



2008 State of the VME Technology Industry



February 12, 2008

P.O. Box 19658

Fountain Hills, AZ 85269

480.837.7486

info@vita.com

www.vita.com

2008 State of the VME Technology Industry

by: Ray Alderman, executive director, VITA

This whitepaper provides the reader with a strategic update on the state of the VME Technology industry, in particular, and a view 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 whitepaper reviews application markets, technology, mergers and acquisitions, forecasts and legal issues impacting VITA and its members in 2008. To learn more about specific VME Technology, review the VME Technology whitepaper at www.vita.com/roadmap.html.

Executive Summary

VME Technology has an indispensable place in the design of critical embedded systems. These are the systems that must be “able” in many dimensions, including: dependable, supportable, configurable, reliable, and serviceable. VME Technology is a favorite choice for critical embedded systems architectures around the world in countless applications. These systems must operate flawlessly to protect life, property, equipment, and the environment – and to do that they rely upon the durable products of today and tomorrow using VME Technology. New projects are leveraging recent advancements in VME Technology, capturing the benefits of performance and long life cycle advantages.

“These are the systems that must be “able” in many dimensions, including: dependable, supportable, configurable, reliable, and serviceable.”

I am optimistic about our industry and its prospects in 2008. But, I am less than optimistic about certain market segments and where they may lead some companies. This perspective is based on macro-level reports, forecasts, and information at my disposal. I think the market is in a mature phase where companies must evaluate the segments, and make decisions about entering, staying, or leaving market segment by market segment. Those decisions will drive M&A activity, product development, and subsequent growth and gross profit margins for those companies in the remainder of the year.

I predict that the market for VME products will grow about 10% in 2008 from the current base of \$1 billion. A large portion of that growth will be in new VME Technologies and in maintaining legacy programs in the MIL/COTS and industrial market segments.



Contents

Executive Summary	1
Markets	2
MIL/COTS	2
Industrial	3
Telecommunications	3
Medical	4
Market Fragmentation	4
Technology	5
Components	5
Technology Transitions	6
Mergers and Acquisitions	7
History of M&A in our Industry	7
Mergers and Acquisitions in 2008	8
VME Forecasts	9
Legacy VME	9
New VME Technology	9
Forecast Summary	10
Risk Management	10
ITAR	10
Patent Policy	10
Green Initiatives	11
Summary	11

To stay on top of the latest discussions related to VME Technology, check out VMENOW.com. Here you will find industry pundits posting topical discussions on issues currently affecting the VME industry.

Markets

VME Technology is used in critical embedded systems over a wide range of market application segments. Each of these segments has its own set of characteristics that influence the use of VME Technology. I will present my views on the segments that are most influencing the buying decisions in our industry.

MIL/COTS

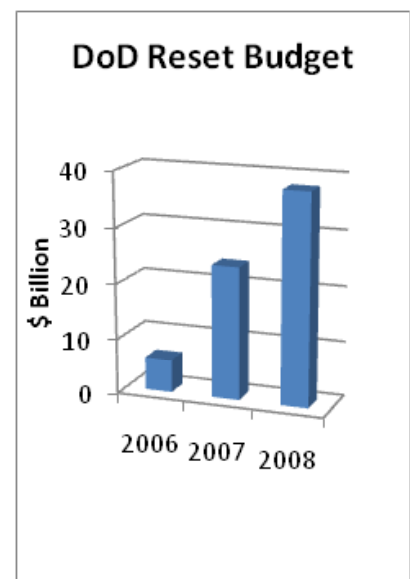
The MIL/COTS (defense and aerospace) market segment continues to be VME Technologies largest market segment by revenue. VME Technology has enjoyed a long run of design wins over the years. Spending on new programs will continue but at a lower rate as new major military platform programs have been unfunded or funding has been reduced. The trend toward cancellation of new platforms started with the Comanche helicopter and the Crusader cannon, and has now extended to certain segments of Future Combat Systems (FCS) and the unfunding of the Land Warrior programs. We will see some new technology systems built and shipped in 2008, particularly for FCS. But, there seems to be a shift in the DoD budget that favors legacy platform refresh over new platform deployment. We might have expected this after an election year, and a new resident in the White House. But this trend has been occurring with an incumbent in office. The budget transitions over the past three years don't seem to be influenced by political aspects like they would be with a new administration. Financial realities seem to be the major driving factor in these budget trends toward more refresh programs.

As I study the last three years of DoD budgets¹ for program "resets" (upgrades and technology insertion of new boards), I can see an interesting trend. In 2006, the DoD budget allocation for "resets" was \$6 billion. In 2007, that budget was increased to \$24 billion and in the present 2008 DoD budget, it is \$38 billion. A significant portion of the reset budget is used in electronics. This year, numerous contracts have been issued: the rebuilding of 126 Apache helicopters that have been cannibalized for spare parts in Iraq and Afghanistan, rebuilding of M-1 Abrams tanks, and upgrades to the Patriot missile systems are examples. These systems have a heavy VME content. It seems clear that the military will be upgrading, refreshing, and "resetting" more legacy platforms than ever before and VME Technologies are the principal electronics technology in those platforms.

