



## *2012 State of the VITA Technology Industry*



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# State of the VITA Technology Industry

## March 2012

by: Ray Alderman, Executive Director, VITA

*This report provides the reader with updates on the state of the VITA Technology industry in particular and of the board industry in general, from the perspective of Ray Alderman, the executive director of VITA. VITA is the trade association dedicated to fostering American National Standards Institute (ANSI) accredited, open system architectures in critical embedded system applications. The entire series of reports can be found at **Market Reports**. ([www.vita.com](http://www.vita.com))*

### Business Conditions

#### Big Picture

Economic growth in 2011 closed up slightly in the U.S. and in Europe. Q4 U.S. GDP (Gross Domestic Product) came in at a positive 3%, but 2011 GDP was up an anemic 1.7%.<sup>1</sup> Europe reported a decline of 0.3% in Q4, but closed 2011 up 1.5%.<sup>2</sup> The U.S. is showing slight growth in the first part of 2012, but Europe seems to be in slight contraction due to the continuing sovereign debt problems.

China reduced their projected growth rate for 2012 to 7.5% in early March,<sup>3</sup> signaling a slowing of worldwide demand at the consumer level. Moreover, China is trying to inspire local demand, to lessen their dependence on exports.

#### Up Close

At the microeconomic market level, there are segments of the board industry that are having a difficult time. Telecom business has remained depressed, while industrial sales are slow due to worldwide declines in consumption and spending. The military markets look solid for 2012, but the looming DOD budget cuts are now making 2013 uncertain. The demand for boards in the medical segment has moved to China as medical device makers shift their attention away from industrialized nations with built-out medical centers to undeveloped nations with little or no medical infrastructure.

1 Lisa S. Mataloni, "National Income and Product Accounts, Gross Domestic Product, 4th quarter 2011 and annual 2011 (second estimate)", U.S. Department of Commerce, Bureau of Economic Analysis, URL: [www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm](http://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm)

2 Tim Allen, "Second estimates for the fourth quarter of 2011", Eurostat Press Office, March 6, 2012, URL: [epp.eurostat.ec.europa.eu/cache/ITY\\_PUBLIC/2-06032012-AP/EN/2-06032012-AP-EN.PDF](http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/2-06032012-AP/EN/2-06032012-AP-EN.PDF)

3 Eddy Elfenbein, "China Cuts Its Growth Rate to 7.5%", Crossing Wall Street, March 5, 2012, [www.crossingwallstreet.com/archives/2012/03/china-cuts-its-growth-rate-to-7-5.html](http://www.crossingwallstreet.com/archives/2012/03/china-cuts-its-growth-rate-to-7-5.html)

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Even though the Greek debt crisis seems to be resolved with the latest bailout payment in March, attention will now shift to other weak European Union (E.U.) members like Portugal, Spain, Ireland, and Italy. The E.U. debt crisis will be a drag on world growth prospects, continuing to add uncertainty. Election year in the U.S. will also bring confusion to the economic outlook until the occupants of the White House and Congress are known later in the year. Chronically high unemployment rates in both the U.S. and the E.U. point to slow growth in both areas for 2012.

*“Chronically high unemployment rates in both the U.S. and the EU point to slow growth in both areas for 2012.”*

The Iranian situation remains very unpredictable, and could result in military action by Israel and the U.S. in the next few months. New conflicts between Israel and Lebanon in Gaza are additional concerns.

The U.S. is slowly pulling out of Iraq and Afghanistan this year; we will have to see how those countries fare on their own. Syria is a major concern as the rebels try to remove al-Assad. Egypt is just now starting to form a new government and avoid civil war. The rest of the Middle East countries, who have ousted their old leaders, seem to be calm for now.

North Korea proposed to stop their nuclear weapons development and testing if the U.S. would send them food. We have been here before with North Korea, with the outcome never acceptable. Their new leader, King Jong-un, took over the country after his father, Kim Jung-il, died in December. The Korean peninsula has been the area of numerous firefights and artillery exchanges in the recent past, continuing to remain unstable.

In spite of these hotspots, the DOD seems to be moving their attention to China. China has increased its military spending by 11% recently, raising concerns about their objectives in Asia.<sup>4</sup> Previous VITA Industry reports have discussed China’s development of new aircraft carriers, their new jet fighter (J-20), and their anti-aircraft carrier missile development. This could lead the U.S. into another “cold war” and a shift to more strategic weapons platform spending in the future.

Intel’s November announcement of their new Knight’s Corner multi-core CPU, and their purchase of Qlogic’s InfiniBand products and design team, signal that they may see opportunities in the supercomputing segment. The supercomputing segment is very small compared to servers and other HPC (high performance computing) segments. This leads one to ask, “Why is Intel developing technologies in this arena?”

The telecom industry is struggling to find a business model that works as smart phones and tablet computers saturate the available bandwidth on their networks. None of the carriers can afford to build-out their networks, so they are shifting to limited data plans and throttling their customers who use too much data. Intel, Google, Apple, and other content providers are exploring IP/TV and on-demand movies and programming. Even Intel is considering a services-based model as PC sales fall worldwide: they are trying to put together Intel TV, to compete with Apple, Google, and the carriers.<sup>5</sup>

2012 has started out on some positive notes, diminishing the levels of risk and uncertainty seen in 2011. But, the ongoing financial difficulties in Europe, the slowing of China, the election year in the U.S., and the geopolitical instability in the Middle East remain as economic threats.

