Introduction to the New Features in *BackupEDGE 3.x*

BackupEDGE has a long history of providing reliable data protection for many thousands of users. As operating systems, storage devices and usage needs and tendencies have changed over the years, it has continuously met the challenge of providing inexpensive, stable backup and disaster recovery on a variety of UNIX and Linux platforms.

Clients routinely find new and clever ways to utilize products. Storage devices have taken on new and exciting features, and incredible capacities. Products designed years ago had built-in limits that were thought to be beyond comprehension. Today, these limits are routinely exceeded. The need for data security is even more apparent.

We're constantly asking our clients what tools our products need to serve them better.

To continue to meet the evolving needs of our clients, we are always asking what features of our products they find most useful, what improvements we can make, and what new requirements they have. We've used this knowledge to map out new product strategies designed to anticipate the needs of the next generation of users, systems and storage products.

This has resulted in the creation of *BackupEDGE 3.x,* with a combination of internal improvements, new features and enhanced infrastructure designed to become the backbone of a new generation of storage software.

Summary of Major Changes and Additions

BackupEDGE 3.x features include:

- Support for OpenServer 6 D2M2 on Proxmox

- Support for Red Hat Enterprise Sever 9.5,Oracle Linux Server 9.5, Rocky Linux 9.5 and Alma Linux 9.5(03.05.04 Build 1)

- Support for Ubuntu 24.10 Server Oracular Oriole

- Support for Ubuntu 24.10 Desktop Oracular Oriole

- Support for OpenServer 6 D2M2

- Support for Linux Mint 21.3 MATE (03.05.03 Build 2)

- Support for Ubuntu 24.04 LTS Server Noble Numbat(03.05.03 Build 2)

- Support for Red Hat Enterprise Server 8.10, Oracle Linux Server 8.10, Rocky Linux 8.10 and Alma Linux 8.10(03.05.03 Build 2).

- Support for Red Hat Enterprise Sever 9.4,Oracle Linux Server 9.4, Rocky Linux 9.4 and Alma Linux 9.4(03.05.03 Build 1)

- Support for virtual clients on Proxmox 8.1.4, Virtual Box 7.0, QEMU-KVM 8.0, XCP-NG 8.2.1 with Xen Orchestra(03.05.03 Build 1)

- Support for Red Hat Enterprise Sever 9.3,Oracle Linux Server 9.3, Rocky Linux 9.3 and Alma Linux 9.3(03.05.02 Build 3)

- Support for Ubuntu Server 22.04.3 Jammy Jelly Fish(03.05.02 Build 2)

- Extra Disk handling for asynchronous disk discovery (03.05.02 Build 2)

- Support for Red Hat Enterprise Sever 9.2,Oracle Linux Server 9.2, Rocky Linux 9.2 and Alma Linux 9.2(03.05.02 Build 1)

- Support for Linux 6.X Kernels(03.05.02 Build 1)

- Support for Ubuntu Server 23.04 Lunar Lobster(03.05.02 Build 1)

- Support for Ubuntu Server 22.04.2 Jammy Jelly Fish(03.05.02 Build 1)

- Support for Ubuntu Server 22.04.6 Focal Fossa(03.05.02 Build 1)

- Support for Red Hat Enterprise Sever 9,Oracle Linux Server 9, Rocky Linux 9 and Alma Linux 9.(03.05.01 build 1).

- Support for Red Hat Enterprise Server 8.6, Oracle Linux Server 8.6, Rocky Linux 8.6 and Alma Linux 8.6(03.05.00 build 2).

- Support for Ubuntu Server 21.10 (03.04.02 build 2).

- Support for Linux kernels compressed with ZSTD (03.04.02 build 2).

- Major S3-compatible Object Storage improvements, including support for Backblaze B2 and **MIN**IO. (03.04.02)

- Improvements to partition sizing, UEFI table cleanup after DR, and SharpDrive debugging (03.04.01 build 3).

- Support for Rocky Linux 8.4 and AlmaLinux 8.4 (03.04.01 build 2).

- Support for SUSE Linux Enterprise Server 15.3 and openSUSE LEAP 15.3 (03.04.01 build 2).