In 2007, many VITA members in the MIL/COTS segment told me that they had seen more RFQ's for VME boards used in refresh programs in the first half of 2007 than they saw in all of 2006. That would make sense, matching the DoD refresh budgets in 2006 and 2007. If there is any relationship between refresh budget and the number of RFQ's for VME products, we should see a near doubling of RFQ's for more VME legacy products in 2008. Since the refresh programs usually leave the backplanes and chassis in place, I anticipate that most of the RFQ's seen in 2008 will be for VME32 and VME64 products (i.e., newer CPUs, faster A/D cards, etc). While this may be beneficial to the board vendors, it could be detrimental to the packaging/chassis/backplane vendors. Still, several reset programs will require hundreds of new chassis and backplane products (e.g. the resets on platforms cannibalized for spare parts).

Additionally, if my logic is correct, suppliers will see a larger number of RFQ's for smaller quantities of VME boards. Order sizes of 50 to 100 boards are showing up now with some as high as several hundred. So, I believe that they can anticipate a brisk business

"It seems clear that the military will be upgrading, refreshing, and "resetting" more legacy platforms than ever before, and VME technologies are the principal electronics technology in those platforms."



¹ DoD Budets. Defense Budget Materials. [Online] 2008. www.defenselink.mil/comptroller/def-budget.

for VME32 and VME64 legacy boards in 2008. Consequently, our members will have to adjust to good business conditions for legacy VME boards, but the orders will be for small volumes. One downside to supporting legacy programs is that VITA members and suppliers of VME Technology will have to scramble to get their hands on components that are at or near the end of their life cycles. They will also continue to be impacted by RoHS (Restriction of the use of certain Hazardous Substances) initiatives throughout the world. The MIL/COTS market is resisting the move to lead-free more than an other industry segment for reliability reasons, since these products go into critical embedded systems.

Industrial

Much of the industrial market, particularly non-real-time applications, has migrated to inexpensive PC implementations on nearly 100 different form factors. This transition has been occurring for more than a decade and is nearing conclusion. It has fragmented the industrial board market into many smaller sub-segments (i.e., PC/104, EBX, ETX, ITX, etc). I project that there will be more new form factors introduced as industrial board makers struggle for growth and profitability in 2008, in what is already a very fragmented and commoditized market.

The VME users in the industrial segment need the hard real time capabilities of VME. There are still no other architectures that can offer the level of real-time determinism that VME offers, especially when one moves to fabrics like PCI Express or Ethernet. Many industrial systems have space limitations and prefer the 6U or smaller form factors, such as VME. VME has been designed into many industrial applications that span nuclear reactor control, industrial lasers systems, steel production quality control systems, and subway remote control, supervisory and computer interlocking systems.

There are a number of VME users who will also be buying VME32 and VME64 products for upgrades and system refreshes. My best estimate is that the industrial VME board segment is about \$150-200 million per year and growing slowly, depending on obsolescence of certain chips, or the refresh plans of the users.

Telecommunications

Some of the largest builders and users of VME boards are telecom equipment makers. There are still many thousands of VME boards going into SS7 and billing systems in telecom. These two areas are major "critical systems" applications found in telecom today. The remainder of the telecom demand is for low QoS applications with no critical requirements, using commodity PC-based low-margin boards and boxes. I do not see many opportunities for VME products from our members in telecom systems with VITA-based standards, other than legacy applications. My research of the VMEbus chip shipments showed that one of the largest VME board makers, if not the largest, is a telecom equipment manufacturer. But, that particular large-volume manufacturer is captive and makes all their own VME boards (or has them made by a contract manufacturer) for use in their own equipment. The VITA Standards Organization (VSO) has no interest in creating any standards specifically associated with commercial telecom and defers this work to other organizations.

Telecom Trends

According to recent reports from ABI Research¹, developed markets for advanced 3G cell phones and features are near saturation. They anticipate that 80% of the new cellular subscribers for the next five years will come from undeveloped nations like India and China. Those markets will demand ultra-low cost cell phones and base stations for voice-only services. This trend is significantly changing the dynamics of demand, toward high volumes of very low cost equipment and basic cell phones. This report also predicts significant market share movements of the cheaper wireless chips from the larger incumbent suppliers to the smaller silicon makers. This market transition could have an impact on the more sophisticated, and more expensive, boards and boxes aimed at the advanced 3G services. Looking further into the economics, consumer spending in developed nations is under severe pressure. ATT announced early in January that they are seeing soft demand in the US for advanced cell phones and services. Verizon followed with similar observations. Anticipating continued downward pressure on subscriber trends, revenues, and profitability in 2008, Sprint Nextel² also announced initial plans to streamline the business in coming months. 2008 could be a difficult year for vendors selling high-performance boards and systems aimed at next-generation build-outs for 3G services in developed nations.

