A Quantum Leap in Midrange Tape Automation

By Alex Chan

Today's IT professionals face an ever-increasing multitude of problems and issues, including logarithmic growth of data storage needs, facility and space constraints, expandability of storage systems, ability to manage systems offsite, ease of use, initial investment cost, investment protection, reliability, and serviceability. Recent economic conditions exacerbated these issues, driving requirements for extreme efficiency and laser-focused effectiveness.

New paradigms in midrange tape automation will take advantage of the opportunity to vastly improve data protection by exploiting consolidated, shared, networked storage technologies. These technologies enable and promote the following benefits:

- Space consolidation through low-form-factor, rackmount configurations
- Remote device management
- Modular, maintainable designs
- Flexible, easily-upgraded systems
- Networked configurations

Offering these benefits in a modern platform for midrange data protection, will result in cost savings, cost avoidance, and increased revenue potential. The next step for these platforms is advancing features found in autoloader units, which is defined as an automated, multi-cartridge (independently addressed), single tape drive system.

Cost Savings Features

Cost savings opportunities enabled by the next generation autoloader include:

- High cartridge density
- Rackmounted configuration

High Cartridge Density

High cartridge density in a low form factor enables unprecedented savings on the amount of space required to store data.

A form factor measures the physical, external size of a device, as opposed to the storage capacity, for example. The form factor of rackmounted devices describes the height of devices. One Unit (U) is equal to 1.75 inches. Rackmounted devices have been systematically downsized from 4U to 3U to 2U; today some vendors have an entire device in 1U. By constantly reducing the height of rackmounted devices, vendors allow data centers to fit more devices into a rack and to maximize the use of floor space.

The autoloaders currently on the market use the traditional X-Y-Z robotics in which cartridges are positioned away from the tape drive (see Figure 1). This traditional setup increases the form factor because it requires the cartridges to be in an upright position. It also increases access time because the robot has to

travel to the cartridges and then back to position them in the tape drive. New technologies for tape automation will use innovative technologies to orient cartridges more efficiently.

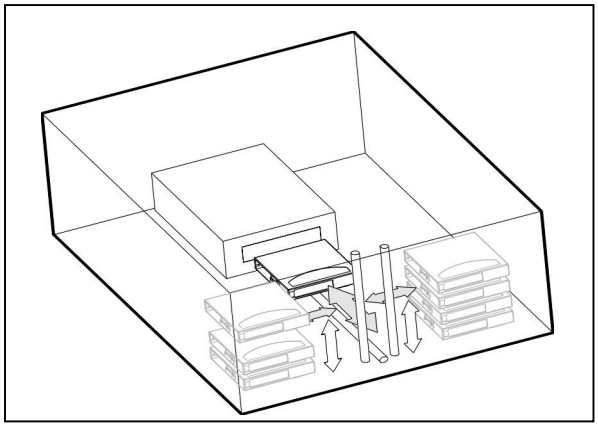

Figure 1. X-Y-Z robotics

Rack-Mounted Configuration

Rackmounted configurations for autoloaders allow quick and easy integration in a data center setting.

With the logarithmic growth of data storage needs, data intensive businesses such as ISPs, ASPs, SSPs, and data centers are grappling with facility and space constraints. In an effort to reduce facility costs, these businesses maximize space utilization by mounting their servers, routers, switchers, and other storage peripherals in standard 19-inch racks and cabinets.

Space has always been a limited commodity in the data center. From the time of the huge mainframes when 1GB of data took entire floors of buildings, to today when data centers typically have had to store hundreds or thousands of units in one room, data center floor space has been valuable real estate. Space consolidation also creates efficiency for storage management by reducing the physical movement required for operations. For the past decade, data centers and IT professionals have used racks, typically 19 inches wide and 3 to 6 feet tall. The standard 19-inch rack increases efficiency by enabling the stacking of networking equipment such as routers, bridges, and hubs. Given the space efficiency of these systems, it was no surprise when hardware vendors decided to redesign their equipment for the rack.

The movement from standalone to rackmount reduces the cost of ownership for drives and autoloaders as well as for servers. New midrange automated tape systems will be designed to be rackmounted, although they will have the flexibility to be configured for tabletop use, as well.

Cost Avoidance Features

Cost avoidance features offered through new paradigms in tape automation include:

- A web-based interface
- Modular parts
- Lower solution integration costs
- Investment protection

Web-Based Interface

New automated tape systems avoid large portions of management cost through a built-in, advanced, web-based software. This type of software will be built into each system and exploit commonly used Ethernet technologies to allow remote administration of the automated unit. This software will enable users to perform many of the functions available directly from the physical unit through indicator lights or a front panel. Remote management of multiple systems through web-based software enables administrators to do more with less, more conveniently. The software will also allow users to download firmware updates using ftp protocol, resulting in time and cost savings.

