



Lowering the cost of
UNIX and Linux
hardware with
BackupEDGE™ 2.0

Using Iomega REV With *Microlite BackupEDGE 2.0*

(Note: This whitepaper is a derivative of our optical media whitepaper, so there is some repetition. REV devices, although based upon magnetic media, have operational properties very similar to DVD devices and may be considered the next step above DVD.)

Microlite has always considered *BackupEDGE 2.0* to be an “enabling technology”, and our role within the industry to find new ways to help our partners deliver competitive, cost effective solutions, especially in the small to medium business (SMB) and web server / back office server space. So we are constantly evaluating new technologies in an effort to find those which can help improve storage reliability and performance while at the same time reducing investment costs for our partners and their clients.

On August 12, 2003, Iomega Corporation, in conjunction with major components supplied by TDK and Texas Instruments, announced the development of a new and exciting storage technology called Removable Rigid Disk, or RRD, as a natural follow-on to their highly successful (but lower capacity) Zip and Jaz devices. 35GB was set as the uncompressed capacity for revision one of the technology.

On November 13, 2003, Iomega announced a production schedule and that their first RRD device would be called REV.

Microlite Corporation recognized the potential of REV early. We started working with Iomega prior to initial production, and when Iomega announced on April 12, 2004 that customer shipments had begun, Microlite was proud to concurrently announce that Microlite *BackupEDGE 2.0* release 02.00.02 for Linux supported it immediately. This was followed by an announcement on May 19, 2004 that *BackupEDGE 2.0* for SCO OpenServer and UnixWare also supported REV.

The optimizations designed into *BackupEDGE 2.0* to support optical media have naturally extended into support for REV.

Background

Iomega REV is designed from the ground up for superior data integrity. The REV drive mechanism is about the size of a 3½” floppy drive, and in fact internal devices are designed to mount in a floppy slot. The external USB REV enclosure is not much larger (see picture). REV media is a 2½” hard disk built into a cartridge small enough to fit into a shirt pocket. It spins at 4,200RPM and has special seals to protect against dust, which is a mortal enemy to hard disk drives. The spindle motor is actually housed in the disk cartridge, not the drive mechanism, leading to even better protection from contamination.



BackupEDGE 2.0 was the first product designed to use and optimize the Iomega REV for both UNIX and Linux backups and disaster recovery.

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The genius behind REV was the Iomega decision to provide firmware support which allows computer systems to see and operate the REV drive more as a CD or DVD device than as a hard drive. This solves a significant number of problems (for instance, there is no need for “hot swap” support), while making it very easy for independent software vendors to integrate it into different platforms.

The term “hard disk” implies performance, and REV is capable in that regard. In fact, it is easiest to think of REV as if it were a very large, fast DVD drive that uses very small, thick DVD media.

Let’s look at the native performance of the fastest CD and DVD Re-writables and compare them to REV (Write once CD and DVD can be faster, but are not typically used for day-to-day backups).

| Media | Capacity | Used By | Speed | Used By (DVD) |
|------------------|----------------|------------------------|--|----------------------------|
| CD-RW | 650MB 700MB | 24X CD Re-Writers | 150KB/sec 8.8MB/min | Current Generation |
| DVD-RAM | 4.7GB | 3x DVD-RAM | 4155KB/sec 243MB/min | Current Generation |
| DVD+RW DVD-RW | 4.7GB | 4x DVD+RW 4x DVD-RW | 5540KB/sec 324MB/min | Current Generation |
| DVD-RAM | 4.7GB | 5x DVD-RAM | 6925KB/sec 405MB/min | Next Generation DVD-RAM |
| REV | 35GB | REV Version 1 | 25,400-12,700 KB/Sec 1,488-744 MB/min | Current Generation REV |

REV media write faster at the beginning of the media (outside tracks), slowing down toward the inside tracks. Our tests have indicated that we can write to the REV at over 1.3GB/min (that’s Gigabytes per minute) for the first few gigabytes and that average write speed over an entire disk can exceed 1GB/min.

The table clearly indicates that current generation REV devices can deliver speeds that are far higher than CD and DVD devices, and that are better than all but the fastest, highest capacity tape drives.

Additionally, In *BackupEDGE 2.0*, the software compression algorithm has been replaced with a state-of -the-art design to maximize the usefulness of these devices.

There is a standard suite for testing compression ratios called the *Calgary Corpus Data Set*. Iomega recently used this suite to test their Windows backup software at a **2.6:1** compression ratio, which is why they claim that the REV media capacity is 35GB uncompressed, 90GB compressed.

BackupEDGE 2.0 default compression using the *Calgary Corpus Data Set* tests at **2.9:1** (101.5GB). At its lowest setting (there are now 9 available compression settings) it is **2.7:1** and at its highest setting it is over **3:1**. By comparison, our older products (and some of our competitors’ current products) test out at **2.1:1** (73.5GB).