1 ABI Research. [Online] 2008. www.abiresearch.com

2 Sprint Nextel Reports Fourth-Quarter Subscriber Results. News Releases. [Online] January 18, 2008. newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle%2Fnewsroom&ID=1097849.

Medical

Medical applications have seen a steady migration away from VME Technologies over the past years. Many of the larger medical modalities that have used VME in the past have migrated to high end PC platforms. They do not have a strong need for real-time responses but do require high performance image rendering similar to the capabilities provided by high end gaming PCs.

Like many of the other segments, medical will continue to have demand in support of legacy equipment. Many medical systems see extended lives in international markets and upgrades will continue to be needed for the foreseeable future. Many medical applications face packaging challenges that traditional VME products did not address. Many medical products require smaller packaging than what 6U VMEbus could provide. The new VPX 3U products are anticipated to capture some of the market back for VME Technologies and VITA members.

Market Fragmentation

Market fragmentation, especially for embedded applications, is among the more prevalent difficulties that the VME industry has faced over the past few years. My latest research shows nearly 100 different form factors in the embedded board market. Some of these board sizes and mechanical specifications are standardized under some accredited standardization process, while others are developed by consortia or a small group of companies. The greatest proliferation has occurred in the small form factor, non-rack-mount arena. The proliferation of form factors has fragmented the board markets into many small niches, making the market more heterogeneous.

Application requirements are not always the driving force for these new board sizes. As the board markets mature and settle on a few dominate form factors (like 3U and 6U), the larger companies have the advantage of economies of scale. The response by smaller companies is to introduce new form factors in an effort to create niches for growth and sales opportunities. The resulting niches are too small for the larger companies to enter and offer no economies of scale. I expect this market fragmentation by form factor to continue in 2008.

After years of relative stability with PCI Mezzanine Cards (PMCs), the mezzanine card market may become a new arena for the proliferation of form factors, based on the transition to higher frequency fabric silicon, and new parallel interconnect standards (like AMD's HyperTransport² and Intel's QuickPath³). As more board-size proliferation occurs, the smaller companies will have an advantage and some market protection. The larger companies cannot afford to support many different form factors at low production volumes.

Custom designs of board and systems level products, sold at commodity prices, haunt some market segments. Custom-designed boards, at premium prices, bless other segments. Custom designs and customized existing products, are the primary driving forces of a company who focuses on a market segment and further focuses on a few customers within that market segment. This is another polar-opposite example of market diversification and an extreme example of market focus.

Most board markets are not elastic enough to have the economies of scale needed for a low-margin business.

2 HyperTransport Technology Consortium. [Online] 2008. www.hypertransport.org/consortium

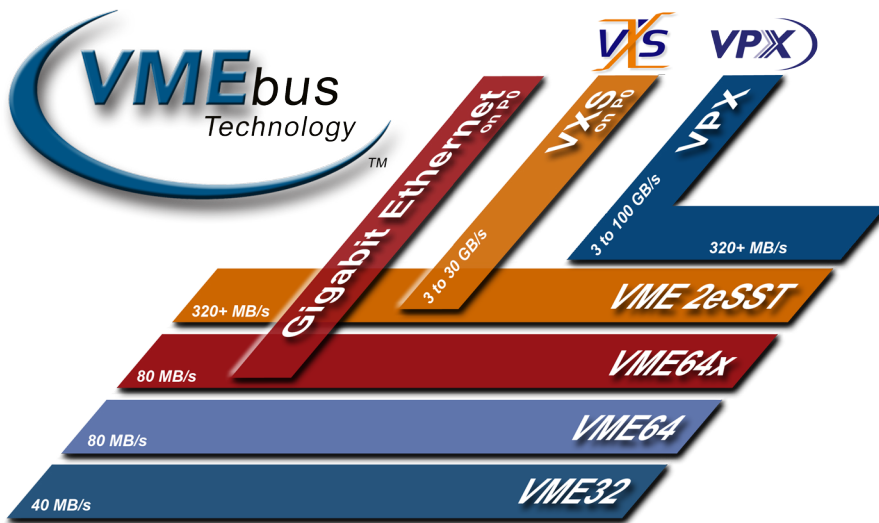
3 QuickPath. Next-Generation Intel Microarchitecture. [Online] Intel, 2008. www.intel.com/technology/architecture-silicon/next-gen

“After years of relative stability with PCI Mezzanine Cards (PMCs), the mezzanine card market may become a new arena for the proliferation of form-factors.”

“Most board markets are not elastic enough to have the economies of scale needed for a low-margin business.”

