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# Advantages of High-Rely Backup drives over Conventional Drive Enclosures for Network Backup

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*Summary: There are some hidden advantages to using removable High-Rely backup drives compared to conventional low cost hard drive enclosures for network backup. These are often not understood until the system is already in place and the real problems arise. This document outlines some of the pitfalls and discusses the advantages offered by the High-Rely removable drive tray solution.*

**Introduction.** Backing up business data to external USB hard drives has become increasingly popular over the last five years. While such drives work well for some small businesses, there are a number of problems and pitfalls to be aware of. USB based backup drives are designed for general purpose storage rather than backup and often fail to deliver the performance, features, and reliability of the High-Rely system, which was designed from the ground up for daily backup. While lots of USB and a few external eSATA enclosures exist, many are NOT designed to let Windows know the drive is removable. Purchasing numerous drive enclosures often costs more than the High-Rely solution as drive count goes up. Add this to poor connector reliability, warranty, and technical support issues and it's easy to see that external enclosures are an inferior backup solution. In addition, no software is included to manage Windows drive letters and drive sharing. This whitepaper outlines these and other real world problems associated with do-it-yourself hard drive enclosures in an effort to educate the customer and allow them to consider all the pros and cons of using hard drive backup solutions.

**Speed.** Efficient backup is often about speed. Many businesses find that their nightly "backup window" (the time available for backup while the business is closed) is shrinking. Suppose that the amount of data that must be backed up is 500GB or more. Conventional USB hard drives using backup products such as Symantec Backup Exec version 10.x can copy data at around 35GB per hour. This means the backup time for 500GB is over 14 hours! By contrast High-Rely hard drive models are available in eSATA versions with a data rate that is 6 times higher than USB 2.0 (USB 2.0 is 480Mbps versus 3000Mbps for SATA). While this doesn't translate to a 6X increase of speed in the real world, it does allow real world backup speeds approaching 120GB per hour to a single drive using the right software. (Note: even higher speeds can be achieved using RAID0 configurations with our FirstRAID and RAIDFrame products - but this white paper focuses only on the conventional eSATA High-Rely product.) At 120GB/Hr the 500GB of data used in our example above can be backed up in a much more manageable 4 hour time window. Contrast this with the typical speed of a 100 Megabyte connected NAS (Network attached storage) device. The NAS is similar in speed to USB hard drives.... around 35-40GB per hour. This is due to the overhead associated with the TCP/IP and Ethernet stack and is why the High-Rely system favors the eSATA connector over Ethernet.

**Reliability.** USB and eSATA connectors are not designed for day to day plug/unplug cycles. Studies show that USB and eSATA hard drive enclosure connectors wear out after less than 1 year of daily use (350 operations). In fact, according to the SATA-IO Committee specifications, the eSATA connector is rated for

only 50 plug/unplug cycles. See the specification document at <http://www.sata-io.org/docs/External%20SATA%20WP%202011-09.pdf>



*The usb cable on this low end enclosure will typically wear out in under 1 year with daily use. In addition, the average secretary tasked with swapping drives in a small business must deal with multiple cables plugged into a live production server.*

Contrast this with up to 100,000 plug/unplug rating of the high-rely drive tray and you realize High-Rely drives are designed for the daily rigors of backup. The fundamental difference between these solutions is that instead of plugging/unplugging the entire unit, you simply slide out the drive tray.



**Exposed Drives.** Even worse than external enclosures are the removable drives found in Network Attached storage appliances. Almost all

NAS drive trays are open at the top and back of the drive (See photo). Such bare drive designs mean hard drives are exposed to shock, static, moisture, and other environmental problems when removed from the unit for transport off site. High-Rely drives are supported in aluminum, fully enclosed and temperature controlled with individual fans. The fact is, NAS boxes are usually designed as local



**Note that the hard drive is exposed at the top and back of this typical NAS drive tray.**

storage, not as transportable media. Experts widely acknowledge that data not transported offsite on a regular basis does not qualify as a backup at all. NAS boxes are simply not designed as true backup solutions.

