS Will Be Key Competition Areas for Telcos and MNOs

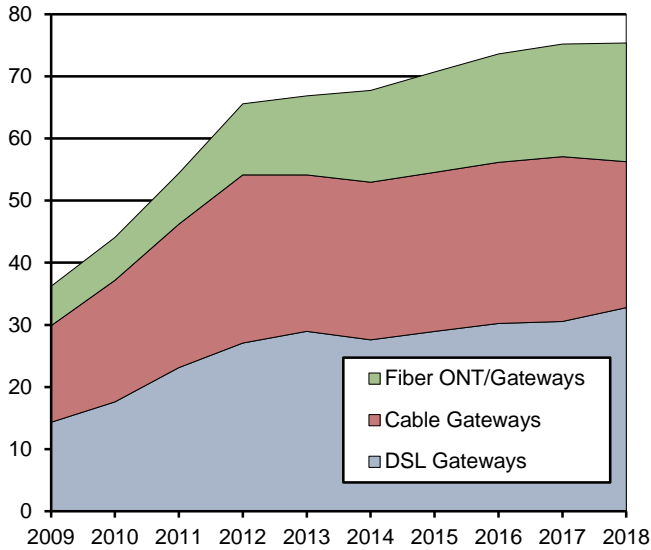
OTT services, such as Netflix, Hulu, Redbox, and others, will continue to grow and will see increasing influence in content acquisition from video content producers, reducing the delivery window from cable TV to pure OTT services. Closing the window of release dates between different regions will see increasing adoption and value generation of OTT video services. In the next 5 years, Telcos and MNOs will battle to retain existing subscribers and gain new subscribers by improving their service offerings, but will see ARPU consolidate to a level that will be directly proportional to the value of services offered. The impact of new entrant Google as a high-speed fiber broadband service provider in the United States, will drive other service providers to bump up their value offerings by next year through higher bandwidths, additional value add services, and better customer service as seen by Verizon, Comcast, and AT&T.

Broadband Gateways to Replace Modems and Routers

Broadband gateways will increasingly find their way into homes of top tier customers with bundled triple play service subscription, while replacing modems and routers in the next 2 to 3 years' time. With the decrease in the number of broadband CPEs per home, broadband service providers will play an increasing role in supporting CPEs using TR-069 to improve customer experience, efficiency of networks, and decrease dependence on vendors for after sales service. The increasing penetration of DOCSIS 3.0 CPEs will see over 70% penetration in the United States and MNOs capable of delivering higher bandwidths will prompt telcos to improve their infrastructure, causing a shift from asymmetrical digital subscriber line (ADSL) to very high speed digital subscriber line (VDSL). In denser populations, fiber to the home (FTTY) will see some traction. Fiber gateways with multimedia over coaxial (MoCA) will be preferred over optical network terminals (ONTs) for triple play services, and higher ARPU for service providers will look at ROIs from such Greenfield investments. The fiber infrastructure build-out will, in most regions, still depend on government subsidy with wholesale infrastructure models as seen in BT Openreach of the United Kingdom and Reggefiber of the Netherlands. China will continue to be a robust market with increasing participation from state and international

firms actively participating in the Broadband China initiative, which is expected to increase the fiber footprint in the region.

Broadband Gateways Shipments
Forecast: 2009-2018



Netflix to Spur the Advancement of Other OTT Video Service Providers

The pure OTT video market has seen increasing activity in the last few years in North America and Europe with Netflix entering the European region. This will test the mettle of other similar service providers. In the next 2 years, those with strong value offerings will stay, while others will be challenged by the increasing price of content acquisition and will find it difficult to compete in low-margin, high-volume market conditions. Cable operators that have been slow in the uptake of multi-screen services will see an increase in OTT customer adoption, which will put further strain on broadband infrastructure, coupled with the increasing penetration of mobile devices.

Multi-screen TV Services Will Continue to Explode

Multi-screen TV services that deliver pay-TV service to different devices, such as iPhones, iPads, laptops, and tablets, are gaining in popularity as adoption of broadband penetration and broadband-connected devices increase. According to ABI Research’s Market Data, 18% of pay-TV subscribers in North America and 12% of pay-TV subscribers in Europe use multi-screen TV services.

The figure is only 2.5% in Asia-Pacific. At present, multi-screen TV services are available only in a few countries in the Asia-Pacific region. The service has been launched in Australia, Japan, South Korea, Hong Kong, Taiwan, and Malaysia. Recently, more operators like AJK Cable Network from India and LG U+ from South Korea have announced the launch of multi-screen TV services.

Multi-screen TV service in Asia-Pacific is at a very early stage of development. However, we can expect the growth of multi-screen TV services in the pay-TV market. As telecommunication infrastructure changes at a rapid pace across Asia, penetration of fixed and mobile broadband services is increasing in the region. ABI Research forecasts nearly 300.5 million fixed broadband subscriptions and 3.6 mobile broadband subscriptions in the region in 2013. In addition, ABI Research forecasts that 261 million smartphones and around 28 million connected devices like smart TVs and media tablets will ship across Asia-Pacific in 2013.

Growing adoption of advanced communication services and devices will drive the purchase of multi-screen TV services. We expect a rapidly increasing proportion of operators in Asia-Pacific will enter the multi-screen TV market over the next 2 to 5 years.