Technology

The VITA Standards Organization (VSO) has been continually developing enhancements to the VME Technology family. These include VXS (VME Switched Serial) and a new revolution in switch fabric and packaging called VPX. The VSO is tasked with keeping the VME Technologies fresh and relevant to today's changing market requirements. More details on the latest status can be found on the VITA website and the *Roadmap for VME Technology* whitepaper⁴.



Components

Our industry has been consuming advanced processor and interconnect technology for several years now. Multicore processors and high-speed serial interconnects are the primary driving forces in new design today.

Interest in using multicore processors from both Intel and AMD in critical applications will increase, at least until we have more information on where Freescale and IBM will take the Power Architecture in the future. We have seen other Power Architecture suppliers like AMCC and PA Semiconductor weigh in with lower power options. In addition, multicore processor volume deployment in embedded segments could be delayed somewhat due to the absence of tools that effectively and efficiently handle multiple core applications.

It is evident from the large number of new product announcements proclaiming the use of FPGAs (Field Programmable Gate Arrays) that interest and applications for FPGA computing will continue in the coming year as more applications depend on hardware acceleration. FPGA technology is growing in performance and capability while decreasing in cost making the choice to use FPGA technology even easier.

Many critical systems will start using removable SSD's (Solid State Disks made with semiconductor memory) instead of moving media (disk drives, CDs, etc). This will exacerbate existing concerns about data security, especially in MIL/COTS and Homeland Security applications.

⁴ Roadmap for VME Technology. [Online] 2008. www.vita.com/roadmap.html

Open Source Trends

Embedded Systems Design magazine, in their "2007 Embedded Market Study"¹, found that the use of commercial operating systems is trending down. In 2005, 55% of respondents used a commercial OS. That dropped to 51% in 2006, and to 47% in 2007. Concurrently, the use of open source operating systems was 16% in 2006, rising to 22% in 2007, according to the report. The trend to open source is very evident in consumer and telecom applications. In the real-time application area, this trend away from commercial OS's is not seen. Medical, military, and aerospace applications are maintaining their use and licensing of commercial software from traditional proprietary vendors.

Some of the operating system vendors have announced Linux products, as they see some of their OS customers move to open source alternatives, in an effort to replace lost revenues. It is clear that the open source operating systems do not meet the requirements of many of the critical embedded real-time applications. The risk of failures and severe problems in open source OS environments is just too high. Open-source is not mature or stable enough to take that risk and apply them in certain critical embedded real-time systems.

¹ Nass, Richard. Open Season on OSes. *Embedded.com*. [Online] CMP, January 14, 2008. www.embedded.com/columns/esdeic/205801058?requestid=535339

We will see a number of new standards development activities start-up in 2008 to accommodate the newer 5, 8, and 10 GHz fabric silicon and connectors. The inspiration for this increased activity will be signal integrity and reliability issues on older lower-frequency designs. In some instances, these activities will simply replace the older slower connector specified on an existing form factor with a newer faster connector. Opportunists will use the faster connectors and silicon on new form factors, adding to the present market-fragmentation-by-form factor problems.

Technology Transitions

Adoption of newer processor and interconnect technologies by users takes time. Many providers abandon their legacy products long before they should, anticipating that the users will rapidly adopt their newer products. There's an old saying: "Never underestimate the value of legacy technology." This may not be true in consumer entertainment products, but I believe it is true in our industry. As I have stated in the defense market segment of this whitepaper, about 75% of total demand for boards in the military segment will be for VME32 and VME64 products. The remaining 25% of demand will be for newer processor and interconnect technology. But, the design-ins today are priming the pump for the orders in 18-24 months. The challenge for board vendors is to maintain and enhance their legacy product offerings while, at the same time, creating the new technology products for design-ins and orders in the future.

"Never underestimate the value of legacy technology."

Most of our VITA member companies have done a good job of balancing these two elements - legacy and new technology products - in their product lines. But, with a disproportionate percentage of demand in MIL/COTS for legacy-compatible products, I do expect to see a flurry of announcements for newly designed boards for both VME32 and VME64 technologies. .

The newer processors today use different software and tool models, and some of those tools are primitive relative to the advanced hardware on which their applications are intended to operate. The high-speed serial fabrics are transitioning from 2.5/3.125 GHz, to 5 GHz in 2008-2009, and then to 8-10 GHz in 2010. So, the rapid increase in newer and faster silicon suggests that each new generation has a design-in lifecycle of about 24-30 months. That is what we are seeing, especially with technologies like PCI Express. The latest connector demand report from Bishop & Associates⁵ shows a 4% decline in demand for 2.5/3.125 GHz connectors in 2007 and a 20+% increase in demand for 5, 8, 10 GHz connectors.