*“2012 has started out on some positive notes, diminishing the levels of risk and uncertainty seen in 2011.”*

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4 Jane Perlez, “Continuing Buildup, China Boosts Military Spending More Than 11 Percent”, The New York Times, March 4, 2012, URL: [www.nytimes.com/2012/03/05/world/asia/china-boosts-military-spending-more-than-11-percent.html](http://www.nytimes.com/2012/03/05/world/asia/china-boosts-military-spending-more-than-11-percent.html)

5 Andy Fixmer and Ian King, “Intel Seeking Media Rights to Start Online Pay-TV System”, BloombergBusinessweek, March 13, 2012, URL: [www.businessweek.com/news/2012-03-12/intel-said-to-look-for-programming-rights-to-start-online-television-service](http://www.businessweek.com/news/2012-03-12/intel-said-to-look-for-programming-rights-to-start-online-television-service)

## Markets

### MIL/Aero

“Caution” is the watchword in the MIL markets since the “super committee” failed to deliver budget recommendations last fall. The proposed 2013 DOD budget shows the present thinking about platforms and systems funding at this point.<sup>6</sup> UAVs, EW (Electronic Warfare: radar, jammers, ISR, SIGINT, COMINT, etc.), and system refresh/upgrades look like the winners.<sup>7</sup>

*“Caution is the watchword in the MIL markets.”*

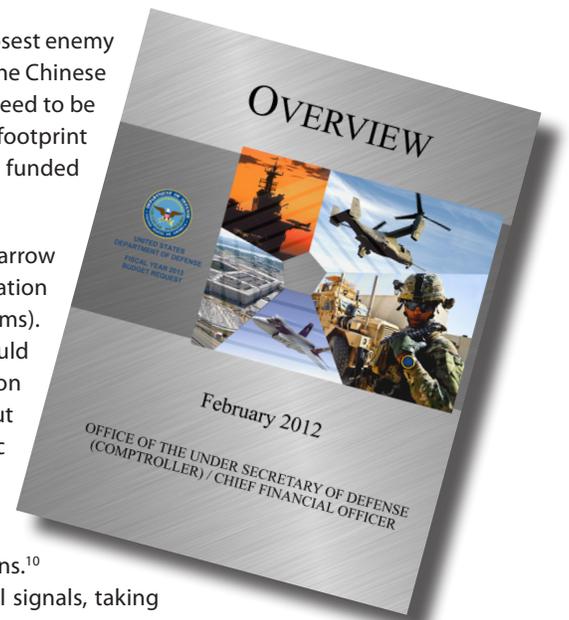
Previous VITA Industry reports have predicted these would be the major segments of opportunity for the next few years. Even in the face of the “defense sequestration” laws on the books, these same segments seem to be most protected as the DOD budgets come under scrutiny.<sup>8</sup>

As a rule of thumb, we need to stay at least three generations ahead of our closest enemy with our weapons platforms. We might be ahead by more than that against the Chinese or Russians these days. But, our intelligence systems and countermeasures need to be at least 5 generations ahead of our closest enemies, as we shrink our military footprint and presence in certain parts of the world. This is why we see EW systems funded through 2013, though not as much as previously budgeted.<sup>9</sup>

If we had the intelligence platforms we need, our sensors would detect a sparrow falling from the sky anywhere on this planet and instantly display a notification on a screen at the Pentagon (using advanced radar, ISR, SIGINT, and EW systems). If that bird fell from the sky for reasons other than natural causes, we would need advanced weapons platforms that can deliver conventional ordinance on that exact position in less than 60 minutes, anywhere in the world, without having aircraft, troops, or ships in that area (using the Advanced Hypersonic Weapons platform).

The Iranian capture of an RQ-170 Sentinel drone, on missions in Afghanistan in December of 2011, changed the game for our intelligence system operations.<sup>10</sup> Iran claims to have “hijacked” the super-secret UAV by jamming U.S. control signals, taking control of the craft, and landing it in Iranian territory. If Iran’s claims are true, and they have some advanced EW capabilities we did not anticipate, then our systems must be upgraded and enhanced far beyond our present EW-defense capabilities.

Last year, it was reported that laptop computers obtained from captured terrorists contained videos created by American surveillance drones in the Middle East, evidently intercepted with readily available PC software. Our intelligence services underestimated the sophistication of our terrorist’s enemies in the Middle East, and their ability to intercept those video feeds. Now, a terrorist nation claims to have gained control of one of our most advanced intelligence drones through sophisticated EW systems of their own. These examples verify that we must increase our EW/ISR budgets and create systems far beyond what our enemies are capable of disrupting. It is clear that we do not have EW and electronic defense systems three to five times more advanced than our enemies.



6 United States Department of Defense, “Fiscal Year 2013 Budget Request”, URL: [comptroller.defense.gov/budget.html](http://comptroller.defense.gov/budget.html)

7 John Keller, “Military systems upgrades and technology insertion are bright spots for defense contractors”, Military & Aerospace, February 14, 2012, URL: [www.militaryaerospace.com/articles/2012/02/military-systems-upgrades-and-technology-insertion-are-bright-spots-for-defense-contractors.html?cmpid=EnIMAEFebruary152012](http://www.militaryaerospace.com/articles/2012/02/military-systems-upgrades-and-technology-insertion-are-bright-spots-for-defense-contractors.html?cmpid=EnIMAEFebruary152012)

8 Mackenzie Eaglen and Michael O’Hanlon, “The specter of sequestration”, CNN World, February 24, 2012, URL: [globalpublicsquare.blogs.cnn.com/2012/02/24/the-specter-of-sequestration](http://globalpublicsquare.blogs.cnn.com/2012/02/24/the-specter-of-sequestration)

9 John Keller, “Electronic warfare spending headed up in 2013 DOD budget in one of only a few growth areas”, Military & Aerospace, February 17, 2012, URL: [www.militaryaerospace.com/articles/2012/02/electronic-warfare-spending-headed-up-in-2013-dod-budget-in-one-of-only-a-few-growth-areas.html?cmpid=EnIMAEFebruary222012](http://www.militaryaerospace.com/articles/2012/02/electronic-warfare-spending-headed-up-in-2013-dod-budget-in-one-of-only-a-few-growth-areas.html?cmpid=EnIMAEFebruary222012)

10 Zach Rosenberg, “Iran displays captured RQ-170”, Flightglobal, December 8, 2011, URL: [www.flightglobal.com/news/articles/iran-displays-captured-rq-170-365768](http://www.flightglobal.com/news/articles/iran-displays-captured-rq-170-365768)