Networks and Infrastructure

SDN to Make a Splash at MWC 2013

Software-defined networking (SDN) will likely be one of the big topics at MWC 2013. Some vendors have already put stakes in the ground on SDN. Ericsson has been talking about expanding the definition of SDN beyond data centers and routers, making it more relevant to telecom service providers. Ericsson sees SDN as an enabler for service awareness policy control and service exposure to enable OTT partnerships and possible monetization. Ericsson is trying to take the discussion around SDN away from the cloud and data centers, and into more traditional network areas like policy, DPI, and traffic monetization. SDN is being driven by the need for operators to reduce costs and improve network efficiencies, also enabling them to roll out services much quicker than they have in the past.

SDN, like any other new technology, is likely to be at the top of the hype cycle in 2013, with more realistic

discussions and proper solutions only making their way in toward 2014 or maybe even 2015.

SDNs Will Disrupt Mobile Equipment Vendors

Like Pavlov's dog, MNOs are salivating at breaking the lock-in established by incumbent equipment vendors. The irresistible move toward the disruption of their supply chain with SDN is gaining both mindshare and momentum. In 2012, we see 10 Tier One operators banding together to start things moving with the Network Functions Virtualization initiative with hopes of achieving massive CAPEX and OPEX savings from homogenized, virtualized, and generic networks of IT equipment. Operators were quite successful in standardizing everything in 3GPP for LTE and minimizing supply chain differentiation. The remaining network equipment vendors comprehend the threat and, in 2012, are planting their own mindshare seeds for virtualization hoping to dictate the conversation.

Like scorpions in a bottle, 2013 will see vendors and operators engage in a tricky dance to settle the future direction of industry. Vendors will try to control the debate and protect their territory, while operators want to push SDN forward and cut their costs even further. The operators control the money and the vendors control the expertise. By the end of the year, the dancers will coalesce around multiple initiatives, but we remain uncertain how things will manifest.

In 2 years, the industry will have settled on an approach to move forward, but most participants will feel too much is given away. It is here that we will see the IT-centric and homogenization faction break away and rally around a new champion adjacent to the mobile infrastructure ecosystem; perhaps a Google, Facebook, or some other rising star.

In 5 years, we will have the first working SDN reference platforms, demos, and trials. The disruptive threat comes from new entrants that are heavily betting on generic IT hardware (or maybe ATCA-based) and the SDNs that are now taken seriously. The resulting race to the bottom and the maturity of the industry will further increase the pressure on equipment vendors to consolidate, and plenty of angst exists that the ecosystem might rationalize by having only two major equipment providers.

In 10 years, we mobile network "big iron" vendors reduced to two dominant suppliers. However, this duopoly is unable to manage margins upward by leveraging their market strength as more and more of the market is captured by SDN centric solutions. The mobile networks' forward direction is rapidly commoditizing the remaining RANs, which are connected to an all-IP infrastructure that is distributed, generic, and homogenized. This trend will increase as operators depreciate the last of their 4G networks and move to the next big thing. Almost all innovation and added value is in the software that runs on the operator's generic IP-Cloud.

Network Hardware – General Purpose or Dedicated?

The use of general purpose hardware to run high-performance network protocols is likely to be a big topic of debate in 2013. Traditional silicon vendors from Freescale, Texas Instruments (TI), and Xilinx are all likely to push for the need for dedicated hardware. However, Intel is already starting to make inroads with its new Crystal Forest chip being powerful enough to run data plane processing. In the past, this has been a challenge; however, Intel believes it has solved some of the key issues. Korean operators are known to be already running LTE baseband poling using custom off-the-shelf (COTS) hardware, using Samsung's technology. Nokia Siemens is also known to be open to using general purpose hardware for its core network elements. However, other vendors like Ericsson and Cisco still believe in the need for dedicated hardware, and are against moving toward general purpose hardware.

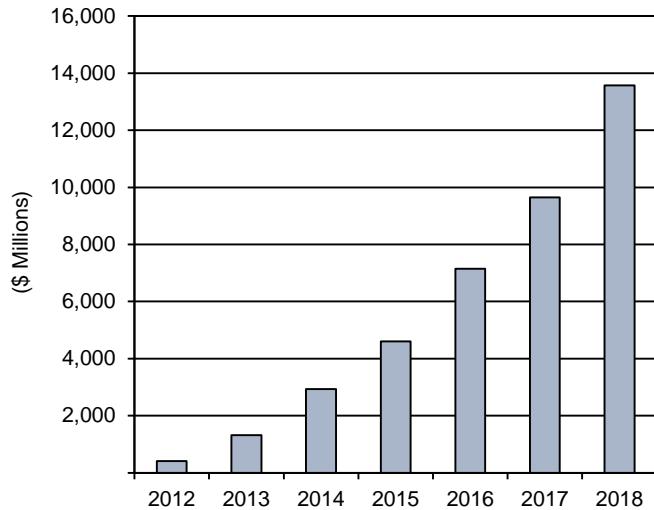
Part of the emergence of general purpose hardware is closely linked to SDN, the need for open platforms and architectures, and reduced time to market. The year 2013 is likely to bring out these divisions clearly, with some vendors like Huawei and Alcatel-Lucent still on the fence about this issue. This is directly tied to the debate around what elements will move into the data center, or be virtualized.