- Support for MD under both UEFI and BIOS modes with SUSE Linux Enterprise Server 15.3 and openSUSE LEAP 15.3 (03.04.01 build 2).

- Support for MD under both UEFI and BIOS modes with Red Hat Enterprise Linux 8.x/7.x, Oracle Linux Server 8.x/8.x, and CentOS 8.x/7.x (03.04.01 build 1).

- Support for Red Hat Enterprise Linux 8.4, Oracle Linux Server 8.4, and CentOS 8.4-2105 (03.04.00 build 2).

- Support for Red Hat Enterprise Linux 8.3, Oracle Linux Server 8.3, and CentOS 8.3-2011 (03.03.01 build 2).

- Support for Red Hat Enterprise Linux 7.9, Oracle Linux Server 7.9, and CentOS 7.9-2009 (03.03.01 build 2).

- Support for Ubuntu 20.10 Server and Desktop (03.03.01 build 2).

- Support for Linux Mint 20 (03.03.01 build 2).

- Support for Ubuntu 20.04.1 LTS Server **and Desktop** (03.03.01 build 2).

- Support for Ubuntu 20.04 LTS Server **and Desktop** (03.03.01 build 2).

- Support for Red Hat Enterprise Linux 8.2, Oracle Linux Server 8.2, and CentOS 8.2-2004 (03.03.01).

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- Updated and optimized product removal program (03.03.01).
- Support for Linux 5.x Kernels (03.03.00).
- Support for SUSE Linux Enterprise Server 12 SP5 (build 2).

See last section ("Summary of Other Changes and Additions" on page 10) for a longer list.

Transparent Media Technology

Transparent Media means that *BackupEDGE* eliminates distinctions between different kinds of backup media. Unless there is a specific hardware or operating system limitation, *BackupEDGE* provides complete functionality for all media and backup types, including:

- High performance backups

- Maximum data integrity through full file checksumming

- Fastest possible access to files/directories for restore

- Multiple archive per medium on all re-writable storage types (except CD-RW and DVD-RW).

- Availability for disaster recovery on platforms supported by *RecoverEDGE*.

- There are no trade-offs when switching media types, even when using the CLI (command line interface).

No other product provides the same flexibility when it comes to choosing the right storage system for any particular application.

Cloud / Internet Backup Storage

BackupEDGE supports cloud object storage protocols:

S3 API Cloud Backups. Many cloud storage providers, such as **Amazon**, **Google Cloud Storage**, **Wasabi**, **Backblaze B2**, **Digital Ocean Spaces** and more, use a common object storage protocol. *BackupEDGE* 03.01.01 and later support this API (S3) and users can chooses worldwide from a variety of cloud companies based on location and price. 03.04.02 and later also support **MIN.IO**, allowing users to design their own personal object storage cloud.

Think of **Cloud Backups** as storage servers with virtually unlimited storage space and bandwidth, and high availability.

BackupEDGE treats compatible **Cloud Backup** sites as a standard storage *Resource*, with many similarities to *FTP Backups* (Network Attached Storage). It is a fully functional *Resource*, capable of:

- Full or partial system backups.

- Checksum and full bit level archive verification.

- Instant File Restore™.

- Bare metal disaster recovery with *RecoverEDGE*.

- Quota use. Allows placing a maximum limit on storage space used and paid for.

As with any other *BackupEDGE* Resource, servers can be set up to perform complete Master, Differential and Incremental system backups. Individual backup subsets (we call them backup Domains) may be created as a supplement to locally hosted backups.

Storage pricing is all managed by the *Cloud Storage Provider*.

Network Attached Storage

BackupEDGE has an FTP/FTPS client which is built directly into the backup engine and treated as a standard storage "*Resource*". It is also completely NFS and CIFS aware (operating system dependent). This means that virtually any server or storage appliance, running any operating system, can be used as a backup device, as long as it is running an FTP server, NFS server or CIFS server and available via a network connection. It is now possible to:

- Use any Network Attached Storage (NAS) device to reduce backup windows and consolidate archives.

- Create your own inexpensive storage server.