## Counterfeit Parts

There is consternation over counterfeit semiconductors, back doors in chips used in military systems, viruses in our military systems, and hackers gaining control of military computers. Last fall, the USAF found their UAV ground control systems infected with a virus.<sup>11</sup> Hackers gained access to computer systems in government and prime contractor locations. In February, hackers eavesdropped on calls between the FBI and Scotland Yard.<sup>12</sup> Last June, the U.S. Navy found 59,000 counterfeit chips with back doors installed in them. These chips were slated for inclusion in missile and FOF (friend or foe identification) military electronic systems.<sup>13</sup>

Has Secretary of Defense Perry's famous Strategic Acquisition Initiative memo on COTS contributed to this mess? Probably, yes. There are systems in the military still using commodity PC-based hardware and software. Where the military saved a little money by using commodity COTS components, those savings are miniscule now, compared to the costs of dealing with the security vulnerabilities inherent in those technologies. The DOD will be reacting to these security problems for many years into the future, swapping-out those older vulnerable systems for more secure hardware and software environments. Coming-up with a continuing stream of software patches and security safeguards on those older commodity systems will look like a dog chasing his tail: You will never reach the goal. CNN appears to be a primary intelligence resource for the DOD. Remember the Granada invasion, where CNN was already on the beach, filming the Marines coming ashore? Maybe, at this point, the DOD should consider issuing contracts to LifeLock (identity theft), Google Earth (video surveillance), and the Geek Squad (computer repair and virus elimination) if they continue to use commodity electronics and software in their systems. Stranger things have happened in the past.

## Program Overview

Looking at the proposed DOD budget, we can see some definite trends:

- *The Navy will get fewer new ships. And, they will need to upgrade and refresh the ones they have.*
- *Helicopter funding is robust and will continue for the Army. Helicopters are critical to the plans for a smaller, faster fighting force on the ground.*

## More on the History of UAVs

In previous reports, we mentioned that Nikola Tesla conceived the concept of UAVs (Unmanned Aerial Vehicles) in 1898. The first UAV was built and flown during wartime conditions by Elmer Sperry, of the Sperry Gyroscope Company in 1918. The first advanced UAV was designed and built in 1980 by Abraham Karem, an Israeli immigrant, in his garage in Hacienda Heights, California.<sup>1</sup>

His first model was named the Albatross, staying aloft for 56 hours on its maiden flight. With another ten years of research and design iterations, his Albatross UAV became the Predator drone, the highly lethal weapons platform in use in the Middle East, and responsible for removing terrorist leaders with ease. Karem sold his company with his first model of the Predator drone in the 90's.

Today, there are more than 7,000 drones active in military and homeland security operations (including the smaller mini-drones) around the world.

Over the next 10 years, the Pentagon is expected to purchase over \$37 billion worth of new drone platforms, to be used in both surveillance and hunter-killer missions. In addition, the Homeland Security Department plans to use more drones to monitor the U.S. borders to detect illegal immigration and drug smuggling. The Teal Group, a market analysis firm, estimates that worldwide, the market for drones will hit \$100 billion by 2019.

Some very strong companies support the drone market today: AeroVironment (small mini-drones), General Atomics (Predator and Reaper), Boeing (Phantom Ray), and Northrop Grumman (Global Hawk and X-47B). Because of the super-secret nature of drone technology, the platforms will be built in the U.S. and not overseas. In addition, the supply chain for the electronics in these drones will be U.S.-based.

Drone technology is moving so rapidly that the USAF just shelved the Block-30 Global Hawks, and will continue to rely on the U-2, and a new more capable Block-40 version of Global Hawk in the future.<sup>2</sup>

Source: Ray Alderman

- 1 Peter Finn, Washington Post, "U.S. drones began with garage tinkering", AZCentral, December 24, 2012, URL: [www.azcentral.com/news/articles/2011/12/24/20111224drones-began-garage-tinkering.html](http://www.azcentral.com/news/articles/2011/12/24/20111224drones-began-garage-tinkering.html)
- 2 Amy Butler, "The Rise And Fall Of Global Hawk Block 30", Aviation Week, February 10, 2012, URL: [www.aviationweek.com/aw/generic/story\\_generic.jsp?channel=defense&id=news/awst/2012/02/06/AW\\_02\\_06\\_2012\\_p34-420189.xml&headline=The%20Rise%20And%20Fall%20Of%20Global%20Hawk%20Block%2030](http://www.aviationweek.com/aw/generic/story_generic.jsp?channel=defense&id=news/awst/2012/02/06/AW_02_06_2012_p34-420189.xml&headline=The%20Rise%20And%20Fall%20Of%20Global%20Hawk%20Block%2030)

<sup>11</sup> "Air Force UAV Controls Infected with Virus", Defensetech, October 8, 2011, URL: [defensetech.org/2011/10/08/air-force-uav-controls-infected-with-virus](http://defensetech.org/2011/10/08/air-force-uav-controls-infected-with-virus)

<sup>12</sup> Scott Shane, "F.B.I. Admits Hacker Group's Eavesdropping", The New York Times, February 3, 2011, URL: [www.nytimes.com/2012/02/04/us/fbi-admits-hacker-groups-eavesdropping.html?pagewanted=all](http://www.nytimes.com/2012/02/04/us/fbi-admits-hacker-groups-eavesdropping.html?pagewanted=all)

<sup>13</sup> Robert Johnson, "The Navy Bought Fake Chinese Microchips That Could Have Disarmed U.S. Missiles", Business Insider, June 27, 2011, URL: [articles.businessinsider.com/2011-06-27/news/30048253\\_1\\_microchips-missiles-foreign-chip-makers](http://articles.businessinsider.com/2011-06-27/news/30048253_1_microchips-missiles-foreign-chip-makers)

- While there is funding proposed for GCVs (Ground Combat Vehicles), this program is vulnerable to cuts as we leave Iraq and Afghanistan.
- The Air Force will get fewer fighter aircraft (F-22's and F-35's). This means they must upgrade and refresh present fighter platforms.
- Funding for UAV platforms is good, but less than previous years.
- Reductions in force, 100,000 fewer soldiers, are in the works. This trend says our remaining military forces will be very dependent on unmanned platforms, sophisticated electronic weapons, and intelligence systems.
- Additionally, this budget considers numerous base closings that could affect many military and civilian jobs.
- A severe reduction in directed energy weapons budgets (battlefield laser weapons) is a concern. These weapons can keep us three generations ahead of our enemies.