CEM Will Be Most Misused Marketing Term in 2013

Customer Experience Management (CEM) has recently become a buzzword in telecom circles. Service providers, faced with increasing pressure from OTT and a highly demanding customer base are starting to pay more

attention to customer experience and customer satisfaction. As we move from 2G to 3G to 4G, the dimensions around which one could measure customer satisfaction have changed. While voice was single-dimensional, 4G is multi-dimensional, with voice, data, video, and a long tail of apps governing how customers perceive their network experience.

Mobile CEM Market
Global Forecast: 2012 to 2018



As a result, the market is flooded with solutions that are trying to solve CEM. Everyone from customer relationship management (CRM) and BSS/OSS vendors, through to data analytics, device management, managed services, and network probe vendors, all are keen to showcase their CEM solutions. For any CEM strategy to be successful, it has to be delivered end-to-end, from the end user device through to the core network and IT domain.

Will service providers choose piecemeal CEM solutions for each domain or will they prefer to go with a single end-to-end solution? With 2012 being the first year when a few vendors talked about CEM, we will see many more vendors using CEM in their marketing pitches in 2013. It is likely to be the most misused marketing term in the industry, with everyone trying to define CEM based on their domain expertise. Once the initial CEM hype dies out toward end of 2013, with operators actually deploying CEM strategies and solutions in their networks, CEM messaging will mature and move to a more meaningful level.

Access Is the New Backhaul

With heterogeneous and small cell network architectures, many more access nodes will spring up in the network, possibly five to ten times more than what we have traditionally seen. As a result, the issue of backhauling these access nodes is becoming an important topic of discussion. Suggest exist that some nodes could become aggregation points, using tree or star branching. We are likely to end up with a grid-like structure, with hierarchies of macro, micro, pico, and, possibly, femtocells, all backhauling to the core. The aggregation points will become the new points of presence (POPs), similar to what is in macro backhaul. The traditional aggregation point will, in essence, move closer to the user. There will also be links between the access nodes like the X2 interface in LTE-A.

Backhaul is no longer a straight connection from the base station, through to an aggregation point, and into the metro ring. The backhaul will traverse through possibly multiple links onto a series of aggregation points, then onto the metro optical ring, and finally into the core. Therefore, we are going to see the need for high-capacity backhaul links at these aggregation nodes. One suggestion is to use existing macro base stations as aggregation nodes and upgrade the backhaul links to fiber. However, not all operators have that flexibility and different topologies are likely to emerge as small cells are deployed. This also raises the need for a backhaul resource management system to control the links and the aggregation points, possibly suggesting the shortest and quickest path, based on network load, and a required utilization factor. We are entering an entirely new world, where access is becoming the new backhaul! Starting in 2013, solutions will cater to solving some of these challenges.

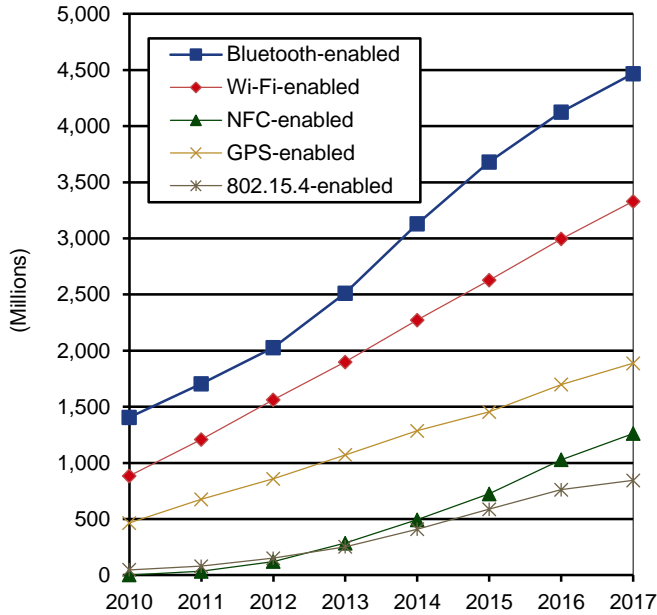
Teardowns and Semiconductors

Seamless Wireless Technology Will Cause the IoT Market to Grow

The ubiquitous wireless world is not a million miles away; the seeds are already sown. Wireless devices have developed from a niche market to an ecosystem of billions in the last 10 years. The IoT will become a reality in the next 5 years and is due to become prevalent in the next 10 years. Initial focus has been on cellular solutions for machine-to-machine (M2M),

but short-range wireless technology is vital for IoT/M2M market growth.

Total Wireless Connectivity-enabled Devices Shipments
World Market, Forecast: 2010 to 2017



As vendors like Broadcom, Intel, Marvell, MediaTek, and Qualcomm widen their technology portfolios, this enables multi-technology solutions to proliferate; this is already seen by the greater than 1 billion combo ICs shipped in 2012. Integrated platform solutions incorporating a wide variety of wireless technology (Wi-Fi, Bluetooth, 4G, etc.) will permeate into hub devices, such as smartphones, tablets, TVs, and STBs, enabling a multitude of interactions with the billions of node devices expected to proliferate in the IoT world.

