



XYZ,

Thanks for the opportunity for Strategic Advisory Services to review the technologies reflected in the *ABC Company* portfolio. I have organized my remarks around the asset classes, with some general remarks at the end.

Desktop PC units

- ❑ **Business Professional/Elite class:** The logical successors to the HP DC7900's were the 8100 Elite models, but ABC should consider skipping the 8100's (introduced in 2010) and investigating the newer 8200s instead. The 8200s have the 2nd generation Core processors, offering vastly superior performance. The SFF models still have one serial port standard and a parallel port optional, as well as the DisplayPort for monitors. ABC should avoid the i3 and lower-end i5 configurations, and look first at the i5-2500 and i7 models (for future 'stretch' of the platform). Any of the AMD graphics boards will be adequate for normal business needs.
- ❑ **In the Business Advanced class:** ABC seems to be moving all the older 5800s and 6000s to the 6200 series. They have spec'd the i5 processor model, which provides good headroom. The 6200's still have the legacy ports (ie, PS/2, serial) they might need.
- ❑ **In the Workstation class:** I cannot tell from the data where ABC might be on the refresh. The two models that I see (the older z200 with the X3440 and the newer z400 with the W3550) are both probably ready for refresh, but ABC would not have to move up to the z600 to get increased performance. If you look at this comparison table between several models of z400 and z600, you can see that processor release date and performance-per-core are not closely correlated. This suggests that ABC could move to a higher-processor model of the z400 line, at a probable lower price point than having to move to the newer z600. The z600's have some additional stretch (and would outperform the z400 in different benchmarks, no doubt) but this table shows that ABC has some additional flexibility for their next refresh of the workstations.

Processor	Model	CPUMark	Cores	PerCore	Release Date
W3550	Z400, Mid-Tier	5,623	4	1405.75	August 9, 2009
E5667	Z600, High-Mid	6,313	4	1578.25	March 16, 2010
W3670	Z400, High-Mid	7,927	6	1321.17	August 29, 2010
W3690	Z400, Highest	10,165	6	1694.17	February 14, 2011
E5649	Z600, Mid-Tier	6,299	6	1049.83	February 14, 2011
X5675	Z600, Highest	10,400	6	1733.33	February 14, 2011

Notebook PC units

- ❑ It looks as if ABC is already moving toward the Lenovo T420, with a high-mid tier processor (i5-2540M). This is a good unit for the future. The QM67 chipset from Intel supports all the newer management silicon (eg, anti-theft, virtualization). ABC might also consider an i7 option for some of the more demanding user populations.
- ❑ The main choices to work through on laptops today have to do with (1) Intel HD or discrete graphics; and (2) SSDs, HDDs or hybrids. The HD versus discrete graphics choice is affected by application requirements, cost, and future-proofing philosophy. For any customer-facing usage, I would suggest looking first at the discrete graphics features for a subset of those units. Memory configurations for units using Intel HD internal graphics need to be slightly larger (especially with larger displays being driven off these units in docking stations), since some internal graphics features use main DRAM as a supplementary memory pool.
- ❑ The SSD/HDD drive choice is affected by cost, capacity needs (eg, SSD drives are still very low-capacity relative to HDD options), performance requirements, and their comfort level with using this newer technology.
- ❑ Since laptop refresh cycles are more driven by wear-and-tear than technology advancements (with the obvious exceptions of weight and battery life!)—resulting in 24 month typical refresh cycles—ABC would not need to ‘buy high’ with these units. In other words, they need only buy capacity for a 24 month performance demand curve than for a 36-48 month upward curve. This will allow them to keep the price point down (since they are not paying in advance for capacity not in use for at least 2 years!). They will, of course, still have to monitor display interface technology changes, even for this shorter window.

