

# **VICOM SYSTEMS, INC. -- ITS TECHNOLOGY AND BUSINESS POTENTIAL**

By Laird Durham

During the past five years, Vicom Systems, Fremont, California has developed an intelligent network to connect computers to storage equipment in a centrally managed virtual pool. The Vicom technology is unsurpassed, performing what one *Storage Magazine* writer calls "the unthinkable". With a Vicom network, pools of storage serving independent workgroups, with servers and storage of differing types and brands, can be consolidated physically. Vicom technology makes it possible for the workgroup to maintain independent control of its files, as it does now, with a workgroup interface, while the consolidated storage is efficiently managed centrally at the disk level with an organization-wide interface.

All of the information in this paper is in the public domain, or is my own personal opinion. You may read about Vicom at <http://www.vicom.com>.

## **WHERE THE DATA STORAGE INDUSTRY STANDS**

As you may know well, the value of shipments of computer data storage equipment has been growing at more than 20% per year. The value of storage shipments now exceeds the value of computer shipments. Storage shipments flattened during the past two years, but did not decline, as did the shipments of computers and most other industrial equipment.

The high demand for data storage by every sector of the economy, from manufacturing and finance to government, has created serious problems among the Information Technology (IT) managers, who are the end users of data storage. Personnel costs to manage data storage have become burdensome. Unconnected, unrelated, workgroup-based pools of storage scattered throughout an enterprise use capital inefficiently. Data access and business continuity both are harder to ensure.

For the past four years Storage Area Networks (SANs) based on FibreChannel switches and cables have promised to bring the unchecked growth of data storage under control by consolidating and centralizing data storage. But so far, SANs have not delivered on that promise.

The benefits of consolidating and centralizing storage through SANs are well known and understood. They are:

- Efficient use of storage capacity;
- Reduced personnel costs;
- Improved organizational access to data;
- Business continuity through automatic data backup (mirroring and remote site back-up);

- Ease of management and monitoring; and
- Scalability.

Those benefits are so compelling that every computer industry analyst has been forecasting SANs to penetrate at least 75% of Fortune 500 companies before the middle of the decade. But after a promising start with the deployment of high-speed FibreChannel networks, the installation of storage-consolidating SANs has slowed.

The reason for the disappointing growth of SANs is that no server or storage OEM has focused on HOW to deliver those benefits in a multi-vendor, consolidated environment. OEMs focus on selling new servers and storage arrays through traditional business partners and resellers. The OEMs have developed higher performance equipment and deployed it in higher speed unconsolidated FibreChannel networks. They have developed data security procedures and safeguards, and increased capacity, but in a monolithic, non-scalable, proprietary manner.

Neither the OEM's resellers nor the IT end users have as yet developed the skill to consolidate this diverse storage under centralized management.

## **WHAT THE STORAGE END USERS NEED**

IT managers are responsible for infrastructure deployment and maintenance of data centers. Their baseline considerations are reliability, ongoing management and maintenance, and adaptability to new requirements and applications. Their workgroup clients, the application or business unit managers, are reasonably satisfied with the storage that is tightly coupled to workgroup application servers in a distributed environment. Consolidating the storage in a central pool would benefit the IT department, and the organization as a whole, but may not offer immediately apparent benefits to the client workgroups. For that reason, FibreChannel SANs, and earlier attempts at consolidation with Network Attached Storage (NAS), are being deployed mostly in a distributed, unconsolidated manner. SAN's benefits over NAS are substantial: speed, scalability, remote back up, and operation on a separate network that does not burden the LAN.

Yet despite all of the technological development of the past five years, the storage and server OEMs are not giving the IT managers what they need to consolidate storage in a manner acceptable to workgroups and IT managers.

This is what workgroups and IT managers want:

- Independent administration of workgroup files with a workgroup interface.
- Central management of physical storage resources, both distributed and centralized, with an organization interface.
- A single point of control of resources, with the ability to assign storage resources remotely and on demand from a central pool;
- Business continuity (no down time) with self-healing networks;

- Automatic fail-over for all equipment within each logical level -- servers, server HBAs (Host Bus Adapters), Fibre Channel switches, routers, and disks – to avoid performance impacts and down time should equipment fail.
- File-level management by policy to control and map file and block information.
- Easy expandability with lowest cost servers and disk arrays;
- Investment protection and utilization of legacy equipment and infrastructures;
- On-line data migration from legacy to new equipment;
- Assurance of SAN vendor continuity; and,
- Vendor services, such as a help desk.