The mass market rollout of the latest Wi-Fi protocol, 802.11ac, will occur in 2013. The Wi-Fi community is mainly focused on increasing data rates and the introduction of 11ac is a major step in achieving this. 60 GHz (11ad) is the next phase for Wi-Fi; this market will grow from 2014 onward and tri-band solutions will dominate Wi-Fi by 2017.

Shipments of 1.3 billion Bluetooth Smart-enabled devices are expected in 2013, accounting for over 60% of all Bluetooth-enabled devices shipped. The ecosystem of Bluetooth Smart and Bluetooth Smart Ready devices will initially build around the smartphone and tablet

markets, with sensors like heart rate monitors leading the initial growth phase.

ZigBee unit shipments will exceed 100 million in 2013; adoption in smart meters has been a key market driver. It will face strong competition from Bluetooth and Wi-Fi in consumer markets, such as remote controls, but its low-power, mesh networking capability will see it adopted in IoT solutions, such as home automation.

As devices are enabled with many technologies, both short-range and long-range, it will become increasingly important to ensure seamless transfer between technologies and this will be a prime focus for technology companies as the IoT market grows. Whether it is Wi-Fi for video streaming (e.g., Miracast), body area network communication using Bluetooth, wireless lighting control using ZigBee, or security systems using NFC, vendors will focus on creating a world where the consumer is completely oblivious to which technology is being used, regardless of the task. This will be the key to enabling the IoT to flourish.

Defense Electronics Market to Start Slow, but Come into Full Swing in 5 Years

Watch for defense electronics to capture more of the center stage as large weapons platforms take a hit as victims of the upcoming budget wars. Defense electronics are becoming more important in today's modern military environment and offer a lot of capability for the buck.

Recent practical experience with drones, IED jammers, new tactical battlefield radar systems, advanced avionics, and existing platform retrofits have all shown that overall defense capability has increased significantly, although at a modest price when compared to major weapons platforms, such as new fighter aircrafts and capital ships. New systems for electronically independent individual combat soldiers are also looming in the near to mid future.

These new scenarios have not been lost on the major defense contractors, with many repositioning themselves, to some degree, for an increase in defense electronics, although many currently have substantial capability in this area already. Included among this list

are Lockheed-Martin, Northrop Grumman, L-3 Communications, Thales, and BAE Systems.

The timeline could be interesting. It is certain the defense cutbacks will occur to varying degrees no matter what happens with the “fiscal cliff” in the United States or in the struggling economies of Western Europe. For the first year or two, cuts will likely affect all aspects of defense spending, but after about 18 months or so, the prospects for increased defense electronics spending look quite good and should be in full swing in the 3 to 5-year timeframe.

Security and Identification

Cyber Security Becomes an Increasingly Big Issue for All

No doubt exists that cyber threats are growing more sophisticated and inflicting considerable damage on enterprises. For about a decade now, organized cybercrime has driven a strong and powerful underground economy centered on malware, fueling the growth of hacktivist movements and providing cover to nation states operating in its shadows.

latest spyware, a niche group of security professionals, engineers, and academics have been working on a deeper level to uncover and expose highly-evolved, complex threat patterns. The long overdue media revelation of widespread nation state involvement in cyber espionage and cyber warfare has led to outrage, panic, and a mad scramble for the latest digital armor.

The gradual admission that network breach and data theft was pervasive among large organizations and, to a certain extent, in small-to-medium-sized businesses (SMBs), is finally driving a change in how cyber security is addressed. Perimeter security is not enough anymore; comprehensive solutions need to include a multi-layered, holistic approach on the technology and also around people, data, and processes.

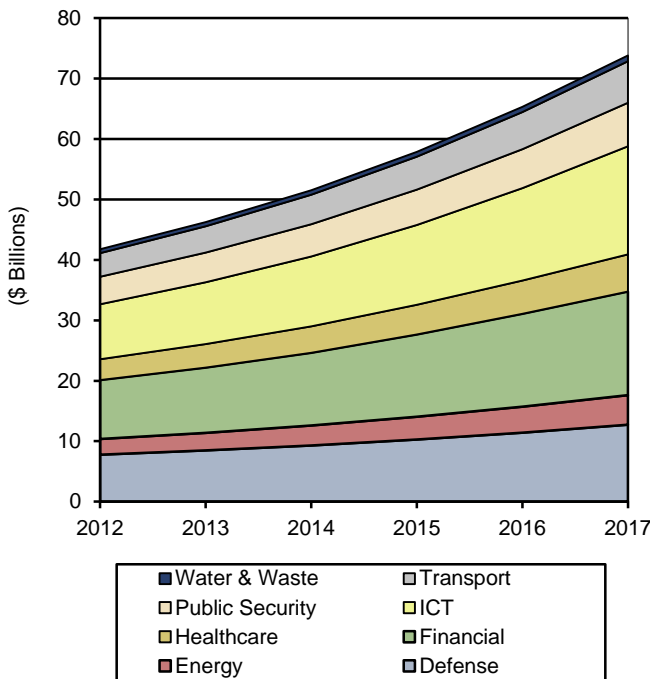
Big security and ICT vendors are seeing an opportunity in this change, vaunting the merits of larger unified solutions and more extensive management platforms, such as SIEM, UTM, and IDS/IPS. And these work well, up to a point. The problem is that these solutions are simply insufficient against modern cyber threats.