- Have two servers backup to each other for redundancy, over your intranet or the Internet.

- Create a star or ring topology, allowing each server to store archives to another server.

- Consolidate all your server backups by sending them to a data center, eliminating the expense of local storage devices.

- Increase the frequency of data protection. Perform multiple differential/incremental backups per day.

- Set quotas per Resource. Expired archive will only be erased when space utilization nears the quota.

- NAS backups are segmented automatically, and are not limited by either "ulimit" or file size limitations on either the local system or the backup server. The high performance compression built into *BackupEDGE* reduces network bandwidth and storage space requirements. All of the other *Transparent Media* features apply.

- NAS devices are treated similarly to autochangers, allowing simple backup rotations and retirement policies. Whenever a restore is requested from a NAS, all current archives are listed and the user may choose the archive to be restored.

- Non-scheduled backups can be given a "Slot Name", or unique storage identification.

- NAS management is included. NAS backups can be viewed and removed at any time. "Volume Size" for a NAS resource is actually a storage quota, or maximum storage allotment for all archives created by the Resource.

- With ftps, the transport layer itself can be encrypted, protecting your data during transit over the intranet or internet.

Directory Backups

Backups may be sent to removable HD / flash media (operating system permitting). *BackupEDGE* will manage mounting and unmounting the media as required. Removable media backups may be used for disaster recovery. Flash cards / removable HDs can be made bootable under Linux. On other platforms, you must use CD / DVD (etc.) boot media with them.

Backups may also be sent over NFS or SMB mounts in this fashion. However, disaster recovery does not support these transports, so ftp is the recommended way to perform remote backups.

Backups may additionally be sent to a directory on an existing filesystem. *BackupEDGE* will not attempt to mount or unmount any devices for this case. Again, these backups may be quite useful for targeted snapshots, but are not suitable for disaster recovery, as they're stored on local storage and may be erased by the disaster recovery process!

All of the other *Transparent Media* features apply.

Command Line Interface

We recognize that despite the power and flexibility of the **edgemenu** and *Scheduler* interfaces, people have custom uses that require archives to be created from the **/bin/edge** command line.

BackupEDGE has the exclusive ability to create archives to *Resources* in addition to files. For example:

/bin/edge cvf dvd0 /bin
would automatically create an archive on whatever appropriate cd or dvd media was inserted into a DVD drive. The right media strategy, preparation (blank, format, etc.), compression and volume size would be selected automatically by the Resource settings.

/bin/edge cvf url0 /bin
would automatically create an ftp backup, negotiating link type, passwords, compression, etc. from Resource settings.

Additional command flags are available for fine control of compression, slot name, etc. No other product has such a capability.

Indexed File Access

BackupEDGE has had quick file access (the ability to quickly find and restore individual files and directories) for many years. We've called this capability Fast File Restore™ for tape backup, and Instant File Restore™ for optical media and Iomega REV backups. We support indexed access capability to archives consisting of multiple volumes and archive with multiple archives per volume, as well as to network, directory and D-2-D backups.

User Interface Flexibility

BackupEDGE has a state-of the-art user interface that can be rendered three different ways:

- in graphical mode as a *Web Service* from any client system supporting Sun Java 1.4.2 or later, such as a Windows PC.

- in graphical mode on X11 consoles or clients equipped with Sun Java 1.4.2 or later.

- in character mode on system consoles, dumb terminals or xterm clients.

The user interface runs in all three modes using the same compiled program. There are no operational differences between the interfaces, meaning that there is no re-training required, or loss of features when switching between interfaces. Of course, the user has full access to GUI-type features such as buttons and mouse clicks when running graphically.

The Web Services interface provides a secure data link and enables authorized users to maintain a *BackupEDGE* installation from anywhere in the world without compromising system security. The only requirement is a Java equipped web browser.

Modern Device Support

No other product supports and controls the full gamut of storage devices enabled by *BackupEDGE*.

- Tape Drives

- Autochangers, Loaders and Libraries

- Blu-ray Disc, DVD and CD

- Removable hard drives, cartridge-based drives and flash devices.

- NAS Devices using FTP, FTPS or NFS.

