



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 this document reviewing the **storage** components.

I cannot actually tell from the limited portfolio data what the storage architecture looks like. There is a Cisco Fibre Channel SAN director (MDS 9513), some pieces of various older HP StorageWorks and/or Smart Array configurations, and various hard drives/controllers. I will have to limit my comments to the individual components, since I cannot tell how they connect and/or interact. I will also add some general comments about storage technology developments and management issues.

Storage Components: Cisco MDS 9513

- This is a steady, venerable SAN director unit which has been out in the market for quite some time. It is still very viable, as long as the components within the box are refreshed periodically. The data I have shows a Fabric2 module for this unit, which was superseded—but not obsoleted-- by the Fabric3 module back in the summer of 2011 [when the required MDS NX-OS Release 5.2(1) was released].
- The Fab3 module cannot coexist with the Fab2 module except during the migration process, so ABC would need to be sure that the MDS box is still the best option for them before acquiring and implementing the next generation Fab3.
- The 24port FC switch module also has newer Gen4 versions available, in the 48port 8GbFC and 24port 8GbFC modules.
- If the HP FC1242SR HBA is used to access the storage behind the MDS (and not some HP/other FC infrastructure), then it might be reviewed for an upgrade to an 8G FC option (from HP or other OEM). It is an older unit and still uses the slower version PCIe. If the rest of the SAN architecture stays at 4GbFC, then this HBA would still be usable, but not scalable.
- If the performance, security, and capacity demands upon the MDS-based SAN are growing substantially (or is expected to grow substantially), then ABC might consider evaluating a Brocade alternative too. In the pure FC world, Brocade is still often the first technology to look at—Cisco does not have the dominance in this market that it has in core switching and enterprise routing. Since FCoE adoption is spotty at best, most of us are still committed to keeping our stable FC environment separate from the production Ethernet environment and so the integration values of a Cisco are less relevant there, compared to traditional SAN features, performance, and cost-effectiveness. Such an evaluation might also prove useful in vendor negotiations and competitive pricing scenarios.

Storage Components: HP equipment

- ❑ The StorageWorks arrays are fairly old, with the MSA50 and MSA70 two generations old. These systems were designed for small offices, so they might still be feasible—if service can be ensured for them, and existing management software can recognize them. The second-generation G2 array (MS500) was apparently terminated, but I cannot find what it might have been replaced with. The Gen 3 MSA boxes are very powerful, flexible, and inexpensive, so they are good alternatives for the older gear, as needed.
- ❑ The HP P800 SCSI controllers are still solid performers, but ABC should note that these units are also a generation behind in the core technologies. The P812 RAID controller is its basic replacement in the HP lineup:

Feature	P800	P812	Current Technology
SAS transfer rate	3 Gbps	6 Gbps	6G Gbps
PCIe version	1.1	2.0	2.0/3.0
Memory	DDR2	DDR2	DDR3
Cache	512MB	1GB	-
Ports	16	24	-

General Considerations

- ❑ Storage architectures are in flux right now, with IT shops trying to find the right configuration of storage for manageability and for application availability. Here is a short list of the issues in the forefront today:
 - Use of SSD drives, 16Gb FC, and 10Gb iSCSI in arrays
 - Various flash-based designs (eg, Fusion-io, EMC Project Lightning)
 - Distributed cache designs in DRAM of clients (Viking) or servers (Nevex)
 - Return to Direct-attached storage models (especially for SSD RAID configurations)
 - Modular trade-offs (eg, latency versus flexibility)
 - Commodity components (eg, x86 versus ASICs, EMC RapidIO-based fabric, IBM XIV)
 - Auto-tiering designs
 - Storage virtualization (eg, HDS) and I/O virtualization (eg, NextIO)
 - All-SSD NAS (eg, Violin, TMS)
 - Scale-out file systems (eg, Isilon)
 - Integration with and exploitation of VMware APIs and features
 - Massive data volume increases (eg, social media, sensor nets, mobile users)
 - Vendor lock-in in tightly integrated hardware-software stacks (e.g. Exadata)

- ❑ Storage architectures support data architectures, of course, and so the latter might dictate different storage architectures for different business apps. Data architectures built to support highly parallel and intense access rates (eg, web lookup uses) might require scale-out / cluster-type designs instead of the familiar dual-controller unit. Other data usage profiles might require large cache capacity (eg, iterative or recursive algorithms) like the deep-cache data warehouses or large EMC/HDS arrays. These data architectures generally dictate server designs and configurations as well.

- ❑ Data lifecycle planning is also having a major impact on our storage plans. The need to factor both **archive** (legal), **recovery** (operational), and **refresh** (economic) demands into our capacity planning, is driving discussions about massive tape usage, hardened archive-only systems, cloud storage instances, data tags for data transit tracking (compliance), all the compression technologies used for reducing storage footprint and reducing WAN costs/latency, and cost-minimal continual refresh processes.

Those are the comments that came to mind while reviewing the storage equipment lists.

Some of the above points might not be relevant to ABC—they are based on the limited data I had to work with—but ABC should at least ‘check them off’ to be sure they have been considered and discussed internally.

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.

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