None of this proposed budget is cast in concrete. As the defense budget goes to Congress, many sitting congressional representatives will be protecting programs and bases in their districts. Moreover, it is an election year. That gives pure politics a serious role in what the final 2013 DOD budget will encompass. It is clear that we will see some reductions in program funding in 2013. Nevertheless, at this point, it is too early to predict what will happen to specific platforms and programs. Consequently, we are in a period of uncertainty until the new members of Congress and the occupant of the White House make the final decisions in 2013.

*“None of this proposed budget is cast in concrete.”*

### Other Programs

There is an interesting program in the Army that has received some funding and is showing some good results: The Advanced Hypersonic Weapon (AHC).<sup>14</sup> This platform is launched high into the atmosphere by a rocket, and can deliver conventional weapons on targets anywhere in the world within one hour, flying at more than five times the speed of sound. The AHC is part of the “Prompt Global Strike” strategy, allowing our military to hit targets around the world instantly, without waiting to move carriers, missile boats, submarines, or aircraft into position. The AHC is another advanced weapon system that will keep us at least three generations ahead of our closest enemies, if funding continues.

In early February, Sandia National Laboratories engineers announced that they had developed a “smart bullet,” for use by soldiers in the field. This bullet is fired from a conventional small-arms weapon that soldiers carry into combat. The bullet is laser-guided, has steering fins on the tail to correct its course over long distances, and contains a small package of electronic circuitry to guide it.<sup>15</sup>

The statistics for the ratio of ammunition fired (small arms) to enemy killed or wounded, in the wars of the past 150 years, are inconsistent. Based on a web search for that information, the most quoted numbers are:

- U.S. Civil War: 200 rounds fired per enemy casualty
- WWI: 5,000 rounds (no good estimates exist, this is based on the curve of the other wars)
- WWII: 25,000 rounds
- Korea: 100,000 rounds
- Viet Nam: 200,000 rounds
- Middle East: 250,000 rounds

14 InnovationNewsDaily, “U.S. Army Tests Secret Hypersonic Weapon”, FoxNews.com, November 17, 2011, URL: [www.foxnews.com/scitech/2011/11/17/us-army-tests-secret-hypersonic-weapon](http://www.foxnews.com/scitech/2011/11/17/us-army-tests-secret-hypersonic-weapon)

15 Ned Potter, “Sandia Labs’ Self-Guided Bullet for Future Soldiers”, ABC News, February 1, 2012, URL: [abcnews.go.com/blogs/technology/2012/02/sandia-labs-self-guided-bullet-for-future-soldiers](http://abcnews.go.com/blogs/technology/2012/02/sandia-labs-self-guided-bullet-for-future-soldiers)

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These estimates may be exaggerated, but the number of rounds fired, to wound or kill an enemy combatant, has risen sharply in each new conflict. Using “suppressing fire” against enemy positions as they did in WWII, or using the old Viet Nam tactic of “spray and pray” gunfire into the jungle, is an inefficient and expensive proposition. One of the reasons that the U.S. military made the transition away from 7.62 mm ammunition (30-06 and 308 caliber) to the smaller 5.56 mm (223 caliber) ammunition in Viet Nam was to allow ground soldiers to carry more ammunition with less weight into battle. This transition to smaller rounds is an indication that the general trend, of more and more bullets being fired per combat casualty in each new conflict, is validated by the estimates. Smart bullets are a new technology that can begin to lower ammunition consumption and raise the marksmanship and efficiency of our ground troops in the future. As you might suspect, this technology could also be placed in larger ordinance, like grenades, artillery, and mortar rounds. That development would change the ratio, from rounds-fired-per-casualty (RFPC), to casualties-per-round-fired (CPRF). Ultimately, our weapons platforms must become more efficient. These new “smart bullet” concepts will allow us to approach an RFPC of 1.0 for small arms, and something greater than 5.0 for CPRF for precision artillery and mortars.

Russian military analyst, Vladimir Slipchenko, got it right when he said, “I see the main purpose of war as being the large-scale real-life testing by the United States of sophisticated models of precision weapons.” Future conventional weapons development will be based on significantly improving RFPC and CPRF ratios and that will require the use of lasers and embedded electronics. Early wars used the stochastic model (i.e., the larger force firing the most ammunition always won). In WWII, we moved to the Poisson distribution (i.e., if you drop enough bombs near a target, the probability of hitting it is high). Today, the military is moving to a deterministic strategy (i.e., precision laser-guided weapons raise the probability of hitting the target to 1.0).

These comments only apply to anti-personnel weapons where our RFPC and CPRF ratios are very inefficient. Our Tomahawk Missiles, laser-guided bombs, Pulse Bombs, and MOAB (bunker buster) weapons are designed to destroy infrastructure, not kill or injure enemy combatants. We are very far ahead of our enemies when it comes to destroying infrastructure, so funding for such systems will be limited.

*“New VPX opportunities will be in these new platforms.”*

### Looking Forward

In the Bible, Matthew 24:6, it says “And ye shall hear of wars and rumors of wars: see that ye be not troubled: for all these things must come to pass, but the end is not yet.” On the Kardashev Scale, we are still a Type-0 civilization of nation-states.<sup>16</sup> And nation-states derive their power from their ability to make war. Herbert Prochnow, noted banker and writer, once said, “A visitor from Mars could easily pick out the civilized nations. They have the best implements of war.”

We will continue to develop new weapons and technologies, even with the proposed DOD budget cuts. However, those platforms will be smaller and more efficient (like UAVs with smart munitions). We will continue to develop new intelligence gathering platforms, new radar, new EW (electronic warfare) systems to thwart our enemies, and new techniques to make us more efficient at knowing what our enemies are doing. New VPX opportunities will be in these new platforms.