Innovative security vendors are taking a page from advanced government cyber defense operations and developing military-grade cyber security solutions and services. These vendors are offering next-generation cyber security based on active defense and strike-back technologies. Intelligence gathering will be the fastest emerging cyber security service in 2013.

Intelligence services already offered include infiltrating underground forums and chat rooms to find information about crimeware, threat groups, and motivations. CSID is a company that has developed an interesting data recovery service for organizations by monitoring underground web-based communities, IRC channels, and specific command-and-control (C&C) servers for stolen data.

Damballa, on the other hand, uses a signature-less solution to identify and terminate cyber threats in real-time. The solution deploys as an out-of-band appliance with a management console. The company has a unique network solution that isolates the C&C centers that launch attacks using botnets and then terminates the C&C communication channel in order to kill the attack.

Total CI Security Spending
World Market, Forecast: 2012 to 2017



While the rest of the world has focused on arguing about Anonymous and updating their antivirus to root out the

Juniper Networks offers a slightly different approach to intelligence gathering. It creates a fake company webpage into which it inserts hard traps. These contain fake data that are then injected into a stream of interaction with botnets and recorded on their end. This allows them to bait the attacker to a fake website with booby-trapped payloads and then study the tools used by the attacker, thereby revealing their cyber weapons of choice and their level of skill.

The growing trend is to work with or even hire military and law enforcement personnel within high-profile and up-and-coming cyber security vendors; Check Point Software, CrowdStrike, Mandiant, and CounterTack are some of the companies playing this angle. ABI Research predicts that the next 2 years will see a growing demand for offensive cyber security and intelligence gathering services from organizations looking to pro-actively address the persistent and advanced cyber threats.

As offensive cyber security solutions mature, organizations will seek to differentiate themselves on a different level. The current focus is on the science and technology component of security, such as electrical engineering, programming and coding, computer science. The next few years will see the development of military grade intelligence services, but beyond that, in the next decade, cyber security strategies will seek solutions requiring inter-disciplinary knowledge and skill sets.

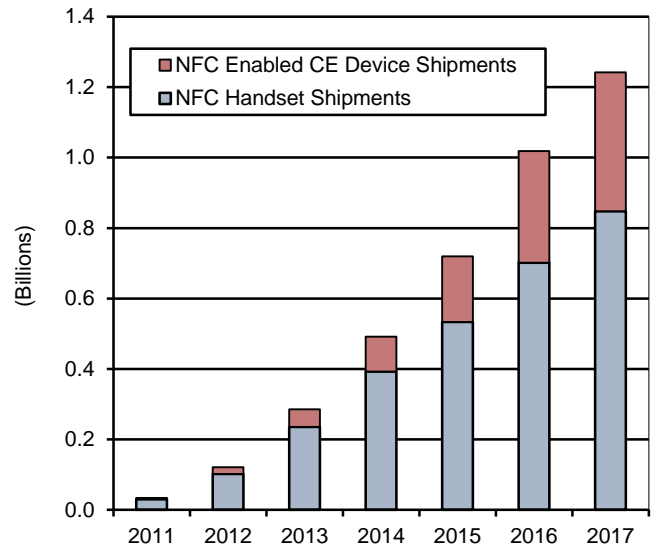
Future cyber security solutions will combine elements of a non-technical nature from psychology and behavioral science to legal, economic, and political theory. The next decade will see an emergence of a non-technical cyber security market leveraging arts, humanities, and social sciences.

Broadcom, TI, Qualcomm, and Combo Chipsets to Change the Face of the NFC IC Market in 2013 and Beyond

In 2013, IC giants Broadcom, TI, and Qualcomm will make their presence felt in the NFC IC market, directly resulting in a shift in the type of secure element employed. Up until now, it has been the NFC RF/controller, combined with a secure element integrated into one chipset that has had the lion’s share of success with inclusion at point of manufacture in most NFC-enabled smartphones and a handful of tablets. For year-end 2012, ABI Research forecasts that 75 million combined NFC

RF/controller and secure elements will ship, accounting for 61% of total secure element shipments or 85% of all embedded secure element types shipped.

Title NFC Shipments by Device Type
World Market, Forecast: 2011 to 2017



The year 2013 will see Broadcom’s, Qualcomm’s, and TI’s combo-connectivity ICs begin to have an impact. Combining multiple connectivity technologies including GPS, Wi-Fi, Bluetooth, and NFC will account for approximately 25% of the total NFC RF/Controller IC market in 2013, increasing to 94% in 2017. As a result, ABI Research expects standalone embedded secure elements to begin ramping up in shipments. This anticipated trend will begin in 2013 in line with expected combo-connectivity IC releases.

An early indicator for this shift is Broadcom’s November contract win for the supply of its NFC RF/controller into the Nexus 4 handset and Nexus 10 tablet. Although the solution adopted (BCM20793) does not utilize a combo-connectivity IC, it does show faith in the manufacturers’ capabilities and a willingness to shift from, arguably, an established NFC IC vendor in NXP to one that is just entering the market at a commercial level. This is surely a sign of things to come and ABI Research has no doubts that Google will expand its partnership with Broadcom, a strong indicator that Google will adopt combo connectivity ICs. This was the first occasion that Google decided not to go with an NXP NFC RF/controller solution.