Modular Parts

New autoloader systems will contain maintenance cost by using few, customer-replaceable, swappable modular parts.

The tape drives in these new systems will be bundled with the majority of the electronics, power supply and cooling mechanisms. This bundling allows quick upgrade and service of the main working parts in the system. Removable units will slide easily into and out of the system, anchored with a minimum number of screws, and use docking connector technology similar to that used for laptops, to gain optimum reliability and blind mate insertion. Magazines will be configurable to be fully interchangeable in any magazine slot within the system. Laser-based barcode reader technology will be used in these new systems, which allows the quickest scan of all cartridges in the magazines, compared to LED type barcode readers available in most current tape system products.

Lower Solution Integration Costs

New automated systems will offer high data capacity in single drive systems, avoiding the overhead and software license fees associated with more complex systems. The simple design will be easy to test in the context of data protection solutions, due to the similarity to interfacing to a single drive itself. These new systems will conform to industry standards, and use common, well-tested, reliable components. This conformance reduces the effort needed to integrate the new solutions into existing environments, and still be able to take advantage of new features..

Specifications subject to change without notice.

Investment Protection

The new autoloaders will avoid forklift upgrade cost by enabling customers to upgrade drive type and cartridge count at their site.

Increased Revenue Potential

Revenue opportunities enabled include:

- Reduced backup windows
- Reliability features which lower data protection risks

Reduced Backup Windows

The new autoloaders will increase revenue potential by reducing the time needed for backup windows. Advanced robotics and media technologies will free up time to use data for revenue producing activities.

New technologies will allow duplex communication between the tape drive and autoloader in a SCSI Logical Unit Number environment. Using a Packetized Serial Protocol (PSP), these new systems will execute robotic processes at a significantly increased speed.

A mailslot will be a standard feature in these new autoloaders, allowing the quick insertion or extraction of cartridges without interrupting the operation of the tape drive and autoloader. The design of the mailslot will ensure that the cartridge is presented to the end-user without exceeding the profile of the autoloader. This design will prevent any damage to the tape cartridge or autoloader if the door of the rack cabinet is closed.

Reliability Features

Reliability features that will be available in these new autoloaders will lower the risk associated with data projects, thereby increasing the number of projects that can be accomplished. Such features will include:

- A soft power down switch on the front panel allows the tape drive to complete any robotic movement in progress before the power turns off.
- Additional flash memory buffers firmware upgrades, so that until the tape system confirms a successful download, the new code stays in the buffer.
- Password-protection for key functions: security at the operator level and the administrator level. The operator-level password will allow the user to perform all routine commands and view status information. The administrator-level password will access all operator-level functions, plus all the configuration and diagnostic functions.

Specifications subject to change without notice.

Network Integration

Storage Network technologies increase efficiency and total cost of ownership. The new tape system technologies are tested in networked configurations, such as those pictured in Figures 2 and 3 below. In Figure 2, all authorized servers on the Fibre Channel network can share the tape system. Since these new autoloaders will hold capacities in the terabyte range, and average servers require between 200GB and 600GB of backup capacity, this sharing allows multiple servers to optimally share the density advantages of the autoloader. In Figure 3, all authorized servers on the Gigabit Ethernet –based storage network can share the autoloader using the iSCSI protocol, again optimizing the use of the capacities offered by the autoloader. In both instances, efficiencies are available through server-less backup technologies[1]. Our last illustration, Figure 4, presents a networked-attached storage (NAS) configuration that improves backup/recovery efficiencies for network-based file servers. The configuration in Figure 4 exploits the Network Data Management Protocol (NDMP)[2].