If they can have those things, then IT managers and their workgroup clients will embrace storage consolidation. They will be able to centralize storage management with virtually no comprise to their existing environments. The benefits to the workgroups and the company as a whole would be more apparent.

Although the servers and storage arrays the OEMs are delivering are SAN-capable, the OEMs have been ineffective in overcoming the barriers to consolidating and pooling storage equipment. Present deployment of SANs primarily offer connectivity, not consolidation management. Because connectivity alone is not a compelling value-added proposition the price of data storage equipment has dropped rapidly. Once high-riding companies such as EMC are struggling to make a buck, and are watching their share prices fall to the basement.

## **VICOM SYSTEMS PROVIDES WHAT BOTH IT MANAGERS AND STORAGE OEMs NEED**

Vicom Systems has developed the technology to make it possible for the storage and server OEMs give the IT community what both IT managers and workgroups want, and simultaneously permit the OEMs to offer differentiated solutions. The technology is implemented in a Storage Virtualization Engine (SVE), made up of hardware, firmware, and software.

Two or more Vicom's SVEs form an intelligent network to connect servers with storage, wherever the storage is located, and integrate the storage into a centrally managed virtual pool. The storage looks to any server as though it were directly attached. RAID (Redundant Array of Inexpensive Disks) and JBODs (Just a Bunch of Disks) racks, NAS backends, SAN islands, Fibre Channel routers and switches, automated back-up systems, and tape storage can be physically configured much like today's distributed NAS and SAN storage. But with Vicom SVEs the storage can be connected and consolidated at the block level where it can be centrally managed as a virtual pool.

Vicom's SVEs operate at the network device level and interact with the network directly, an architecture favored by many storage industry analysts. Other virtualization efforts are implemented in software running on servers or in a dedicated network appliance. Servers and appliances become bottlenecks, and hinder reliability, compatibility, and scalability.

The network formed by Vicom SVEs acts as a programmable platform, analogous to a computer operating system, on which OEMs can build their own differentiated solutions, i.e. applications. The OEMs can add value according to their technological and business strengths, and still meet the IT managers' needs. With Vicom, OEMs also get faster time-to-market, lower development costs, and access to broader markets.

Vicom is not a storage or server vendor. It intends to provide its SVE to OEMs, and to work with them and their resellers to provide a final solution.

Here is how the Vicom SVE meets both workgroup and IT managers' needs.

## **CONSOLIDATING DISTRIBUTED POOLS OF STORAGE: THE BEST OF BOTH WORLDS**

Vicom's SVE eliminates the single largest barrier to consolidating storage: the conflict between the IT manager responsible for resources, and the administrators of distributed storage pools dedicated to workgroup applications (such as engineering, finance, or office systems). In a Vicom SVE SAN, the IT manager has a network-wide view of storage resources at the block level, and can administer the storage as a single, virtual pool, while the storage attached to an application is administered at the file level by a workgroup level GUI (Graphical User Interface).

Although not yet implemented in the Vicom SVE, the Vicom architecture anticipates an eventual organization-wide file management administration.

The Vicom SVEs communicate under any combination of communication protocols, including FibreChannel and Ethernet. As new communications technologies are adopted, such as Infiniband and iSCSI, Vicom's SVE can adapt easily to them without disrupting legacy communications.

The distributed application pools of storage can be in close proximity or separated by whatever distance is cost-effective, considering communication cost and efficiency.

Because the IT manager sees all of the networked resources, when a workgroup pool needs additional capacity, the manager can add storage to the pool remotely from a central pool of new storage, or from spare capacity anywhere on the network. The location of the storage is transparent to the workgroup administrator.

Pools of storage can be multi-application, multi-vendor, and multi-type, composed of proprietary RAID systems or racks of JBODs. The SVEs also can connect separate NAS back ends and SAN islands into such a network.

### **REMOTE SPACE ALLOCATION**

The IT administrator can access the Vicom SVE network from any node or port on the network, and can assign any storage on the network to any server on the network. The

administrator can access the network remotely, including an Internet connection from his home using a laptop computer. Vicom demonstrated that capability at the 2001 Comdex.