Other vendors have had success with embedded secure elements, in particular NXP and STMicroelectronics. The side effect of combo-connectivity IC adoption is that more embedded secure element solutions will ship. This highlights that the market is expanding and a multi-supplier strategy will be sought by OEMs.

But what will this mean for those vendors who already have a good foothold and market share presence within the NFC IC market space? NXP, Infineon, Inside Secure, and STMicroelectronics should be aware and make the necessary changes to current business models to allow them to remain competitive at the highest level.

With the future NFC RF/controller market likely to become commoditized, some companies are focusing their efforts on the development and supply of all the different NFC secure element form factors. This is the stance that Infineon has taken, concentrating its efforts on secure elements, dismissing NFC RF/controller manufacture. Infineon already has an established partnership with Inside Secure, supplying the secure element component used in the range of NFC-enabled BlackBerry handsets.

The year 2013 will be the beginning of the end for the combined NFC controller/secure element IC. ABI Research forecasts that the combined RF/controller and secure element solution will peak at 227 million units shipped in 2015, decreasing to 46 million in 2017. This particular market development makes it one to watch for in 2013. Changes to strategies and business models will become a necessity as the wave of combo-connectivity ICs gain traction over the next 5 years, reaching shipments totaling 540 million units in 2016. To date, NXP, Infineon, Inside Secure, and STMicroelectronics have enjoyed being the top NFC IC vendors, but that could change. Vendors should consider the multi-supplier strategy that the market looks likely to adopt and position themselves with the embedded secure element form factors that are likely to win out. Alternatively, vendors could focus more efforts on the single wire protocol (SWP) subscriber identity module (SIM) market or diversify to serve the niche market with the supply of micro SD secure elements and other bridging solution form factors. STMicroelectronics is one vendor that has had initial success with the deployment of SWP SIMs to date.

Vehicles, Location, and Telematics

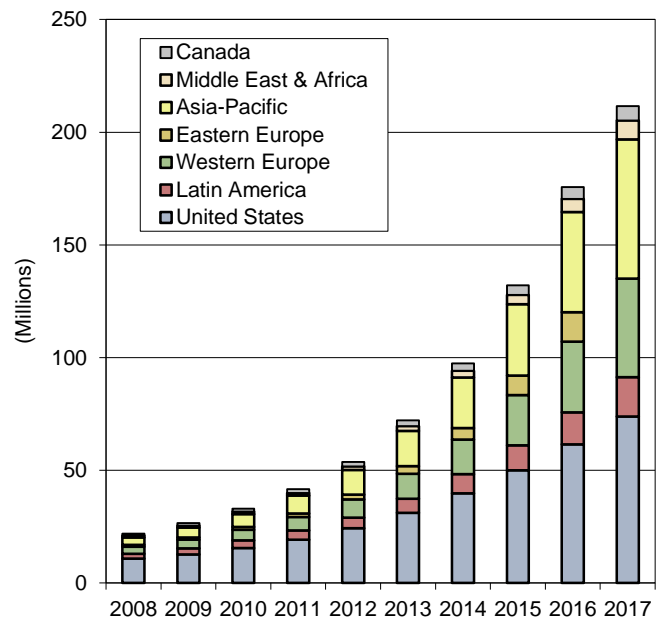
The Connected Car Finally Lives Up to Expectations

In 2013, the connected vehicle will finally live up to a decade long of promises, with OEMs across the globe rolling out connected solutions at an ever increasing pace. While the U.S. market will see some smaller OEMs, such as Subaru and Acura, finally joining the established players, in Europe, bigger OEMs, such as VW and Opel, are expected to (finally) announce solutions. At the same time, European luxury brands, such as Audi, BMW, and Daimler, will continue their foray into China and other Asian countries.

In terms of technology, 2013 will be an important test for the viability of open platforms, such as the GENIVI open source automotive infotainment consortium (with thus far, only BMW planning a launch based on this platform) and the MirrorLink screen replication technology from the Car Connectivity Consortium, which has only been adopted by Toyota.

While connected infotainment is now well-established and widespread, in 2013, functionality like connected navigation, multimedia streaming, and social networking integration will reach must-have status for every self-respecting OEM.

Safety and Security Telematics Subscribers by Region
World Market, Forecast: 2008 to 2017



At the same time, safety and security will make some kind of a comeback, as OEMs prepare for mandates in Europe and Brazil (the Contran SVT regulation is expected to finally enter into force in Brazil in 2012), but also continuing to push ADAS active safety technology across their entire portfolios. Vehicle-to-vehicle (V2V) technology trials in the United States and Europe will also be watched closely, especially as the U.S. Department of Transportation (DOT) makes a decision on a possible Intelligent Transportation System (ITS) Dedicated Short-Range Communications (DSRC) mandate in the course of 2013.

But not all will be rosy in 2013. UBI (aka insurance telematics) will fail to reach a wider scale (yet), as insurance vendors continue to procrastinate, seeing connectivity as a possible disruptive trend toward more transparency in the auto insurance industry. What is in store over the longer term for the connected car industry?