- Cloud (internet) backups using the industry-standard S3 API.

Microlite is particularly proud to have recognized the early potential of optical and the now-discontinued REV devices for use as reliable backup devices under UNIX and Linux. We were the first company to support these media types, allowing our partners to build more cost-competitive systems. The addition of NAS/HD/Flash backups provides even more options, and both NAS and S3 backups give users truly reliable cloud (internet based) storage options. Our performance and media handling is still far and away the best-in-class.

Microlite is the world leader in enabling our partners the opportunity to save money by deploying modern, inexpensive storage devices and media.

Data Encryption

The need for data privacy and security continues increase, and *BackupEDGE* is ready to respond to that need.

BackupEDGE has a license option enabling public key data encryption. Users may choose to encrypt data by specifying filenames, directories or file extension types. Encryption uses the well documented AES encryption algorithm with 256 bit keys, which are further protected by RSA 2048 bit encryption. Encryption is performed at the file level, providing the following benefits...

- only data that needs to be protected is encrypted.
- overall performance stays high as only critical files are subject to CPU intensive encryption.
- full compatibility with our bit-level verify, new file checksum verify, indexing, quick file access and disaster recovery features is maintained.
- Each encrypted file is pre-compressed using the powerful ZLIB libraries to ensure that no space is lost due to the inability of tape hardware compression implementations to compress encrypted data.

Optionally, a user may choose to encrypt an entire archive (except the file headers), although this is not recommended.

The methodology used by *BackupEDGE* for data encryption will be published on our web site to assure users that standards are being followed and that no "back doors" or other security holes are in place. Users of encryption should be aware of the potential consequences of lost or stolen keys or pass phrases before utilizing this new technology. A separate whitepaper describes our encryption capabilities in more detail.

Enhanced Data Compression

The increasing popularity of CD, DVD, NAS and cloud backups has placed a whole new emphasis on the importance of software data compression. *BackupEDGE* has the industry standard ZLIB compression algorithm incorporated into its data format.

There is a standard suite for testing compression ratios called the *Calgary Corpus Data Set*. *BackupEDGE* default compression using the *Calgary Corpus Data Set* tests at **2.9:1**. At its lowest setting (there are 9 available compression settings) it is **2.7:1** and at its highest setting it is over **3:1**. By comparison, our legacy products test out at **2.1:1**.

This means that, at the compressibility of the data used by the *Calgary Corpus Data Set*, our legacy products could get **9.87GB** of data onto a 4.7GB DVD, while current *BackupEDGE* would by default be able to store **13.63GB** on the same media. Your results will be based on your data mix, and will be different.

We've also incorporated a method for doing streaming compression. This results in faster performance, especially when compressing very large files, and zero temporary space requirements.

Compression and encryption work together seamlessy.

Compression and encryption have a natural synergy. Encrypted files confuse the compression algorithms built into modern tape drives. When encountering files with seemingly random data, the compression algorithms either begin to compress negatively or temporarily disable themselves. Either way, net storage space and performance are impacted. By using our new software compression before encryption, it

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is possible to maximize available storage space while maintaining reasonable performance.

Of course, archives compressed with legacy versions of *BackupEDGE* can still be restored and uncompressed.

Archive Integrity Checking

A checksum can be added to each file in a *BackupEDGE* archive. This allows an archive integrity check to be made with great confidence months or even years after the archive has been created.

The checksum guards against medium errors. For example, if an archive was verified successfully years ago, and one now wishes to restore data from that archive, it is desirable to know that no data has changed while the medium on which the archive resides was in storage. To do this, *BackupEDGE* uses the checksum to make sure the data is identical to what was verified earlier.

The checksum does **not** tell you if the data is an accurate reflection of the filesystem data on which the archive was based; it only checks that the archived data has not changed since it was written. **If** the data was verified successfully against the original filesystem data, **then** the checksum can be used to check if the archive still records that correct data. It cannot tell you if the archived data matches what was on the filesystem initially.

The checksum can be computed and verified without being able to decrypt the archive data; one can verify that the archive is as good as it was when it was written without having to decrypt the data itself. Note that the checksum does **not** protect against intentional tampering.

