



## ***How BitBackup Works***

*BitBackup* technology can do backups and restores many times faster than traditional methods while using far less storage space on the DRS Server by backing up only the small parts of files that have changed since the last full backup. It's local Data Store insures that multiple copies of the most recent backup files are maintained for added safety and failsafe operation.

*BitBackup results in a reduction in backup size by an average of 99.77%*

### **BitBackup's Local Data Store**

BitBackup maintains copies of the most recent versions of the files it backs up to the DRS Server in a local *Data Store*. Restoring from the local Data Store is automatic and VERY fast - the speed of the local Network or disk buss. The most common restores are done from the local Data Store instead of from the DRS Server.

BitBackup is far more reliable and failsafe than traditional online backup methods. It's local Data Store acts as a "hot spare" for backups, mirrored to the DRS Server. Restores are done first from the local Data Store, and fail over to the DRS Server only if the requested files are not available in the local Data Store.

Restores done from the local Data Store do not contact the DRS Server at all, and do not require an Internet connection. Therefore, in an emergency that takes the DRS Server offline, or brings down the Client's Internet connection, restores from the local Data Store can still be done.

The local Data Store can be maintained on each local computer, or it can be shared by all computers in a network on a network device.

### **Backups with BitBackup**

The first time a file is backed up using BitBackup technology, the entire file is backed up to the DRS Server, and a snapshot of the file is stored in the local Data Store.

Subsequent BitBackups of the same file compare the most current "live" version of the file to the snapshot stored in the local Data Store. Copies of the changes between the two files (called Patches) are created and backed up to the DRS Server.

Since these Patches contain only the changes made to the "live" file since the Reference File was made, they are often very small - just a few words or a paragraph out of a large document.



Patches are cumulative. Every patch has the ability to restore a file from the date of the most current Reference copy to the date of the Patch. Thus, BitBackup technology needs only one patch and one Reference copy to restore a file to any point in time.

Since Patches are cumulative, they tend to grow larger with time. At some point in time a Patch may approach the size of the original file, if that file is modified frequently. When that happens, BitBackup technology refreshes the Reference file in the local Data Store and on the DRS Server through a process called *Roll-Forward*. This reduces the size of the Patches to their minimum size again.

Thresholds for Roll-Forward can be set in two ways - by number of backups since the most recent full-file backup, or by the size of the Patch relative to the Reference file. When one of these thresholds is reached, BitBackup technology performs another full-file backup and (depending on the Purge/Retention Settings) erases the previous full-file backup, all its Patches, and the older Reference copy stored in the local Data Store.

BitBackup's Roll-Forward procedure is fully compliant with all the Purge/Retention Settings that are used with Incremental, Differential, and Full backup methods.

### **Restoring Files with BitBackup**

From a user's perspective, restoring files with BitBackup works the same way as the other backup methods, only much faster. From a technical perspective, however, it is quite different.

BitBackup first determines which files are needed to restore a full file by determining the Patch file needed to restore the selected version. It then looks up the Patch file and its associated Reference file in the local Data Store.

If both the Reference file and the Patch exist in the local Data Store, BitBackup restores them from the local Data Store without downloading them from the DRS Server. If they are not the correct versions (or they don't exist in the local Data Store), BitBackup downloads the correct versions from the DRS Server.

If the correct version of the Reference file exists in the local Data Store, but the correct version of the Patch does not, BitBackup downloads only the Patch from the DRS Server.

BitBackup then applies the Patch to the Reference file, converting it to a full file of the selected version, and copies it into its original location, or an alternate location if selected.



**BitBackup Efficiency**

The following table illustrates some typical file types and the tested percentage of file size reduction using BitBackup. Your actual results may vary, depending on many factors including the type of data stored, the number and size of changes applied, various user-controlled settings in the software, pre-backup file processing by applications out of DRS's control, and the methods used by application software to modify the target files.

Because there are so many variables that can affect the size of BitBackup backups, DRS cannot guarantee that you will achieve these results.

File Type	Original File Size (Bytes)	Changes Made to File	Changed File Size (Bytes)	BitBackup Size (Bytes)	Reduced Percentage in Backup Size
Text File	75,904	Added text to the end of the file	77,682	1,778	97.71 %
Microsoft Access File	407,552	Added 7 Records, Deleted 7 records, added a new table with 5 records	410,615	3,063	99.25 %
Bitmap File	272,358	Changed the Image Size	277,238	4,880	98.24 %
PDF Document	11,528,264	Added Inline text, Notes at the end of document	11,534,713	6,449	99.94 %
SQL Database	1,048,576	Added 4 records	1,050,894	2,318	99.78%
Word Document	13,005,336	Added a new table with 6 rows and 2 columns	13,014,890	9,554	99.93 %
WinZip File (Zip)	234,055	Added two text files to the zip file (1,188 and 2,388 Bytes)	237,631	3,576	98.50 %
Exchange Server	242,229,248	Added a new Mailbox	242,231,095	1,847	99.99 %
TOTAL	268,801,293		268,834,758	33,465	99.99 %