These constant enhancements to the silicon will cause customers to get on certain lifecycle curves at their market introduction, skip some product curves, and protect their hardware and software investments out to 3-5 years, if possible. In MIL/COTS markets, the users want a lifecycle of 10-15 years, which is already difficult to maintain. However, FPGA technology has allowed certain applications to gain longer equipment lifecycles by using software cores. This will continue in 2008, and the market for FPGA-based computing and interconnect solutions will grow dramatically as the generic silicon lifecycles compress.

"FPGA technology has allowed certain applications to gain longer equipment lifecycles by using software cores."

⁵ Bishop & Associates. [Online] 2008. www.bishopinc.com

Mergers and Acquisitions

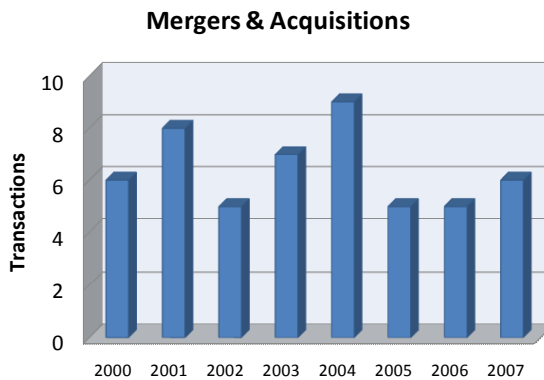
History of M&A in our Industry

I have been tracking relevant mergers and acquisitions in our industry since 2000. Over that time, our industry is averaging slightly more than six acquisitions/mergers per year. Of the 51 transactions I tracked, 40% were in MIL/COTS, 29% were in telecom, and the remaining 31% were in industrial market segments (or they were diversified into several market segments).

When I look at the multiple of sales (purchase price divided by annual sales) paid for these companies, I can see the average valuations. For the MIL/COTS transactions, the average multiple of sales paid for them (2000-2007) was 1.98 times sales. During this same period, the average multiple paid for telecom board companies was 1.35 times sales. But, averages can mask the trends.

Before the dot com and telecom bubble collapse, Intel bought Dialogic in 1999 for 2.66 times sales, only to sell it to Eicon Networks in 2006 (along with Intel's Media Server Group) for some undisclosed amount. Eicon is a private Canadian firm and did not have to report the financial details of the transaction. As for Intel, the amount involved in the sale of Dialogic was so small, they were not required to report the transaction details publicly. In 2000, Intel bought Ziatech for 3.43 times sales, only to sell it for less than 0.5 times sales two years later. The biggest transactions in 2007 were the sale of Motorola's Embedded Computing and Communications group to Emerson for 0.67 times sales and Intel's sale of their Modular Communications Platform group to RadiSys for 0.5 times sales. So, it is clear that prices for telecom board companies have declined to 20% or less of pre-bubble valuations. From the purchase multiples of the Motorola and Intel sales of business' that sell primarily commodity telecom boards and boxes, it is clear that their margins were well below 20%, possibly down to 10-12% based on some financial rules of thumb.

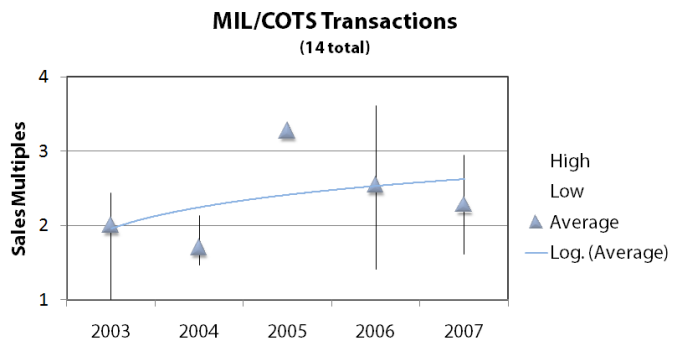
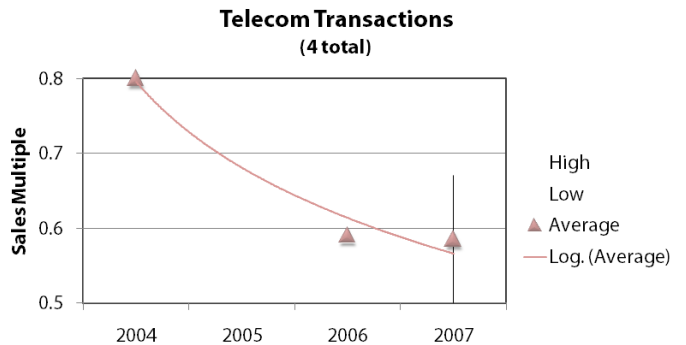
On the MIL/COTS side of the equation, valuations of companies in that segment are increasing (see MIL/COTS transactions chart). VME-based MIL/COTS companies are averaging over 2.5x sales multiples. Two recent transactions were the VMETRO purchase of Micro Memory for 1.6X, while Vecima Networks purchased Spectrum Signal Processing for 2.9X sales. Typical gross profit margins (GPM) for a VME MIL/COTS company run from about 30% (for pure COTS products) to over 70% for very specialized boards that can survive and operate in extreme environments. The average GPM for a company focusing on VME products in MIL/COTS applications is about 50%.