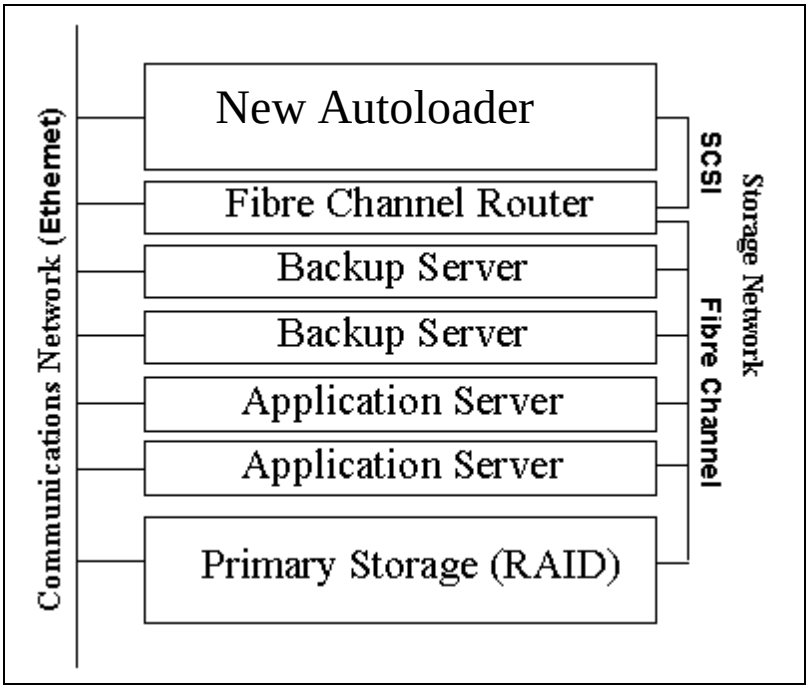

Figure 2. Fibre Channel SAN configuration example

[1] For more information on storage networks and server-less backup technologies, visit the Internet Engineering Task Force (IETF) website (http://www.ietf.org) or the Storage Network Industry Association (SNIA) website (http://www.snia.org).

[2] For more information on NDMP, visit http://www.ndmp.org or http://www.snia.org.

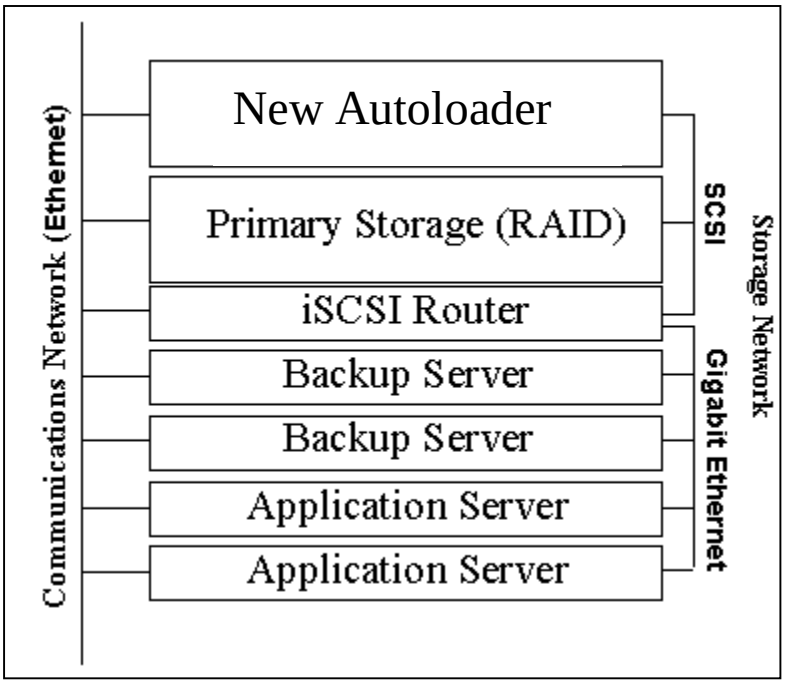

Figure 3. IP storage configuration example

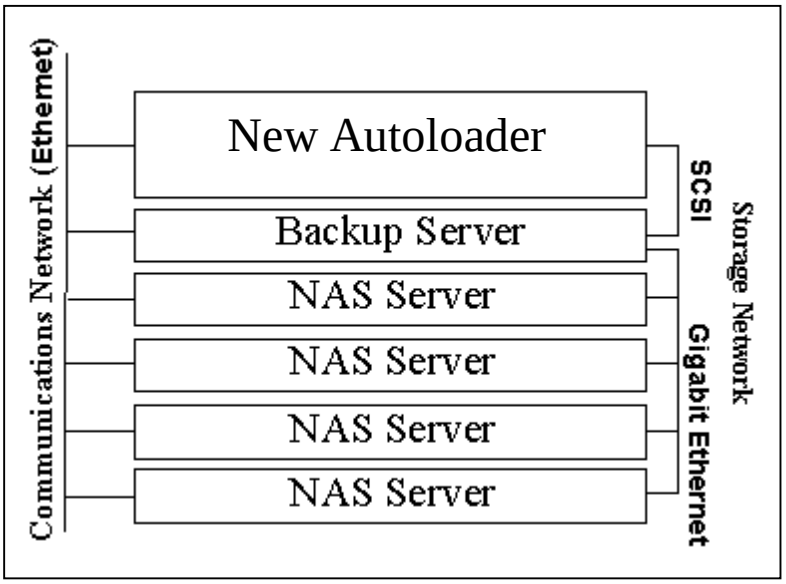

Figure 4. NDMP configuration example

Conclusion

The advanced features offered by the new autoloader technologies improve total cost of ownership by easing management overhead, reducing the physical space required, and improving serviceability. Testing and integration of these new technologies in networked configurations crosses into modern paradigms of sharing and direct data movement. The new autoloaders will provide a solid basis upon which complementary software and hardware vendors can add value, offering the perfect solution for IT professionals to meet the increasing data demands of their customers.

Unylogix Technologies Inc.
Tel: (514) 253-5200
email: info@unylogix.com web site: www.unylogix.com