Virtually Unlimited Pathnames

Network connected systems now have larger pathname requirements. In addition, people use what can only be described as sentences when creating filenames for new documents.

BackupEDGE 2.x and later have been architected with a **5,000 character pathname limit**, which essentially removes all limitations on pathname or link size. Imagine a pathname that takes up 2½ standard 80x25 data screens and you'll get the idea.

The tar data format as described in IEEE 1003.1-1993 had a natural limit of 99 characters per pathname/filename. Some other products are still limited to 170 characters, or to 400 characters for filenames, while still having a 170 character limit for links and symbolic links.

Enhanced Data Format

As we began mapping out all of the capabilities we've listed, it became apparent the we would need to enhance the data format. The old format was too limited to provide an easy mechanism for incorporating these features reliably.

Four primary goals were set for the replacement of this critical part of the product.

- **Standards-Based**. The product must continue to be based upon proven data storage standards, allowing some form of data restoration even without *BackupEDGE*.

- **Backward Compatibility**. That is, the ability to read and restore older *BackupEDGE SS* archives.

- **Command Set Compatibility**. Many of our clients still choose to write their own scripts, and we wanted to maintain maximum compatibility. In fact, we've improved it greatly.

- **Extensibility**. We wanted to build a platform with the ability to add new capabilities quickly and easily. For instance, we added support for ACLs to our Linux, OpenServer 6 and UnixWare 7 products.

The Data Format - PAX from IEEE 1003.1-2001

The data format incorporated into *BackupEDGE 2.x* and later is based on the specifications of the most recent version of the Portable Archive Interchange (**pax**) standard as defined in IEEE 1003.1-2001 by The Open Group and the IEEE. In reality this format is actually the newest generation of the **tar** format. It provides a known, reliable data format definition with the provisions we needed to extend it into a full fledged data protection system.

The format is similar enough to the legacy tar format that existing tar programs can read it, excluding those files which use long filenames or other features that tar does not understand such as encryption and compression. Free-software and public domain readers for IEEE 1003.1-2001 archives are readily obtainable (pax, star), so actually requiring tar to read a *BackupEDGE* archive is unlikely. Of course, the IEEE 1003.1-2001 standard document itself is also available.

While *BackupEDGE 2.x* and later provide features not found in these readers, none of these extensions rely on proprietary technology. Most are based on freely-available, published algorithms. The remainder are well-documented on the Microlite web site, to ensure that your data is recoverable even if a copy of *BackupEDGE* is not available.

Features Based Licensing

The License Manager allows features to be enabled or disabled easily. The first feature to be licensed via the new License Manager is data encryption. Encryption is licensed at an additional charge. All features, including encryption (and excepting P2V support), are enabled during the 60 day evaluation period that commences when the product is first installed, providing plenty of time to test the full product.

Additional Features and Limitations

Performance and System Overhead

BackupEDGE has been the subject of extensive performance profiling, during both backup and verify.

Standardized Pattern Matching

Specifying pathnames and wildcards is consistent throughout the program and user interfaces.

Virtual / Sparse File Processing

This is performed as a single pass process.

Limitations

*Backup**EDGE** 3.x* can read all archives created by older product versions. However, since it can do so much more than the old products, all archives created by the new release can not be restored by older releases.

Platforms

*Backup**EDGE*** is available for the following platforms...

- Linux® - Any version on an AMD64 or EM64T processor with a 6.x, 5.x, 4.x, 3.x or 2.6.x kernel, including Red Hat Enterprise Linux, Novell SUSE Linux Enterprise Server, Oracle Linux Server, CentOS, AlmaLinux, Rocky Linux, Ubuntu Server and more. Support levels for different releases are listed on the *Linux Support Tables* section of the *Microlite Web Site*.

- Linux - Any version on an Intel IA32 processor with a 4.x, 3.x or 2.6.x kernel, including Red Hat Enterprise Linux, Novell SUSE Linux Enterprise Server, Oracle Linux Server, CentOS, Ubuntu Server and more. Support levels for different releases are listed on the *Linux Support Tables* section of the *Microlite Web Site*.