## **SELF HEALING**

Every SVE on the Vicom network has configuration data about every other SVE unit on the network, and every unit of storage equipment, and every server on the network. All SVE units are field replaceable modules configurable to provide redundancy.

Should any storage unit fail, the SVE automatically connects an uncommitted storage unit to the pool to replace the failed unit.

Should a server fail, the SVE is compatible to all server fail-over software that automatically switches to a back-up server.

The communication channel among Vicom SVEs is bi-directional and redundant, with no single point of failure. The Vicom SVEs automatically trigger a Call Home event to order a field replacement of a network module when any failure is experienced.

## **FILE LEVEL MANAGEMENT AND ACCESS**

Vicom's SVE provides block management using Logical Unit Numbers (disk partition information). The SVE's block-level functions and features are addressed through standard interfaces on SANs and through Command Lines and APIs. Any storage resource can be integrated into a seamless pool without changes to existing equipment. Using Command Lines and APIs, OEMs can integrate their storage management value-adds, such as file and policy management.

For example, a recent article in *SearchStorage* alerts readers not to believe everything they see when running the *vxinstall* procedure to install Veritas storage management software on a Sun *StorEdge T3+* storage array. The author, Rick Cook, notes that *vxinstall* only displays the first connected HBA in each array partner group even when it detects more than one path to the group.

The programmable Vicom SVE platform would eliminate this problem. The SVE would integrate Sun's and Veritas' capabilities independently without losing functionality or imposing a performance penalty.

If a workgroup administrator wishes to restrict file access to his workgroup, the workgroup file management software communicates with Vicom's SVE to initiate LUN (Logical Unit Number) masking on the disk. The restricted file may be scattered among several storage systems -- even among several buildings. Vicom's SVEs track the LUNs and enables the file to be assembled only for the authorized user. That is, the SVE makes it possible to restrict access to physical resources -- disk space -- without assigning an entire storage resource to a single workgroup.

## **EASY EXPANDABILITY**

Vicom's SVE is compatible with any storage protocol – SCSI, Fibre Channel, Ethernet, or SSA – and with any operating system – NT, AIX, Unix, H-P 3000, Solaris, and Linux. So an administrator can add servers or storage equipment from any vendor to any storage pool without software or device driver modifications. The administrator does not need to worry about compatibility, nor vendor lock-in. The administrator can buy on price/performance, reliability, or any other criterion.

## **EASY DATA MIGRATION**

Vicom's GUI provides drag and drop capability to migrate data from any storage unit to another, regardless of storage type. Data can be transferred without application down time and without backup to tape. Data migration uses the same basic capability built into the SVE that makes mirroring, data replication, automatic failover and remote mirroring and space allocation possible.

## **VENDOR CONTINUITY**

Vicom does not intend to supply its SVE independently. Instead, Vicom will work with major OEMs and their business partners to build a total solution into the OEM's product offerings. Vicom now is selling pieces of its SVE technology to Sun, IBM and H-P.

## **VENDOR SERVICES**

Vicom will work with major OEMs and their resellers, and with IT outsourcing firms such as Accenture, EDS, and SAIS, to provide a suite of customer services. Vicom has pioneered in offering customer services for its products through IBM Global Services Division.

As an example of how Vicom's SVE would facilitate the operation of a help desk, every SVE in the network keeps track of every piece of equipment in the network, and its status. A help desk would have access to this information, and the ability to assist the IT customer with access, repair, and replacement of any unit in the network from any location, worldwide. A help desk in India, for example, would be able to access information about any element in the network or virtual pool for any customer anywhere in the world.

## **THE POTENTIAL FOR VICOM AND THE IT INDUSTRY**

To realize Vicom's potential, capital and expertise needs to be invested in Vicom to introduce its technology to the IT community, and to demonstrate that it can meet IT managers' needs in concert with storage and server OEMs. That would generate demand

and “pull through” that could make Vicom’s SVE the preferred choice for all OEMs in offering IT customers a storage consolidation solution that meets the customers’ needs.

Vicom’s emergence as a *de facto* industry standard would have an enormous benefit both to OEMs and to the IT community. It would provide OEMs with a platform on which to build their differentiated solutions, and it would give the IT managers what they want in NAS/SAN equipment.

The upside potential for Vicom is enormous. An SVE network would account for 5% to 15% of the value of the storage equipment installed on a SAN. The value of annual shipments of storage equipment is expected to top \$10 billion in a few more years.