For the platforms we have now, that are several generations ahead of our enemies, we will refresh and upgrade them rather than replace them. Incremental improvements to sufficiently advanced systems will create great opportunities for VME-based products in the coming years. We will know the strategic direction of the DOD and their primary program emphasis in 2013, after the elections. Even then, the opportunities in the MIL markets will be better than those in the low value-added and commodity market segments, like telecom and industrial controls. We will simply need to adapt to any new directions the Pentagon takes in the coming years.

*“We will simply need to adapt to any new directions the Pentagon takes in the coming years.”*

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<sup>16</sup> Wikipedia, “Kardashev Scale”, URL: [en.wikipedia.org/wiki/Kardashev\\_scale](http://en.wikipedia.org/wiki/Kardashev_scale)

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## Telecom

It is hard to tell what is really going on in telecom at the microeconomic level. There is still some business for the telecom board vendors these days, but to what degree is hard to ascertain. Surely, sales at European telecom equipment suppliers are down due to austerity measures. At the macroeconomic level in the U.S., carriers are now throttling data-hogs and eliminating unlimited data plans.<sup>17</sup> The most interesting development is a new disease associated with telecom: Nomophobia,<sup>18</sup> the fear of being out of mobile phone contact. We cannot live with them, and we cannot live without them.

Back in 2011, Nokia-Siemens Networks (NSN) announced they would lay-off 17,000 workers.<sup>19</sup> Those lay-offs started in Finland and Germany in February,<sup>20</sup> adding to the already serious unemployment problems in the E.U. NSN has lost money ever since Nokia and Siemens dumped their telecom equipment divisions into this joint venture company to avoid the negative financial contamination of their profitable divisions. NSN says they will focus on software and services in the future, and ease out of the hardware business.

In the U.S., lay-offs in telecom continue in the landline segment as Verizon cut their workforce in New Jersey.<sup>21</sup> Additionally, Google reports it is time they got into the hardware business, with consumer products like phones, tablet computers, and entertainment equipment connected to the telecom network.<sup>22</sup> At the same time, Apple is trying to get AppleTV off the ground and Verizon entered an agreement with Redbox to provide content.<sup>23</sup>

The telcom service providers have gotten themselves into a mess: they scramble for agreements to sell the latest data-hogging smartphones and tablet computers, and those devices then consume huge portions of their network bandwidth, causing the service providers to spend more money to expand network bandwidth than they receive from cellphone contracts.<sup>24</sup> In turn, the providers have to throttle the new devices as they consume more and more data, or start charging users by data consumption. This conflict will continue to worsen in the coming years.

ATT terminated their unlimited data plans last year. As they began throttling users on their unlimited plans, some decided to sue ATT for breach of contract. A California iPhone user just prevailed in a suit against ATT, and was awarded damages from ATT for throttling his data access. This opens the door for about 17 million other unlimited plan customers to file suit.<sup>25</sup>

Now, ATT is exploring a new billing model. They are working with other content and service providers to allow specific content to be downloaded, without charging it against a customer's data plan limits. However, ATT wants a share of the content provider's revenue that they charge for that download or service.<sup>26</sup> ATT wants the content providers to fund any bandwidth additions to the network: ATT cannot possibly fund bandwidth expansion themselves without

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17 Josh Long, "AT&T Clamps Down on Wireless Bandwidth Hogs", V2M, February 7, 2012, URL: [www.vision2mobile.com/news/2012/02/at-t-clamps-down-on-wireless-bandwidth-hogs.aspx](http://www.vision2mobile.com/news/2012/02/at-t-clamps-down-on-wireless-bandwidth-hogs.aspx)

18 Wikipedia, "Nomophobia", URL: [en.wikipedia.org/wiki/Nomophobia](http://en.wikipedia.org/wiki/Nomophobia)

19 Matti Huuhtanen, "Nokia Siemens To Lay Off 17,000 Worldwide", Huff Post Tech, November 23, 2011, URL: [www.huffingtonpost.com/2011/11/23/nokia-siemens-layoffs\\_n\\_1109650.html](http://www.huffingtonpost.com/2011/11/23/nokia-siemens-layoffs_n_1109650.html)

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21 Lindsay Weinick, "Verizon Slashes Jobs, Blames Dwindling Landline Numbers", V2M, February 7, 2012, URL: [www.vision2mobile.com/news/2012/02/verizon-slashes-jobs-blames-dwindling-landlines.aspx](http://www.vision2mobile.com/news/2012/02/verizon-slashes-jobs-blames-dwindling-landlines.aspx)

22 Kit Eaton, "Google Enters Your Home For Your Data", Fast Company, Real Clear Technology, February 11, 2012, URL: [www.realcleartechology.com/2012/02/11/google\\_enters\\_your\\_home\\_for\\_your\\_data\\_3532.html](http://www.realcleartechology.com/2012/02/11/google_enters_your_home_for_your_data_3532.html)

23 Tim Stevens, "Verizon and Redbox team up to launch streaming and physical media service later this year", Engadget, February 6, 2012, URL: [www.engadget.com/2012/02/06/verizon-and-redbox-team-up](http://www.engadget.com/2012/02/06/verizon-and-redbox-team-up)

24 Craig Galbraith, "Video Streaming Jumps 88% as Mobile Data Nearly Doubles", V2M, February 21, 2012, URL: [www.vision2mobile.com/news/2012/02/video-streaming-jumps-88-as-mobile-data-nearly-do.aspx](http://www.vision2mobile.com/news/2012/02/video-streaming-jumps-88-as-mobile-data-nearly-do.aspx)

25 Max Eddy, "Man Successfully Sues AT&T Over Throttling his iPhone", Geek System, February 24, 2012, URL: [www.geekosystem.com/man-wins-att-throttling-suit](http://www.geekosystem.com/man-wins-att-throttling-suit)

26 Josh Long, "AT&T Mulling New Billing Model", V2M, February 28, 2012, URL: [www.vision2mobile.com/news/2012/02/at-t-mulling-new-billing-model.aspx](http://www.vision2mobile.com/news/2012/02/at-t-mulling-new-billing-model.aspx)

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going broke. This makes sense since the content is what is driving the explosive demand for bandwidth. In essence the service providers would like to collect a “usage” tax.

