



Technology Brief...

November 30, 2007

J.Gold Associates LLC, 6 Valentine Road, Northborough, MA 01532
www.jgoldassociates.com 508-393-5294
Research, Analysis, Strategic Consulting

Workstations for the Masses

INSIDE THIS ISSUE

- 1 Workstations for the Masses
- 2 Mega-Carriers: the Next Wave?
- 3 Google Goes Mobile – or Maybe Not?

Technical Workstations have been a mainstay of engineering, architecture, medical, automotive, aerospace, energy, and related industries for decades. These high powered and generally expensive machines are used for extensive mathematical modeling and graphics processes, and until the last few years were often expensive, bulky and created with proprietary processors and other hardware components (e.g., Sun, SGI, HP, IBM). It has only been in the last 3-4 years that the traditional PC platform has become powerful enough to capture a substantial portion of the engineering marketplace from its more proprietary forbearers, lowering the price and expanding the market with new form factors (e.g., notebook based workstations) and new players (e.g., Dell, Compaq/HP, Gateway, Lenovo).

In the past, PC-based workstations have been a relatively small niche of the overall PC market (<5%), and provided by the biggest enterprise-focused players (Dell, HP). The specialized hardware (e.g., fast internal bus, greatly expanded memory, multiple processors, high end graphics systems) meant that the price and capability of these machines was beyond the budget of most casual users (e.g., \$10K-\$15K+). However, we believe we are in the early stages of a transition, with traditional engineering workstations being configured and priced for much wider adoption. Powerful commodity processors and the lowered cost of memory and graphics subsystems can produce a capable entry level workstation for well under \$2K. But it remains difficult for many users who might consider such machines to actually determine what benefits those machines could provide. It is equally difficult to purchase and configure those machines with the appropriate HW/SW. We expect vendors to change this reality over the next 2-3 years, and a marketplace to emerge that will substantially increase the number of workstations sold, while also blurring the lines between high end PCs and true workstations.

“... Vendors who have sold PC-based engineering workstations in the past are looking for ways to lower price and expand the market. With commoditization, prices are dropping low enough to make these machines attractive to a wide range of individuals and small business users....”

Much of what is driving the change is the adoption and standardization of high end processors (e.g., quad core chips from AMD and Intel), and the affordability of large amounts of memory (typically 32GB or greater depending on the application). Further, high end graphics, traditionally only available as an add-on card, are being miniaturized to the chip level (although the truly high end graphics required of many traditional design applications are still only available on a specialty card). We expect both AMD (which recently bought ATI) and Intel to increase their emphasis on building chip-level high end graphics subsystems, and that within the next 2-3 years, these chips will achieve levels of capability that will encompass 75% of traditional workstation requirements. Vendors will further upgrade internal bus architectures such that memory to processor and graphics subsystem bottlenecks will be much less of an impediment. Finally, software, the

Achilles heel of most deployments, will improve and become available for full multi-threaded use across multiple cores (we expect a migration from the current mainstream quad core to 8 cores within 2 years). We further expect that Linux will take a majority share of the high end technical workstation platform market, but that off-the-shelf applications running on Windows systems will dominate the small to medium business and personal use market.

The competition for PC-based technical workstations is heating up. Lenovo recently announced that it has entered the workstation market due to demand from its customer base, joining HP and Dell to compete for the business (we do not expect Sun to compete directly in the volume PC-based workstation space, and IBM is exiting the workstation business). We expect Acer, Toshiba and others to enter the expanding market in the next couple of years. However, in order to expand this market, the vendors must create a larger, more complete ecosystem than is currently available. Solution-based systems for particular needs will be configured for an off-the-shelf sale and channels of distribution will be expanded to include more traditional retailers (beyond the current specialty VARs).

We expect the entry price for capable workstations to drop to under \$1K within 2 years, making them highly affordable for not only business but for personal use as well (e.g., video editing, animation and graphics, gaming, etc.). This will be driven by the commoditization of chips and components, and the lowering of the substantial margins vendors are currently obtaining with their premium pricing.