Reasons for Acquisitions

Mergers and acquisitions drive much of the change in our industry. There are a number of reasons that companies do acquisitions. Primary among them are:

1. To buy growth opportunities in other market segments when their present targeted market segment does not offer organic growth opportunities (i.e., telecom board makers buying MIL/COTS board makers).
2. Consolidation of market share in stagnant market segments with low growth and low margins (i.e., telecom board makers buying other telecom board makers).
3. Enhancing a company's position in an established, profitable, and growing market segment (MIL/COTS board makers buying other MIL/COTS board makers).



It is clear from looking at the exit multiples of MIL/COTS companies and telecom board companies that the margins are high in MIL/COTS and very low in telecom, as reflected in the multiples of sales paid for those companies. The reasons for telecom companies to be devalued, and for MIL/COTS companies, to increase in value are; 1) the relative stability of revenue streams, and 2) gross profit margins. Once a MIL/COTS board is designed-in to a program, there is a long stream of orders as that program goes to deployment. That order stream is typically not subject to rebidding. In the telecom segment, contracts may be renegotiated every order cycle, and since the products used in telecom are nearly pure commodities, the order often goes to the lowest bidder. MIL/COTS suppliers seem to have an “annuity” of orders and payments that are easily and accurately forecasted. That situation is much less dependable for companies in the telecom board segment.

In short, the lower margin telecom companies have faced a significant decline in valuation while the higher margin MIL/COTS companies have seen a holding or rise in valuations.

Mergers and Acquisitions in 2008

Looking at the future of M&A in this industry, conditions suggest that there will be business model transitions for many companies. I suspect that some companies in telecom will try to enter the MIL/COTS markets, through acquisition, to raise their margins, and to enhance their order streams with reliable orders. Potential buyers will want to take advantage of smaller companies who have a stake in the “reset” upgrade programs. That suggests that some of the telecom board companies will adopt a diversification strategy and buy companies in the MIL/COTS segment. Other companies will try to design product and enter the MIL/COTS market organically. We all know that the order cycle for MIL/COTS products is very long (1-2 years), and deployment shipments for awarded programs take another 1-2 years, for a total of 2-4 years for a design-in and shipment cycle. Not many companies can wait 2-4 years for a return on R&D investment. Consequently, to diversify and enter the MIL/COTS segment, acquisition of existing players would be more effective.

I believe we will see at least the average of six transactions in 2008. Most of the acquisitions we see will be to enhance the buying company’s existing position in one of the established and profitable market segments, primarily in the MIL/COTS segment. The prices of MIL/COTS VME companies will maintain about 3X sales (for a company with about 60% GPM). The values of commodity telecom board and box companies will stabilize at about 0.5 times sales (or about 10% GPM) unless those companies are bought at a pure asset sale, and that could push them lower than 0.5X sales. We may see some random acquisitions of telecom and industrial board makers, depending on economic conditions both in the US and in Europe.

From a macro perspective we saw Solectron sell out to Flextronics for 0.3X sales. According to my calculations, the evaluation of Sanmina SCI was 0.15X (market cap/sales). Since these contract manufacturers are heavily dependent on telecom equipment providers, this is further validation of the reduction in valuation of telecom equipment suppliers.

I will be following companies who diversify in 2008 and those who maintain a market-focused strategy. I think this market is in a mature phase where companies must evaluate the segments, and make decisions about entering, staying, or leaving certain segments. Those decisions will drive M&A activity, product development, and subsequent growth and gross profit margins for those companies for the remainder of the year.

“The reasons for telecom companies to be devalued and for MIL/COTS companies increasing in value are;

- 1) the relative stability of revenue streams, and*
- 2) gross profit margins.”*

“Potential buyers will want to take advantage of smaller companies who have a stake in the “reset” upgrade programs.”

VME Forecasts

Legacy VME

Nearing the end of 2007, I wanted a better gauge for VME shipments and the VME markets, worldwide. I contacted the major VME chip vendors and asked how many VME-specific controller chips they shipped in the past 12 months. The total from all sources was about 335,000 chips. If you assume that 10% of those chips are still on the shelf, in rolling inventory for future use, we can estimate that 300,000 VME chips were used to build 300,000 VME CPU cards. This, however, does not include companies who have their own VME interface technology and thus do not buy controller chips from the VME chip vendors. This is assumed to be a small percentage.