REV media is rated at 1,000,000 re-writes per sector, which compares very favorably with 100,000 re-writes for DVD-RAM and 1,000 re-writes for DVD+RW, DVD-RW, and CD-RW. It also has much lower error rates and a 30 year shelf life.

Other Characteristics

REV devices have certain common traits with regard to computer and *BackupEDGE 2.0* use...

- They are seeking devices, allowing **instant** access to files being restored.
- Computer systems see REV devices as CD-ROM drives, which allows us to write a CD-style boot track, allowing each piece of REV backup media to boot directly into disaster recovery mode.

Operating System Support

BackupEDGE 2.0 does not need a special “device driver” to make use of REV devices. They are all detected by the operating system as a standard CD-ROM drive. *BackupEDGE 2.0* (starting with 02.00.02) handles all of its own reading and writing. No “native” operating system write support is needed.

BackupEDGE 2.0 can make full nightly system backups with our *RecoverEDGE* bare metal disaster recovery component included, making each nightly REV backup a self-contained disaster recovery solution. As mentioned above, REV media will boot like CD-ROMs into *RecoverEDGE* (much faster than booting from floppies or even CD/DVD media), then restore the backups just as if they were coming from a tape drive.

Bus Considerations

Linux products fully support SCSI and ATAPI REV devices. USB 2.0 support is also included in many more recent kernels. IEEE-1394 (FireWire) devices will be tested as they become available. For Linux ATAPI, the `ide-scsi` driver must be used, and DMA support must be enabled.

OpenServer 5.0.7 supports SCSI, ATAPI and USB REV devices. Current SCO Maintenance Packs are recommended for optimal operation. For ATAPI devices the “wd” supplement found at <ftp://ftp.sco.com/pub/openserver5/drivers/OSR507/btld/> is also recommended.

OpenServer 5.0.6 with RS506a also works well with SCSI and ATAPI REV devices. ATAPI requires the SCO 506 “wd” supplement (<ftp://ftp.sco.com/pub/openserver5/drivers/OSR506/btld/>).

OpenServer 5.0.4-5.0.5 works well with SCSI REV devices.

UnixWare 7.1.3 and 7.1.4 supports SCSI, ATAPI and USB 2.0 REV devices.

Open UNIX 8 (UnixWare 7.1.2) supports SCSI and ATAPI REV devices.

UnixWare 7.1.x works well with SCSI REV devices.

At the time of this writing, a new ATAPI (`ide`) driver for 7.1.1, 7.1.2 and 7.1.3 had become available. It is reported to improve writable ATAPI device support under 7.1.2 and 7.1.3 and enable it under 7.1.1. This driver has not yet been tested by Microlite. It is called `ide Driver`

Release 7.1.3a and may be found at:
<ftp://ftp.sco.com/pub/unixware7/drivers/storage/>.

Performance Considerations

Different operating systems can drive their SCSI, ATAPI and USB buses at different maximum speeds. Performance of the REV will not be as fast on some platforms as on others. On most platforms, the SCSI version of the REV device will always provide the fastest possible speeds at the lowest system overhead.

See the chart at

http://www.microlite.com/REV_Download/rev_download.html
for additional information.

Summary

The Iomega REV drive can easily and cost-effectively replace tape drives of up to 100GB capacity on UNIX and Linux systems. Using a standard or slimline read-only CD-ROM drive for system installation and a bootable REV drive for backups and disaster recovery, it is possible to eliminate the floppy drive and create very small footprint systems.

Our high quality compression extends the usefulness of REV media far beyond its stated native capacity, and our encryption provides data security.

On very large systems, REV devices make excellent supplements to the enterprise class tape backup systems for performing *Differential* and *Incremental* backups, as well as backups of specialized *Domains* such as "The Accounting System" or "The filePro Databases".

For replicated sites, bootable system backups can easily be used for new installations and system upgrades on even large systems.

REV devices retail for from \$279.00 to \$500.00. Media prices start at \$50.00. Our reseller partners have been adopting REV technology rapidly, and have indicated that REV will help to make them more competitive in the both the SMB and replicated site marketplaces.

The BackupEDGE 2.0 Advantage

BackupEDGE 2.0 fully integrates REV technology with no compromises.

- Our higher compression ratios ensure that the maximum amount of data can be stored on an archive.
- Our *exclusive* REV writer ensures the fastest possible performance.
- Our media detector allows us to determine media presence and the perfect volume size for any piece of REV media. No space is wasted.
- Instant File Restore functions perfectly.
- Full compatibility with "BootableBackups" for disaster recovery is maintained, even when compression and encryption are employed.

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