- Xinuos SCO OpenServer 6.0.0, 6.0.0V and 6 Definitive, including Definitive 2018 build D2M1 and D2M2.

- Xinuos SCO OpenServer 5.0.5-5.0.7, 5.0.7V and 5 Definitive, including Definitive 2018 build D2M1.

- Xinuos SCO UnixWare 7.1.4 and 7.1.4+ and 7 Definitive, including Definitive 2018 build D2M1.

Summary of Other Changes and Additions

*Backup**EDGE** 3.x* features include:

- Support for *Red Hat Enterprise Linux 8.1* (03.03.00 build 2).

- Support for Oracle Linux Server 8.1 (03.03.00 build 2).

- Support for Ubuntu 19.10 Server (03.03.00 build 2).

- Support for Ubuntu 19.04 Server (03.03.00).

- Support for *Red Hat Enterprise Linux 8* (03.02.03 build 1).

- Support for bonded NICS in *Recover**EDGE*** for Linux (03.02.02 build 1).

- *Resource Editor* tab added to *Recover**EDGE*** (03.02.02 build 1).

- Support for SUSE Linux Enterprise Server 12 SP 4 (03.02.01 build 7).

- Support for SUSE Linux Enterprise Server 15 (03.02.01 build 6).

- Support for Ubuntu 18.10 (03.02.01 build 6).

- Support for openSUSE Leap 15 (03.02.01 build 4).

- Support for Red Hat Enterprise Linux 6.10 (03.02.01 build 3).

- Improved S3CLOUD (Amazon S3-Compatible) Performance (03.02.01 build 3).

- Support for CentOS 6.10 (03.02.01 build 3).

- Support for CentOS 7.5 (03.02.01 build 3).

- Support for Scientific Linux 7.5 (03.02.01 build 3).

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- Support for Ubuntu 18.04 LTS (03.02.01 build 3).

- Support for Red Hat Enterprise Linux 7.5 (03.02.01 build 2).

- Support for Oracle Linux Server 7.5 (03.02.01 build 2).

- Support for ClearOS 7.4 (03.02.01 build 1).

- Support for OpenServer 6 Definitive 2018 D2M1 (03.02.01 build 1).

- Support for UnixWare 7 Definitive 2018 D2M1 (03.02.01 build 1).

- Improved UEFI .efi file management (03.02.00 build 3).

- Support for Ubuntu Server 17.04 (03.02.00 build 2).

- Support for UEFI booting with *Recover**EDGE*** on multiple platforms (03.02.00 build 1).

- Support for SUSE Linux Enterprise Server 12 SP3 (03.02.00 build 1).

- Support for openSUSE LEAP 42.3 (03.02.00 build 1).

- Support for Red Hat Enterprise Linux 7.4 (03.01.05 build 3).

- Support for Ubuntu Server 16.04.3 LTS (03.01.05 build 3).

- Removed DevPay Resources [Deprecated by Amazon] (03.01.05 build 3).

- Full Ubuntu Server 16.10 and 17.04 support (03.01.05 build 2).

- Amazon S3 signature version 4 support (03.01.05).

- Updated communications and security libraries (03.01.05).

- Red Hat Enterprise Linux 7.3 and CentOS 7.3 (1611) support (03.01.04 build 2).

- GPT Support for Linux system disks (03.01.04 build 1).

- Updated all communications and security libraries (03.01.04 build 1 and 2).

- Java Commercial Code Signing Certificate update (03.01.03 build 6).

- P2V Support for Hyper-V (03.01.03 build 5).

- Ubuntu Server 16.04 LTS Support (03.01.03 build 5).

- Database Improvements for FFR/IFR (03.01.03 build 5).

- CIFS / SMB backups for Linux (03.01.03 build 2).

- Updated all communications and security libraries (03.01.03 build 1).

- Red Hat Enterprise Linux 7.2 / Oracle Linux Server 7.2 support (03.01.03 build 1).

- Ubuntu Server 15.10 support (03.01.03 build 1).

- Added Linux 4.x kernel support and distributables (03.01.03 build 1).

- Updated all communications and security libraries (03.01.03 build 1).