For the sake of estimating the size of the VME market I use an average selling price (ASP) of \$2,000 for a typical VME CPU board. I have to believe that average selling prices are actually increasing as VME becomes more of a broad niche product. Some of the big names that drove the price wars of the past have left the market, new players have entered, and the mix of market application segments has changed. Using the \$2,000 ASP, times 300,000 CPU's shipped in the past 12 months, the worldwide VME market, is about \$600 million for processor and intelligent I/O boards. But, that does not include backplanes, packaging, power supplies, carrier cards, mezzanine cards, and specialty I/O cards. I suspect that those additional product categories would result in another \$400 million in sales when you consider the number of companies in those product segments, the size of those companies, and the large numbers of products offered. This gives a total market size of \$1 billion.

Growth is difficult to calculate unless you know the sales numbers from a large portion of the suppliers (supply-side perspective). But looking at the demand-side, I would estimate that the VME market grew at about 11-13% in 2007. And, I think it will grow by a similar amount in 2008. This prediction is based on the mix of industry-segment demand for VME. From my perspective, I believe that VME market demand is about 50% MIL/COTS, with 25% in high-end industrial applications, and the remaining 25% in all other segments (medical, transportation, mining/drilling, etc). I believe that 80% of the demand for VME32 and VME64 products are for legacy applications. These applications are hard real time in nature, and there are no other architectures or technologies in the market that can provide the required level of determinism. Consequently, the customers maintain the use of these VME products and their software. The increased reset budget in the DoD helps to support my predictions.

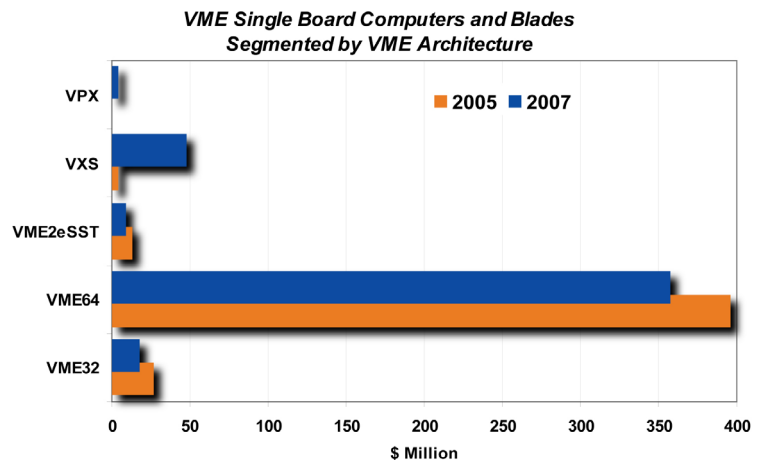
New VME Technology

I see a number of our members receiving orders for VXS and VPX switch fabric-based products. My estimate of the VXS market in 2007 was about \$35-40 million in sales were transacted. The VPX market was developing last year as new programs took delivery on boards for testing and evaluation (about \$5-10 million in my estimation). I expect to see VPX sales top \$20-30 million or more this year, depending on funding for these new platforms and programs for field testing.

Market Research

VITA and its members work with several VITA Media Partners to provide guidance in the trends and size of the VME markets. Venture Development Corporation (VDC) and Electronic Trend Publications (ETP) both provide data to VITA to share with the industry.¹

1 Market Overview for VME Technology. [Oline] 2008. www.vita.com/mktoverview.html



Source: Venture Development Corporation, 2007

Forecast Summary

Again, from my perspective, I see about 80% of the total VME demand in 2008 coming from legacy customers, especially from the military “reset” programs. And, I see 20% of VME demand coming from new platforms, new upgrades, and new programs ready to use fabric-based interconnects, liquid cooling, and VPX REDI capabilities. If you assume that the VME market in 2007 was \$1 billion, and will grow by 10% in 2008, the worldwide market will then be \$1.1 billion. Legacy demand (VME32 and VME64 products) are estimated to be about \$880 million, and demand for the newer enhanced VME products (VXS, XMC, VPX, REDI, etc) would be about \$220 million (including packaging, I/O cards, mezzanine cards, cooling components, etc).

Risk Management

ITAR

As many of our members are aware, I see an increased concern with ITAR (International Trafficking In Arms Regulations). Many board level products are designed and used in sensitive military equipment.

The US Department of Commerce, Bureau of Industry and Security⁶ maintains a list of restricted countries and people, to where identified technologies and products may not, for security reasons, be shipped. The US Department of Justice, in 2007, installed a new export czar, Steven W. Pelak⁷, to oversee investigation and prosecution of ITAR violators. Increasing tensions with some countries (e.g. Peoples Republic of China), and their military build-up, has increased concerns about shipping advanced technology into those countries. There are other countries, either with nuclear weapons or trying to design such weapons, that raise concerns further.

For this reason, VITA's Board of Directors adopted our IIEPP (International Information Exchange Policies and Procedures) in 2007.