**Cost.** One of the common reasons clients give for favoring external single drive hard drive solutions is lower cost. But when talking about a multi hard drive backup solution, tray based drives are actually cheaper than buying multiple external enclosures. This is because each external enclosure has the extra overhead of a separate power brick and other components. Analysis shows that the more hard drives that are used in a backup rotation, the better price advantage the High-Rely system has over cheap external enclosures. As an example, compare the cost of

the 1 bay slimline High-Rely solution with 8 removable hard drives versus eight individual enclosures:

High-Rely Slimline	\$195
8 250GB removable trays	8x\$145
<b>Total</b>	<b>\$1355</b>



Typical external enclosures:

1 drive Sata enclosure	8x\$100
8 250GB Hard drives	8x\$95
<b>Total</b>	<b>\$1560</b>



As you can see, the High-Rely solution has a \$205 price advantage. The savings increase with the number of hard drives.

We've already discussed the reliability issues. Obviously, a single failure of the backup system can cost 10 times the purchase price. So even if the High-Rely system is priced slightly more, it is often well worth it in terms of peace of mind.

**Upgradeability.** High-rely trays accommodate whatever capacity of 3.5" drives the end user wants to put in them. Highly Reliable Systems was the first removable drive vendor to support 1 Terabyte drives and continues to push to build upgradeable systems that allow the customer to leverage their investment as data sizes increase.

**Hot plug/ Unplug.** Most external SATA enclosures are not seen by Windows as removable. Pulling such drives offline while the system is live results in a "surprise removal" event in windows. This is

an extremely poor practice and should not ever be done to a production Windows server operating system! One way to tell if the drive is seen as removable is to look for the "safely remove" icon in the lower right hand corner of the Windows screen



If this icon doesn't exist, then the eSATA controller and drive combination has not informed windows that the drive(s) are removable. All Highly Reliable Systems controllers and drivers support hot plug/unplug. Unplugging a standard external enclosure without Windows support is playing with the very integrity of your server.

**Swimming Drive Letters and Lost Shares.** One problem that plagues other multi-drive external enclosures is that Windows appears to randomly assign drive letters as drives are plugged and unplugged. In addition, when a removable drive is "shared" in Windows, the share is lost when the drive is removed. Highly Reliable Systems ships software called HRDM2, which installs as a service and manages these thorny Windows issues. Drives removed that were "F:" and left on the shelf for a year will plug back in and be assigned "F:". Lacking this software, daily swaps of hard drives become unpredictable, frustrating, and scheduled backup jobs inexplicably fail to run.

**Warranty & Quality.** One look at High-Rely drive trays with their temperature displays, multiple fans, and fan failure alarms convinces even the casual observer that this system is far superior to the typical low cost external enclosure. High-Rely failure rates are extremely low and 18 month warranties speak to the confidence we have in the product. Better engineering means little or

no mysterious “write cache errors” during backup that plagues the low cost enclosures out there. High-Rely Software support includes free utilities to determine where backup bottlenecks are and how to manage them.

**Hands off Operation & Drive Density.** Highly Reliable Systems makes backup systems from 1 drive to 10 drives and everything in between. Desktop, Rack-Mount and mini versions are available. Multi-drive enclosures with removable drives allows hands off operation in which a separate hard drive can be used for each day of the week (Mon-Fri) and then one drive can be removed for off-site at the end of the week. External enclosures are typically only 1 drive and must be attended to (swapped) every day.



**Technical support.** We are a backup company. Our mission statement is “Making Backup Invisible” and our products and service reflect that focus. Our tech support people constantly help customers with common backup software and drive rotation scenarios. Whether discussing technical support for enhancing backup speed, dealing with failed drives, or just best practices, there is a clear difference between Highly Reliable Systems and vendors who simply make drive enclosures for general storage.

**Conclusion.** Consider carefully what the hidden costs associated with using cheap external drive enclosures as well as the advantages and disadvantages. The whole purpose of a backup is to be able to recover quickly and easily when problems occur. Hard drive backup solutions can provide this functionality if enough drives are used in the rotation and the system is designed to hot swap. For many customers, High-Rely hard drive backup solutions based on high quality trays makes more sense than using cheap external enclosures with their associated cabling and reliability issues.