- Updated MySQL detection (03.01.02 Build 2).

- Improved Amazon DevPay interfaces (03.01.02 Build 2).

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- Red Hat Enterprise Linux 6.7 support (03.01.02 Build 2).
- Updated all communications and security libraries (03.01.02 build 2).
- NFS Backups (03.01.02 Build 1).
- GPT Support for Linux SharpDrives (03.01.02 build 1).
- Red Hat Enterprise Linux 7.1 support (03.01.01 build 4).
- Updated all communications and security libraries (03.01.01 build 3).
- Added Google Cloud Storage support to s3cloud Resource type (03.01.01 build 3).
- Ubuntu 14.04.2 supported. (03.01.01 build 3).
- Fixed issues on *RecoverEDGE* with OpenServer 6 and Dell servers with newer USB chipsets (03.01.01 build 3).
- Amazon S3 Bucket and Worldwide Region Support (03.01.01).
- EDGEMENU Java and ncurses Character interface fixes (03.01.00 build 3).
- CentOS 7 Server Support (03.01.00 build 2).
- Linux P2V Conversion for Red Hat Enterprise Linux 7 and CentOS 7 (03.01.00 build 2).
- Java Commercial Code Signing Certificate added to Java client (03.01.00 build 2).
- Red Hat Enterprise Linux 7 Support (03.01.00).
- Ubuntu 14.04 LTS Server Support (03.01.00).
- Linux P2V Conversion for Red Hat-based 6.x releases (03.00.07)
- Red Hat Enterprise Linux 6 Multipath Support (03.00.06).
- Ubuntu 12.10, 13.04 and 13.10 Server Support (03.00.06).
- SLES 11 SP3 Support (03.00.06).
- MD RAID support (03.00.05).
- SLES 11 SP2 Support (03.00.05).
- Open SUSE 12.2/12.3 Support (03.00.05b5).
- MySQL Hot Backups.
- Linux 3.x kernel support (03.00.04)
- SharpDrive™ support (03.00.03).
- Blu-ray Disc™ (BD-RE) support.
- New Scheduling System.
- Device Quotas.
- Archive retention times with "lazy" reclamation.
- Disk-to-anything-to-anything support.
- Multiple backups per medium on tape, Blu-ray Disc, DVD+RW, and DVD-RAM, and of course of URL and AWS Backups.

BackupEDGE 2.3 added internet cloud storage and many new operating systems:

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- Amazon Simple Storage Service (S3) [now called **DevPay**] is now supported as a storage Resource.

*Backup**EDGE** 2.2* added security improvements and a licensing change:

- A new FTP/FTPS client with many security improvements
- Relaxed FTPS rules. An encryption license is no longer required to use FTPS
- FTP/FTPS works on more server types
- SSL libraries have been updated
- A Cancel Jobs facility has been added to EDGEMENU

*Backup**EDGE** 2.1* added many new capabilities over its lifetime:

- Transparent Media™ Technology
- Network Attached Storage (NAS) support with **ftp** backups
- Backups to removable HD or dedicated archive directories
- Command line interface access to Resources
- Multi-Volume Fast File Restore / Instant File Restore
- Access Control List support under Linux, OpenServer 6 and UnixWare 7
- Media-free PXE booting for disaster recovery under Linux
- LVM2 support for disaster recovery under Linux 2.6.x kernels
- Support for Xinuos SCOoffice Server 4.1 and 4.2
- Web Services support for Sun Java 5 (1.5)
- Hot Plug device support
- WORM tape detection and support
- Tape media capacity reporting
- A Cancel Jobs facility has been added to EDGEMENU

*Backup**EDGE** 2.0* improved on almost every facet of its predecessor, as well as providing a variety of new features. Additions and improvements included:

- Choice of Character, Java™ and Web Services Interfaces
- Support for Modern Storage Devices
- Data Encryption (Optional)
- Enhanced Data Compression
- Unlimited Pathnames
- Additional Archive Integrity Checking
- Enhanced Data Format
- Features-based Licensing

Of course, as usual different build levels of the products support more Linux and UNIX releases and supplements, fix bugs and have minor enhancements.

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