On the bright side, the roll out of 4G LTE has been on schedule with most major markets well equipped with an LTE infrastructure from Verizon and other service providers. Verizon plans to double the size of their network in 2013. But the bandwidth death spiral continues as Apple announced that 3 million new iPads shipped in the first three days, many of them consuming 4G connectivity over the Verizon LTE networks. Consumers are quickly finding that they can consume their entire monthly data allotment in a single movie causing many to reconsider using 4G.<sup>27</sup>

It is clear, at this phase of telecom market life, that unique hardware devices and new entertainment (content) services are the order of the day. Rumors abound that one of the major consumer device players (or a telecom service provider) will buy Netflix in the near future, to add appealing content to their line-up. The telecom equipment needed to deliver the content, amounts to commodity servers (stacked-up in a huge data center somewhere), with a few routers here and there.

Ultimately, the telecom carriers will become a basic utility like the power companies. They cannot compete with Apple, Google, or Facebook on content and brand-appeal. Pricing for connection to their networks will follow what the airline industry has been doing to their customers over the past few years, a la carte pricing for every service that they can come up with, making it very difficult to determine how much you are really paying each month. Everyone hates the airlines today, and those same consumers will hate their telecom service providers sooner than they expect.

From the telecom board vendor perspective, things are not looking any better. Most telecom boards are low margin products that use a PC-based reference design, with the I/O simply routed to a connector.

The integrity of the board industry was compromised when so many companies, looking for growth, went into the telecom markets with reckless abandon. They knowingly traded margin for the promise of volume, and the volumes never materialized. Alternatively, the volumes were not sustainable after a year or two. Telecom sucked the marrow from the bones of many good board companies over the past 10 years. Companies who remain in this segment will continue to slip the surly bonds of profitability as the telecom industry struggles to find a viable business model. Without ugliness, there can be no beauty. That is why we have a telecom segment in the board industry.

*“The integrity of the board industry was compromised when so many companies, looking for growth, went into the telecom markets with reckless abandon.”*

## Industrial

Inexpensive motherboards and commodity small form factor (SFF) computer boards have overwhelmed the industrial segment over the past decade. The applications run from traditional industrial controls, to commercial applications like kiosks and vending machines. Few industrial applications today use backplane-based electronics as they did in the past with VMEbus, STD, Multibus, or other architectures. In addition, high volumes and very low price to margin ratios in most of the applications characterize this market segment.

The industrial markets seem to be the most cost-sensitive area of embedded computer boards, even more than telecom. This characteristic puts the industrial board vendors in a severe margin squeeze. Additionally, the continuing financial problems in the E.U., the global slow-down in consumer consumption, and swings in currency exchange rates make this market segment a financial nightmare for the suppliers.

## New kid on the block

Maybe that is why several European SFF manufacturers announced the formation of a new standards group in March, called SGET (Standards Group for Embedded Technologies).<sup>28</sup> They intend to focus on dimensions of SFF boards and

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27 Edward C. Baig, “New iPad’s speedy 4G can use up data allotment in a flash”, USA Today, March 22, 2012, URL: [www.usatoday.com/tech/columnist/edwardbaig/story/2012-03-21/ipad-data-4g/53692024/1](http://www.usatoday.com/tech/columnist/edwardbaig/story/2012-03-21/ipad-data-4g/53692024/1)

28 “The new Standardization Group for Embedded Technologies (SGET) is on its way”, Kontron, February 28, 2012, URL: [emea.kontron.com/about-kontron/news-events/the+new+standardization+group+for+embedded++technologies+sget+is+on+its+way+.5638.html](http://emea.kontron.com/about-kontron/news-events/the+new+standardization+group+for+embedded++technologies+sget+is+on+its+way+.5638.html)

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the cabling/connectors involved. The companies claim that existing standard development organizations (SDOs) are too slow and they can get standards approved quicker.

“The goal of the founding members of the Standardization Group for Embedded Technologies is to create a new, powerful, worldwide committee for embedded computer specifications which will operate at greater speed and with far less bureaucracy than comparable organizations. To achieve this, the SGET has, amongst other things, set out simplified rules and shorter objection periods, so that specifications can be passed much faster”, Dirk Finstel, Kontron, names as a main reason for the founding of the consortium. Few details of how SGET plans to achieve a faster process were released and the website is still under construction, only asking that you contact them to join. ([www.sget.org](http://www.sget.org)) This new SGET group will be organized under German law, which also raises questions.

Many SFF board and system suppliers use reference designs (RDs), from the processor suppliers, to build their product, using the least amount of engineering overhead. Moreover, they implement these RD's on already-recognized form factor standards for embedded boards, done by mostly by U.S.-based SDOs. But, processor suppliers have no allegiance to a form factor, often changing the RD form factor as frequently as every 18 months, as they roll out new processors and EOL the previous generation, and they change the connectors and pin outs for I/O interfaces like graphics and storage as new interfaces emerge. That means that the commodity SFF board vendors must use the new RD and come-up with a new connector pin out for the existing board standard, making it incompatible and untested against the new RD. It leads to a long list of derivative form factors that are “kinda” similar but not really.

Volume may be the wheel that makes the world go around. But profitability is the axle upon which it revolves. In my opinion, you would have to take a mental trip on two airplanes, three trains, two buses, and a bicycle to arrive at a different technical reason to justify the standards they are proposing.

*“Volume may be the wheel that makes the world go around. But profitability is the axle upon which it revolves.”*

## Healthcare/Medical

Growth in the medical equipment markets has been slow for several years in spite of demographic shifts: increases in aging populations in the U.S., Europe, and Japan.<sup>29</sup> Equipment manufacturers have shifted manufacturing facilities closer to developing markets in Asia where hospitals and clinics are being built and equipped. As reported in the November 2011 report, General Electric moved their Medical Imaging Division to China last year, to capitalize on the local market demand and to take advantage of lower labor costs.