The short-term prospects are very much an organic evolution from the current situation, with more OEMs launching more solutions on more car models in more regions offering more features and applications. It will be a period of scaling previous efforts on a wider basis, while looking for efficiencies to reduce costs and offering more affordable systems, but at the same time, still struggling with the fundamental lifecycle gap between the automotive and mobile and CE environments, particularly as it relates to dedicated, managed automotive application stores *versus* embracing the smartphone ecosystem as such.

The 5-year window will see some important shifts, such as the introduction of the eCall mandate in Europe in 2015, the first V2V implementations in both the United States and Europe, new concepts of car ownership, distribution and usage modes gaining traction, open platforms going mainstream, OEMs realizing the importance of using connectivity as a tool for CRM and UBI finally getting traction.

The 10-year window will provide the first signs of the full transformation of the automotive industry starting to become visible as it relates to widescale electrification and EV telematics, vehicle-to-grid (V2G) linkage with smart grids, wider availability of V2V and V2I cooperative ITS systems, and the first autonomous vehicles making their appearance.

From a technological point of view, we will see the complex fusion of a large number of technologies:

- **Very short-range** – ADAS sensors like radar, sonar, laser, lidar, video, Bluetooth, and RFID for critical line of sight applications, such as collision prevention requiring short response times.
- **Short-range** – DSRC / IEEE 802.11p-based V2V and V2I connectivity for cooperative V2V and broadcast type solutions for safety at junctions, traffic information and management, and drive train applications.
- **Wide area connections** – Cellular, Wi-Fi, satellite for less critical applications, such as traditional safety and security telematics and connected automotive infotainment. The short response times of LTE-Advanced might qualify it for use as a proxy for dedicated V2V infrastructure.

The long-term success of the connected car future will hinge on how well governments and industry leverage and combine the continuous spectrum of available and new technologies into a holistic vision and strategy and deploy it as an enabler of the automotive transformation that will ultimately deliver more sustainable, efficient, predictable, safer, and more convenient transportation in a world dominated by smart megacities.

Indoor Location, BRIC Countries, and Ambient Intelligence Will Be the Focus of Growth in the LBS Space

The year 2013 will bring indoor location, mapping, and applications to the mass market. However, it will take at least another year to iron out issues, such as cross-platform location, privacy, app development, robust performance, and, ultimately, hyperlocal advertising and analytics. A fundamental shift in bricks and mortar *versus* online retail spending could occur in 4Q 2012, which will help catalyze the industry. Little appears able to prevent the indoor location space becoming a major revenue generator over the next 5 years.

Looking at LBS, the BRIC countries are already showing signs of strong LBS growth, while social and local discovery applications are also poised to be the next big revenue generating categories in mature markets. Finally, 2013 will be the year that location-based advertising finally arrives. Geofencing will play a

key part, with companies like Google, Apple, Urban Airship, and Qualcomm (TomTom's new platform is expected to also support geofencing in the future) offering geofencing APIs to developers. We will see the increase of location-based push notifications, proximity marketing, tracking applications, and the expansion of the high-value enterprise market.

In terms of GPS/GNSS design, Glonass was widely adopted in 2012, with 2013 set to be the year of sensor fusion. By the end of the year, a very limited number of new high-end smartphones will feature some form of this technology, with a view to supporting ubiquitous location. Non-smartphone GNSS will also come to market in 2013, with shipments in the hundreds of millions, as location is adopted across tablets, cameras, fitness devices, *etc.*

Looking 2 to 5 years out, ambient intelligence is the latest location buzzword. With handsets capable of always-on ubiquitous location, we will see the increase of personal coaching and recommendation applications based on our everyday activities and what is around us. This repackaging of constant and detailed analytics as a personal tool will help significantly alleviate privacy fears. At the hardware level, it will be interesting to see the impact of GPS-enabled goggles as a replacement for handheld/gripped GPS devices. The year 2013 will be a breakout year for Recon Instruments, with Google Glass available to consumers by 2014.

Automation, Control, and M2M

Bluetooth Smart Ready to Lead a Fast Growing Wearable Wireless Devices for the mHealth Market

After a trickle in 2012 in which a wave of innovation began to emerge in the wearable wireless and mHealth devices coming to market (see the [ABI Insight "Bluetooth Smart Healthcare and Wellness Devices Ideas Flourish"](#)) a flood of new wearable and mHealth devices will start shipping in 2013.

Driving the potential of these devices will be the continuing rollout of standardized ultra-low power short-range wireless connectivity embedded in mobile handsets, primarily Bluetooth Smart Ready. The handset connectivity that Bluetooth Smart Ready provides will be the infrastructure for a wide range of

self-monitoring applications and devices moving the concept of the quantified self and more casual activity monitoring into the mainstream.