Bottom Line: Vendors who have sold PC-based engineering workstations in the past are looking for ways to lower prices and expand the market. With commoditization, prices are dropping low enough to make these machines attractive to a wide range of individuals and small business users. However, unless the vendors do a better job of building out an ecosystem that includes both applications and distribution channels, they will end up stifling what might otherwise be a significant expansion of the marketplace. Specific “productivity suites” targeted to specific platforms and marketed to specific constituencies (e.g., types of users and/or vertical markets) are what is required and where vendors should focus their efforts over the next 2-3 years.

Mega-Carriers: the Next Wave?

North American wireless carriers are facing a new reality. Their monopoly hold on the customer experience (the “walled garden”), and the severely limited ability of its customers to change to other networks (thus incurring a hefty cancellation penalty) are coming to a gradual end. Indeed, the subsidized model, where customers receive a major cost reduction on their phones (as much as \$200-\$300) in return for signing a long term contract, motivates customers to go to the carrier to purchase a phone. This dramatically limits the variety of phones available to the customer, since only carrier selected and approved phones are offered for sale, and even results in exclusive deals (e.g., AT&T being the only provider of the iPhone service in the US). It also means carriers are free to custom configure their devices, including limiting them to certain features and capabilities chosen by the carrier, often to increase revenue and limit choice, rather than maximum user benefit.

“...we believe that the consolidation in carriers across country borders is inevitable. While there are certainly country-specific regulations that might stand in the way, economics will drive the Mega-Carrier phenomenon.....”

Customers have grown accustomed to the subsidies and low costs associated with new phone purchases. But we expect that carriers, seeking improved profit margins, will act to gradually phase out such subsidies. Further, users are clamoring for new devices as soon as they are released, but often they are not

available from their carrier. Being able to provision customer-chosen devices will become a key consideration for many users in choosing a service provider within the next 1-2 years, especially with the proliferation of newer high-end smart devices (we expect that many low end phone users with limited service needs to remain within a subsidized service model). Most parts of the world have allowed customer device selection for some time, requiring simply that a SIM card be purchased and placed into a GSM-compatible device. Verizon Wireless (VZW) recently announced that it will open its network and provide access to any device (although it must pass their testing first, a process which has yet to be defined). For more detail on this major change, see our recent *Technology Current*, "Verizon Wireless Opens Up".

VZW also recently announced that its next generation "4G" network plans will take it in the direction of the GSM-sponsored LTE (Long Term Evolution) technology and away from the UMB (Ultra Mobile Broadband) 4G technology sponsored by Qualcomm (the creator and primary IP holder of CDMA technology upon which the current VZW network is based). We believe that VZW adopting LTE makes it attractive for VZW and Vodafone (with an approximately 45% stake in VZW) to ultimately merge their operations (Vodafone runs on the GSM network). International competition and new technologies will require larger scale and more efficiency. And universal, standards-based networks, powered by IP compatibility with the current Internet, will re-structure carriers from country-localized (primarily) into worldwide and/or regional mega-players. This will take 5-8 years to play out, but we expect to see some far ranging multi-national players, including some that are just surfacing from the emerging markets. This is a logical extension of what is already taking place in most countries; larger carriers acquiring smaller ones, and leaving only 3-5 players owning the vast majority of the base. Such economics of scale will ultimately play out across international borders as well.

Bottom Line: VZW's intention to move to LTE for its next generation networks is an indication that the consolidation in carriers across country borders is inevitable. While there are certainly country-specific regulations that might stand in the way, economics will drive the Mega-Carrier phenomenon. VZW's announcement also bodes ill for Qualcomm's 4G plans. VZW is its biggest customer, and VZW's acceptance of LTE as the future (even though that future is 7-10 years away from full implementation) means other players may not consider going with a Qualcomm UMB 4G upgrade (although there is still some hope that LTE will be able to bridge the CDMA and GSM worlds).

Google Goes Mobile – or Maybe Not?