In 2013, a new 2.3% medical device tax in the U.S. goes into place; all buyers of new medical devices will pay this new tax. This tax could retard medical equipment purchases in the future and manufacturers are already downsizing and preparing for slow sales.<sup>30</sup> For large-scale imaging systems (MRI, CAT, CT, etc.), the designers are struggling with the bandwidth limitations of copper connections. New design efforts will incorporate faster processors and probably optical connections in the future.

It is hard to say how many board vendors participate in the medical market demand for PCBs and packaging. However, the slow-growth characteristics of this market make it unappealing for the next few years. The primary growth in medical systems so far has been in electronic medical records, mandated by federal law; diagnostic images and test results from medical equipment are part of the medical record initiative. It is not yet clear how the move to electronic medical records will influence the diagnostic equipment designs and components.

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29 Dave Phetepplace, Bishop & Associates Inc., “The Medical Market for Cable Assemblies: The Beat Goes On — Slowly”, Cable Assembly Supplier, URL: [www.cableassemblysupplier.com/Articles/2012/CAS\\_Medical\\_Market\\_Phetepplace\\_2-14-12.htm](http://www.cableassemblysupplier.com/Articles/2012/CAS_Medical_Market_Phetepplace_2-14-12.htm)

30 Jenny Bieksha, Bishop & Associates Inc., “Technology Trends Driving Medical Market Growth”, Cable Assembly Supplier, URL: [www.cableassemblysupplier.com/Articles/2011/CAS\\_Medical\\_Technolog\\_Trends\\_Bieksha\\_2-14-12.htm](http://www.cableassemblysupplier.com/Articles/2011/CAS_Medical_Technolog_Trends_Bieksha_2-14-12.htm)

## VPX for Supercomputing

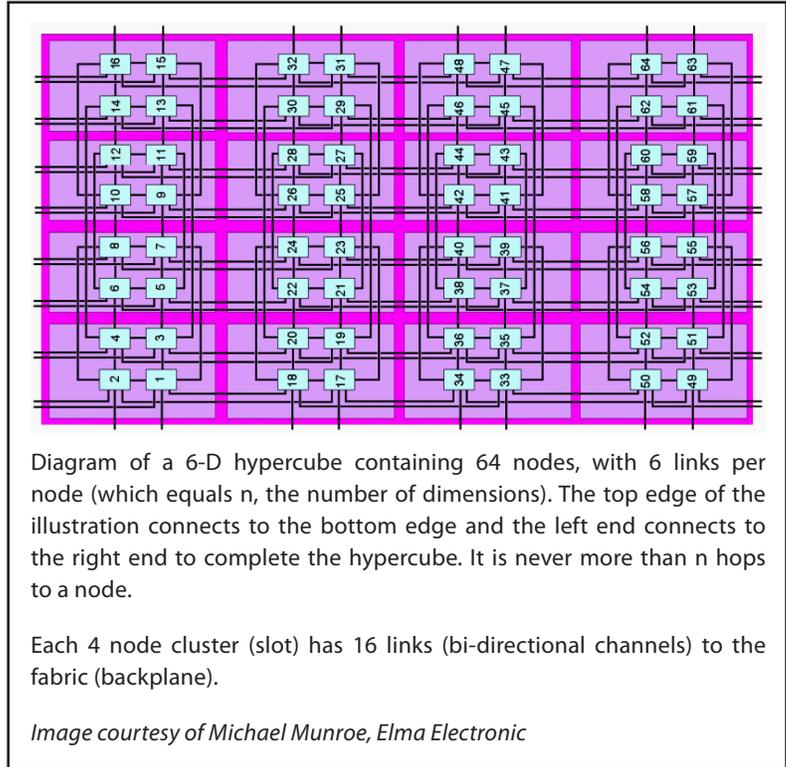
Last fall, Intel introduced their new Knight's Corner CPU chip, containing 50 cores.<sup>31</sup> Then, in January of 2012, Intel bought the InfiniBand products and design team from QLogic.<sup>32</sup> On the surface, this says that Intel sees market opportunities in supercomputers. Additionally, it is clear that PCI Express will not be able to keep up with InfiniBand's roadmap. Moreover, the PCI Express tree structure, a carry-over from the old PCI parallel bus architecture, hamstrings future performance. Therefore, one could assume they bought the QLogic assets to break the high-latency/poor performance cycle of PCI Express.

Does Intel want to get into the supercomputing business against Cray machines that use AMD processors or IBM's Blue Gene that use Power processors? No. On the surface, it looks like the Knight's Corner chip, the InfiniBand interconnects, and switches would allow them to build massively parallel computers for Cloud Computing. The primary application in the cloud? Data mining.

With these advanced processor chips and the InfiniBand interconnects, we can take VPX into a new realm: VPX-SC (VPX Supercomputing) in critical embedded applications. In January, there was a MIT (Massachusetts Institute of Technology) press release on new faster more robust FFT (Fast Fourier Transform) algorithms.<sup>33</sup> In March, MIT announced new advanced algorithms for calculating optimal paths in swarms of UAVs and UUVs.<sup>34</sup> These new algorithms will require tremendous amounts of computing power and interconnect bandwidth. We are living in an algorithm-based world today.

In the past, a very large number of VME boards were used in simulators. In a future of diminished DOD budgets, the military will need to train pilots of UAV/UUV/GCV platforms with simulators, rather than burning fuel and risking loss of the platform due to error or accident. In addition, there are numerous free software packages for simulating FEA (finite element analysis), computational fluid dynamics (CFDs) and other heavy mathematical models in research. What we need are "supercomputers-in-a-box" to run these applications at much lower cost than a Cray machine.

At the March VSO meeting in Orlando, a new standards effort, VPX-SC was proposed. It may be an addition to the present OpenVPX document (new profiles), or it may be a new specification if the working group agrees. The pin outs and the connection diagrams for building 4- and 6-dimensional hypercubes that could take VPX into the supercomputing arena for embedded applications running complex algorithms (radar, sonar, SIGINT, etc.) will need to be developed. A 4D hypercube could be designed with as few as four VPX modules, with four GPGPU nodes on a module. A 64-node 6D hypercube could be built with 16 VPX boards, with four nodes on a card.