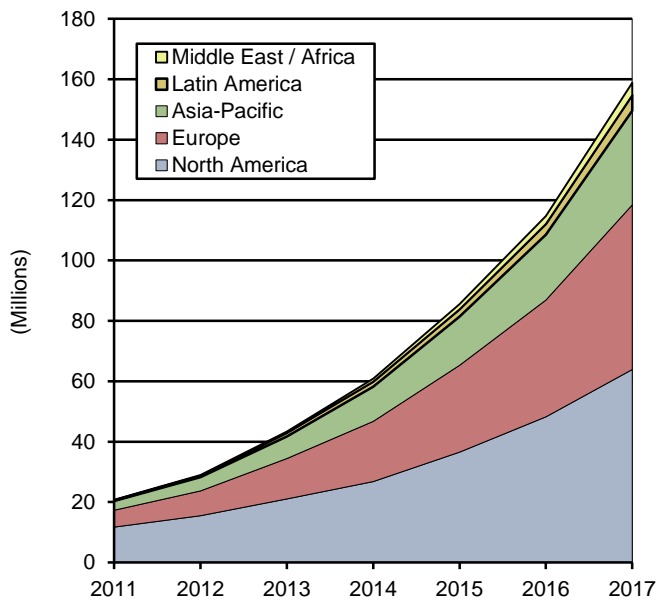
The devices will range from updates to existing heart-rate and other fitness monitors to new applications looking to leverage the connectivity and potential of using mobile handset Internet connectivity. Existing players across the sports equipment, diet, and healthcare industries will increasingly look to leverage online connectivity from wearable devices, leading to co-branded and OEM device launches.

Within 2 years, expect not just a wider selection of devices and parameters being measured, but a greater range in the consumer cost of these devices and a breadth of market being addressed from casual user to professional healthcare. Devices available will range from free in cereal packets, or the equivalent kind of promotions, to monitoring patients throughout their stay in hospital. Increasingly, it will be the data management and gaining value from that data that will drive proliferation and provision of devices.

In the next 5 years, broadly adopted devices will support data collection switched seamlessly between multiple connected devices to another. For example, activity data will use a paired phone connection on the move, but will switch to a connected gateway when the individual arrives at home or in the car to monitor different parameters. That transition and multiple gateway device support will see wearable devices data collection starting to be integrated into additional applications. In the home, for example, an individual's data can automatically inform the control of the house to match the individual and their preferences related to their ongoing activity.

In the coming decade, the proliferation of personal monitoring devices is leveraged to inform more than just personal activity and conditions. Instead, for the individual, activity data will combine with specific condition monitoring data as part of integrated healthcare and environment management. mHealth collected data will be aggregated to inform a range of applications from emergency response to smart grid and traffic management to environmental conditions monitoring all related to specific geographic regions and events. Underpinning all this will be interoperability between wearable devices and mobile handset gateways.

Home Health and Fitness Wearable Wireless Device Shipments by Region
World Market, Forecast: 2011 to 2017



MNOs Will Continue to Move up the M2M Value Chain and Look to Capture More than Just Revenues Associated with Raw Connectivity by Offering Value-Added Services

It is likely that, in 2013 and beyond, a number of operators will announce partnerships with application enablement platform (AEP) vendors. AEPs can represent anywhere from 10% to 45% of the value in the service value chain. As in many markets, higher volumes of deployed devices drive down the cost of the AEP. Much of this value accrues to the AEP vendor, but the ability to offer the AEP in partnership enables the MNO to offer additional value on top of the AEP. This could take the form of system integration services, or partnering with application service providers (ASPs) to deliver a finished application. Do not, therefore, be surprised to see an exclusive reseller agreement between a major MNO and an AEP vendor, akin to January 2012's AT&T/Axeda tie-up.

Going forward, no new connected device platform (CDP) will be self-built by MNOs. Outsourcing core CDP functionality will become an increasingly commoditized aspect of the network, better left to third-parties that can amortize development costs across multiple MNO customers. Furthermore, merchant market CDP vendors provide a range of other support services for MNOs in

their go-to-market activities. As such, it is highly probable that the likes of Jasper and its rival, Ericsson, will reveal a number of new deployment partners in the coming weeks, months, and years. MVNOs, too, such as KORE Telematics, Aeris Communications, and Wylless, are believed to be closing in on deals that will see MNO customers use their respective CDPs and these are set to be revealed in the not too distant future. Within the next 5 years, all leading Tier One and Tier Two MNOs may settle upon a third-party CDP vendor. Even longer term, many MNOs may swap out one company's platform for a rival's. This is something that might already be under consideration by certain operators, but we have yet to see any concrete evidence. It is certainly true that a race is already underway by merchant market CDP vendors to sign up the limited number of potential MNO customers to service deals. This race has moved beyond the first tier of MNOs in North America, Europe, and Latin America, and now consists of trying to win deals with second-tier MNOs and MNOs in the Asia-Pacific and the Middle East & Africa regions.

Finally, the trend for AEP vendors to extend CRM and enterprise resource planning (ERP) systems out to the connected asset is sure to continue. Having the ability to integrate a platform into back-office systems is an important part of an offering and a mark of differentiation in this increasingly competitive marketplace. Already in 2012, we have seen Digi International snap up Etherios, a cloud computing services provider and salesforce.com platinum partner. In 2013 and beyond, similar deals will surely follow. Similarly, we could see a fair bit of mergers and acquisitions (M&A) activity among AEP vendors, as the market, which today consists of hundreds of companies, begins to consolidate. Maybe we will even see the acquisition of a major AEP vendor by an MNO; it has happened in the CDP marketplace (think Verizon and nPhase), so it is by no means improbable.

And that's all! We hope you enjoyed ABI Research's assessment of 2013 and the decade to come. Remember to check back with ABI Research to obtain more concrete data to further back up our analyst predictions. Until next year, happy holidays from all of us at ABI Research!

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