Google recently announced Android – an "Open Source" operating system for mobile devices. In essence, it is a user interface layered on top of a Linux kernel that, through open source licensing, allows anyone to develop apps for this environment, and in theory at least, ignore the hardware it is running on. With approximately 30 signatories to this initiative (e.g., Motorola, Samsung, HTC, Sprint, T-Mobile, DoCoMo, KDDI, Intel, TI, Qualcomm), Android is meant to democratize the mobile environment by expanding the ecosystem and providing common means to deploy across multiple device types. We applaud Google and the other members for trying to achieve openness and compatibility in a highly fragmented and closed mobile phone ecosystem that has stifled innovation and allowed the phone makers and carriers near monopoly control over what users see and do on their devices. There is no question that Google has substantial influence (and "deep pockets"), but despite the backing of the Open Handset

"...We remain highly skeptical that Android will ultimately provide the true open platform and industry that its supporters believe it will.... Many questions about Android still need to be answered....."

Alliance members, we remain skeptical as to whether Android can meet its stated goals of opening phones to a wide array of applications compatible across multiple hardware implementations. Hype aside, we do not believe Android changes the smart phone market very much, for the following reasons.

First, we expect the majority of smart phones in the next 3 years to be powered by Symbian, primarily through Nokia (S60/S80) and Sony Ericsson (UIQ). Indeed, we expect Symbian based systems to control 50%-60% of the smart phone market in 2010/2011, Microsoft Windows Mobile 15%-20%, RIM 8%-10%, Apple 3%-5% and Linux 10%-15%. Android could accelerate the deployment of Linux-based smart phone devices, but will have no substantial effect on Symbian, Windows Mobile or BlackBerry devices (vendors of these OSes are unlikely to support Android).

Second, how will a robust eco-system develop? Does Google plan to push its weight around to get apps marketed, deployed and supported? Who will test that the apps actually work on all phones (far harder to assure compatibility across all phones than across all PCs, which are essentially the same). This is an important issue, as hordes of badly written apps that cause end user problems is a major "Achilles Heel" of any widely deployed open source environment.

Third is the proverbial "chicken or egg" effect. Will apps drive adoption of large numbers of Android devices, or the other way around? Developers want lots of target devices before making an investment, but device manufacturers want a large app ecosystem to drive volume device sales. Neither J2ME nor BREW has been overly successful in pushing adoption of open devices, though both have similar goals as Android (play on any device with their technology). J2ME has had limited success in cross platform app compatibility, but as a secondary effect (i.e., most users don't buy J2ME devices; they buy devices that include J2ME).

Fourth, how will Google monetize this? If they can't ultimately monetize it (after all they are a capitalist enterprise) they will lose interest and Android will fade (it is unlikely Android can build enough critical mass to survive on its own without a strong supporter with deep pockets - there are too many competitors already established). So what is Google's end game? Will it be add driven? Google web component powered? Will Google somehow steer it in its own direction?

Finally, the degree of difficulty in making this work is staggering. With so many different types of smart phone devices (e.g., different screen sizes, computing and memory resources, navigation styles, connection capabilities) it is unlikely that "one size fits all" will actually work (unlike the PC environment where virtually all machines are basically the same). As many vendors have discovered, building a good quality wireless smart phone operating system is very difficult (e.g. usability, robustness, cross processor support, security, performance).

Bottom Line: We remain highly skeptical that Android will ultimately provide the true open platform and industry that its supporters believe it will. It may apply some initial pressure on apps and some manufacturer's devices, but unless it grows quickly with large numbers of devices and users, there is no real incentive for carrier support (even though some have joined the alliance). Further, since Google is the primary driver, it is unclear whether consumers will be as enamored with this once they discover the amount and type of information Google might ultimately acquire about them and the control it may exert. Many questions about Android still need to be answered.



J. Gold Associates, LLC

6 Valentine Road
Northborough, MA 01532

Phone:
508-393-5294

Web:
www.jgoldassociates.com

*Research, Analysis,
Strategic Consulting*