Display units

- ❑ The issue of display technologies and their connections is actually a more complex (and therefore potentially a more expensive and/or disruptive issue). Connection types, interface protocols, and enhanced intelligence in monitors and connectors present new opportunities and new challenges for the next wave of refresh. Making sure our desktop and laptop computers have adequate graphics chip/card capability (eg, how many monitors at what resolution can we drive and do we lose any desired Aero/GUI features in the process), modern interface silicon (eg, DisplayPort 1.1 versus 1.1a versus 1.2), and that our monitors can exploit this capability (eg, HDMI with Ethernet, daisy-chaining of DP monitors) will require some analysis and planning.

- ❑ This basically means that the following items need to be checked with the vendor for each corporate-standard configuration of systems, docks, and monitor(s):
 - Which versions/types of interfaces does the computer system come with? DVI-x, HDMI, DisplayPort?
 - What types of inputs does the monitor have—and what versions of the protocols? (DVI-x, HDMI 1.4a, DisplayPort 1.2)?
 - Are enhanced cables needed (e.g. HDMI with Ethernet, rated at least at 6.75Gbps; DisplayPort for daisy chaining of monitors?)
 - What is the performance impact upon the computer system for running these enhanced capabilities (eg. DP 1.2 can daisy-chain two monitors at 2560x1600—but how will this effect system performance in your applications)?

- ❑ One additional complicating factor is the move (driven mainly by flat panel manufacturers) from 16:10 to 16:9 screens. Although largely driven by the market for HD entertainment devices (using 16:9), the economics of manufacture are creating strong cost advantages for laptop and display makers to ‘push’ 16:9 screens. This can be a problem, however, for applications which need the additional clarity of the 16:10, or which represent graphical data in visual formats (eg, forecasting, BI, modeling). Curves will look slightly different than what a worker might be accustomed to (at first). This difference also needs to be checked when looking at using 16:9 monitors on 16:10-optimized graphics adapters. Field reports indicate that some mixes of mid-tier graphics chips and 16:9 monitors do not yield the color quality or image precision that can be obtained from a HD-centric graphics adaptor. This needs to be factored into refresh evaluation and planning.

- ❑ Of course, we also have the possible issue of interface converter adapters. The HP specifications page for the 6200s and 8200s, for example, list optional ‘DisplayPort to HDI’, ‘DisplayPort to DVI’, and other type of ‘converter’ options for some of the models—all of which require expense, administration, and logistics.

- ❑ Also needing consideration is the use of audio/speakers to/from the monitors. Some monitors have speakers, webcams, and microphones. Managing open-office noise requires some thinking about how much PC-based sound can be used/allowed. If speaker capabilities are not to be used (except in special configurations or in enclosed offices), then models without speakers should be looked at—and pricing be negotiated with the vendor accordingly.

- ❑ One general trend—and ABC might already have adopted this—is the move to multiple monitors rather than simply one larger monitor. We are seeing more desktops with dual 22-24” monitors rather than those with a single 30” display. For laptops, this can be facilitated by either a docking station with additional video ports, or by USB-based adapters (eg, pluggable.com’s DisplayLink/USB

connector).

- This multiple monitor scenario requires that desktop systems have two video outputs (e.g. VGA and DP—as in the 8200s and 6200s) and that both monitors can be driven at the required resolutions. For example, you cannot push 2650x1600 through a standard VGA adaptor, but you could drive two of them through a single DisplayPort 1.2 technology (assuming the monitors were built to that specification also). Dual monitor setups should probably be added to the permissible configurations within corporate IT standards, but only after configuration validation and stress-testing under different graphics loads.

Those are the comments that came to mind while reviewing their desktop, notebook, and display equipment lists.

Some of the above issues might not be relevant to ABC—they are based on my experiences at many large enterprises both similar and dissimilar to ABC—but they should at least be noted early.

I will begin reviewing the other parts of the equipment portfolio early next week.

Thanks again for the opportunity to help you help them, and I look forward to working further with you, in applying Macquarie's value to their successful use of technology finance for business success.

Glenn M. Miller (Nov 2011)
VP, Strategic Advisory Services
Macquarie Equipment Finance