VITA, and our members, must comply with the ITAR, export, and information exchange rules as long as these security concerns persist. One product of a VITA member was found in a restricted country, and that member endured weeks of investigation and oversight. The investigation found that the member company had acted legally and properly, but a third-party in Europe had sold and shipped that board to the restricted country. The disruption of that company's business, people, and customers was devastating. I believe that the ITAR investigations and inquiries in our industry will increase in 2008, and our members should be vigilant and insure that they are in compliance with all export rules.

“The disruption of that company's business, people, and customers was devastating.”

Patent Policy

In 2007 VITA adopted ex ante (before the completion) disclosure patent policies in our VSO standards group⁸. Our policies state that during the development of any VITA standard, anyone who has a patent, or patent application, on essential elements in that standard MUST disclose that patent or application and to also disclose a maximum royalty rate.

⁶ Bureau of Industry and Security. [Online] 2008. www.bis.doc.gov

⁷ “Justice Department Appoints National Export Control Coordinator as Part of Enhanced Counter-Proliferation Effort”, [Online] 2007, www.usdoj.gov/opa/pr/2007/June/07_nsd_440.html

⁸ VITA Standards Organization Approves Changes on Disclosure and Licensing of Patents. VITA. [Online] 2007. www.vita.com/disclosure

Ex ante gives protection from patent ambush, making things fair and equitable. The VITA Standards Organization has been operating under these ex ante rules for over a year now, and we have seen several disclosures made on standards now in development.

As you also may know, ANSI approved these new policies, and Motorola appealed that decision in 2007. The ANSI Executive Standards Council (ExSC) Panel heard the appeal and found in VITA's favor. A second appeal was made per the ANSI appeals process to the ANSI Appeals Board, the supreme court of ANSI. On January 22, 2008 ANSI upheld their decision that VITA's ex ante policies do not violate ANSI Essential Requirements, or ANSI patent policies. This decision has made history. We are the first accredited standards developer in the world to adopt such patent policies, have them accepted by the VITA Standards Organization, endure formal antitrust agency review and then both review and appeals processes within ANSI. Others will follow us and adopt similar patent policies in the US, in Europe, and elsewhere around the world.

Green Initiatives

During 2007 the ball began rolling on initiatives that address environmental concerns. With global warming on everyone's mind, more initiatives will emerge to reduce the impact of electronics on our environment.

The implementation of regulations about RoHS (Reduction of Hazardous Substances) will continue to cause confusion and chaos in the supply chain, and difficulties for the systems and board designers. Integrators will be particularly vulnerable to hybrid board-level products (i.e., a mixture of products, some of which are RoHS compliant and others that are not) and a potentially higher level of new and unanticipated system failures.

Summary

I am optimistic about our industry and its prospects in 2008. But, I am less than optimistic about certain market segments and where they may lead certain companies (as we have seen in 2007, where some of the largest suppliers sold-out). There are great opportunities and possibilities in this industry. But, they are in the niches. The board market is too fragmented and certain segments are too depressed for a mainstream to develop in 2008.

The following are what I think are some of the key highlights of things to come in 2008.

- *Board vendors will be more dependent on new orders from legacy customers than on new orders from new customers in 2008, more so than in previous years. This may be true across several market application segments. If I am correct here, this will drive most of the M&A activity, and will also drive most product development in 2008, especially for companies who focus on a market segment, and a short list of customers in that segment.*
- *Because of ITAR and National Security concerns, the MIL/COTS board segment will be relatively immune from offshore manufacturing and commodity pricing, especially in many critical defense system applications. New testing, evaluation, and qualification requirements (particularly from the US Army and US Navy) will raise barriers to entry, as well as raising costs for the incumbent suppliers.*

“Ex-ante gives protection from patent ambush, making things fair and equitable.”

“Others will follow us and adopt similar patent policies in the US, in Europe, and elsewhere around the world.”

- *New board and systems designs in the MIL/COTS and critical segment will continue to be driven by SWaP (Space, Weight and Power) requirements. Non-critical market segments will continue to be driven by price, even with faster processors and interconnects coming to market. Many new high-end critical embedded systems designs will begin migration to more advanced cooling techniques, especially liquid cooling.*
- *In the standards arena, companies who participate have moved from a “we” perspective (let’s all build a large market for this technology), to an “us” perspective (let’s build a market for OUR technology implementations), to a “me” perspective (let’s use the standards process to create a market for “my” technology implementation). That is the primary reason that the embedded board markets are so badly and terribly fragmented. And, it is the germ that will kill this industry, unless we move at least back to the “us” position.*
- *We may see a shift in this industry from being purely technology driven to a market segment driven business. Market segment choices will take an equal position in determining the business strategy of the winners in this industry. Innovation, in the board and systems industry, may shift from a product or technology-driven focus to new business models, target market strategies, and specific customer-centric efforts. This has been developing for several years, some companies have made this transition already, and this trend may accelerate in 2008.*