<sup>31</sup> John Hengeveld, "Supercomputing 2011 Day 2: Knights Corner shown at 1TF Per Socket", Intel, November 15, 2011, URL: [communities.intel.com/community/openportit/server/blog/2011/11/15/supercomputing-2011-day-2-knights-corner-shown-at-1tf-per-socket](http://communities.intel.com/community/openportit/server/blog/2011/11/15/supercomputing-2011-day-2-knights-corner-shown-at-1tf-per-socket)

<sup>32</sup> Zack Whittaker, "Intel buys QLogic's InfiniBand assets for \$125 million", ZDNet, January 23, 2012, URL: [www.zdnet.com/blog/btl/intel-buys-qlogics-infiniband-assets-for-125-million/67756](http://www.zdnet.com/blog/btl/intel-buys-qlogics-infiniband-assets-for-125-million/67756)

<sup>33</sup> Larry Hardesty, "The faster-than-fast Fourier transform", MIT News, January 18, 2012, URL: [web.mit.edu/newsoffice/2012/faster-fourier-transforms-0118.html](http://web.mit.edu/newsoffice/2012/faster-fourier-transforms-0118.html)

<sup>34</sup> David L. Chandler, "Sometimes the quickest path is not a straight line", MIT News, March 8, 2012, URL: [web.mit.edu/newsoffice/2012/underwater-swarms-robots-0308.html](http://web.mit.edu/newsoffice/2012/underwater-swarms-robots-0308.html)

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I know what you are thinking. We will have cooling problems with such high-power-density boards. Not to worry: we are already cooling a 6U quad-CPU card dissipating 800+ Watts with LFT (liquid flow-thru). And we believe we can cool over 1kW on a 6-U card with ease (also with LFT). The real problem might be getting over 1kW of clean power to each of the cards in the VPX chassis.

With the advancements in computing power offered by GPGPUs and chips like the Knight's Corner chip, along with the low latency and amazing performance of the InfiniBand interfaces, we now have the tools to take VPX into supercomputing applications that require these performance levels.

## **M&A Activity**

Merger and Acquisition activity in our industry has been very slow over the past six months. Poor business conditions in telecom, margin pressures in the industrial market, the medical electronics market moving to China and the uncertainty about military budgets have hampered interest in acquiring board and system companies.

Since the November report, there have been two acquisitions in the board industry. In December, Mercury Computer Systems completed the acquisition of KOR Electronics for \$70 million. ADLINK purchased LiPPERT Embedded Computers in January for \$7 million Euros.

There has been significant activity in the connector industry lately.<sup>35</sup> Connector demand has been depressed for several reasons: declining business conditions in Europe, reduced connector demand as smartphones and tablet computers displace PCs, and the continuing transition from backplane-based systems to SFF (Small Form Factor) and motherboard-based embedded computers, especially in the industrial markets.

As the 2013 DOD budgets become clear, and the programs with funding are well established, we could see increased M&A activity as large industry players buy the smaller companies with proven funded programs.

## **Market Estimates**

Financial statements for the top two companies in the embedded computing segment were released in Q1, 2012. Advantech reported sales of about \$880 million in 2011, showing respectable growth over 2010. However, as reported in previous reports, Advantech's income includes revenue from certain subsidiaries that make products or provide services not related to our industry. Kontron reported sales of \$763 million, with good growth over their 2010 numbers. Kontron has now reached the highest revenue plateau in our industry, surpassing the high established by the Motorola Computer Group at the peak of the telecom bubble. Will Kontron be able to sustain their growth and break through the billion-dollar barrier?

## **Summary**

At the macroeconomic and geopolitical level, things have calmed down in the past six months. Gasoline prices hitting \$5/gallon in the U.S. will definitely have a negative effect on our GDP growth. The Greek debt problem has been solved, for now, but several other heavily indebted countries could be the catalyst for renewed concern about the E.U.'s financial strength. The European financial terpsichoreans are still far from ending their performance.

The Israel-Iran situation could flare-up at any time and affect the business environment. The U.S. will definitely be involved in insuring the free passage of oil through the Gulf and the protection of Saudi Arabia's oil facilities on the gulf shores. That could mean neutralizing Iran's aircraft and naval platforms (warships and submarines), as well as their air defense radar and surface-to-air missiles. Military action may be the only remaining option in the next few months.

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<sup>35</sup> Ronald E. Bishop, Bishop & Associates Inc., "The 2011 Head Count: Merge and Acquisitions", Connector Supplier, URL: [www.connectorsupplier.com/Facts\\_Figures/ind\\_fact\\_figures\\_2011-Mergers\\_Acquisitions\\_3-6-12.htm](http://www.connectorsupplier.com/Facts_Figures/ind_fact_figures_2011-Mergers_Acquisitions_3-6-12.htm)

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Some segments of our industry, at the microeconomic level, will continue to erode. Telecom is less likely to resume demand for board products than any others, and players in this segment will suffer more blunt-force financial trauma. The industrial segment is tied more to the macroeconomic conditions than other segments, and margins on commodity motherboards and SFF products continue to erode. While the military market will do well this year, there is concern about what the 2013 DOD budget will contain, and which programs will be unfunded.

However, advanced intelligence systems (using VPX) and upgrades/ refreshes of existing platforms (using VME) are the bright spots that offer good opportunities for the coming months.

We will continue to stay years ahead of our enemies with our weapons platforms, and we will spend more money to move our intelligence systems to new advanced capabilities. Ultimately, our enemies will only have time to ask two questions, and in this order:

1. *How did the Americans know?*
2. *What is that noise?*

So keep an eye on the geopolitical situation, and the E.U.'s financial condition. And, take advantage of the good opportunities presenting themselves in the MIL markets this year.

*“Keep an eye on the geopolitical situation, and the E.U.’s financial condition.”*

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