Evaluating Concentric Managed Backup

A Guide for the Technical Decision Maker

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Executive Summary

In this white paper, you will learn about some of the underlying technology and architecture behind the capabilities of Concentric Managed Backup.

Specific topics covered include:

- Unique Concentric differentiators
- How Concentric technology compares to other tape emulation and deduplication solutions
- How Concentric balances fast backup, single-pass restores, and data deduplication to offer dramatic reductions in your overall backup data footprint
- How Concentric performs end-to-end data deduplication
- Unique Concentric features that ensure the security and integrity of your data

Technical decision-makers should come away from this document with a deeper knowledge of the Concentric Managed Backup platform and its overall architecture. They should also gain more insight into why customers choose Concentric as the guardian for their own critical data protection processes.

1. Common Factors Driving the Popularity of Disk-Based Backup with Concentric

The face of corporate data protection has changed dramatically in recent years. This is due to a number of emerging internal and external factors that most corporations must take into account as part of their efforts to effectively evaluate the merits of any disk-based backup and unified recovery platform. Table 1 summarizes how such factors contribute to the increasing popularity of Concentric's disk-based, unified recovery platform.

Table 1. Factors Influencing the Adoption of Concentric Managed Backup

Factor	Drives the Popularity of the Concentric Managed Backup
Explosive growth in applications and their underlying data	Increased business reliance on critical, growing applications now requires: • Rapid backup of applications and data—with minimal disruption to systems or users • Fast local and remote restores to bring data "back online" after disruption • A cost-effective backup/recovery platform flexible enough to scale up, scale out, be managed in-house or out-sourced, as company needs grow and change.
Growth in distributed work environments and an emphasis on 24x7 system availability	As businesses evolve to include different regional and geographic facilities, new data protection needs have emerged: • Short (or non-existent) nightly backup windows now require quick completion of backup processes without bringing production systems offline • As regional offices emerge with limited access to dedicated IT staff, centralized IT organizations look to technology alternatives to help them simplify, automate and manage the protection of remote office data.
Emphasis on disaster recovery	Recent acts of nature and terrorism have prompted corporations to quantify the risk of extended downtime and take proactive steps to mitigate that risk in the form of faster, more immediate, local and off-site recovery.
IT efforts to contain operational and capital costs, consolidate resources and standardize processes	IT organizations are making progress in their efforts to develop a flexible, economical infrastructure that can adapt quickly to market or business changes. For data protection and recovery, this trend has translated into: • A move away from the use of separate or dispersed point solutions and IT silos. Companies are moving towards a unified backup/recovery platform supporting wide ranges of operating systems and application environments. • The need to quickly manage and report on data protection/recovery "readiness" from a central console or web interface. • The need to free up IT staff resources for more critical functions—replacing inefficient, largely manual tape-based backup/recovery efforts with more efficient, automated backup/recovery from disk.
Increased emphasis on regulatory compliance and data security	New legislation and IT governance initiatives are fueling the following moves: • Replacing less secure tape backup/tape transport with local/remote disk-based backup that includes end-to-end encryption over LAN or WAN connections. • Use of a central backup/recovery console with role-based security and backup job status information, and quick access to backup/recovery success and failure reports. • Rapid, point-and-click recovery of data sets for internal and external audits
Shifts in technology	A combination of technology factors make Concentric disk-based backup more attractive: • Many companies have already invested in wide area network (WAN) infrastructure that now makes highly compressed, disk-based backup "over the wire" very viable. • The emergence of lower-cost disk drives and the dropping overall cost of disk media now make online, disk-based backup an economical alternative to tape.

2. Concentric: Delivering the Perfect Balance of Performance and Efficiency

Several aspects of the Concentric Managed Backup architecture make Concentric uniquely suited to perform disk-based backup and recovery functions for such a wide group of customers. These include:

- **Perfectly Balanced Disk-based Backups:** The Concentric backup/recovery platform strikes the ideal balance between fast backups, a reduced amount of backup data sent across LAN or WAN connections, and reductions in the overall storage 'footprint' to subsequently store backup data.
- **Optimized, End-to-End Data Reduction and Deduplication:** Concentric Managed Backup is one of the few solutions that combines unique data reduction features on both the front-end (agent or source) and the back-end (target or "vault" system). Concentric Managed Backup data reduction technology on the front-end and its own post-processing Director-side deduplication combine to offer significant reductions in required storage capacities and bandwidth.
- **Easier, Less Costly Scalability:** Concentric avoids the hidden cost of scaling found in many solutions. Instead of spending inordinate extra time processing larger quantities of backup jobs or forcing the acquisition of more hardware, Concentric's architecture easily scales up (to accommodate larger amounts of data) and scales out (to protect larger numbers of servers).
- **Easy, Centralized Management**—Despite its sophisticated engineering, Concentric Managed Backup differentiates itself by extreme ease-of-use and management. Organizations wanting to standardize data protection processes universally—even across multiple, geographically dispersed offices—can do so easily from the same, straight-forward web-based console.
- **Unified, All-in-One Architecture**—Instead of requiring third-party integration to gain necessary features, Concentric Managed Backup developed its unified architecture to accommodate a variety of needs: From fast delta processing of changed data blocks to deduplication and end-to-end encryption.

In contrast to other data protection technologies, the following table demonstrates more of Concentric's benefits.

Table 2. Comparing Concentric Managed Backup to Other Disk-Based Data Protection Technologies.

Technology	Drawbacks	How Concentric Compares
Virtual Tape Library *or* Disk-based Tape Emulation	• **Longer backup times** due to ongoing need for daily incrementals, full backups. • **Increased cost of data storage** due to reliance on file-level backup (as opposed to block-level) and the need to store more data. Usually requires periodic off-load to tape. • **Feature-limited**—Features like deduplication may need products from more than one manufacturer, prompting more complexity in restores, implementation, or support. • **Bandwidth-intensive**—Especially for remote locations, many solutions require periodic full backups, consuming too much bandwidth.	• **Shorter backup windows** due to use of delta, block-level change processing (Concentric Managed Backup), and adaptive compression. No need for on-going incrementals and full backups. • **Reduced cost of data storage** due to use of block-level backup change practices and deduplication/optimization. Smaller storage footprint enables longer term storage on disk, versus a required off-load to tape. • **Feature-rich**—Features from deduplication to end-to-end encryption are native to the Concentric Managed Backup technology platform and fully supported by Concentric. • **Bandwidth-optimized**—Many features, from Concentric Managed Backup to adaptive compression significantly reduce the amount of data transmitted over the wire.

Technology	Drawbacks	How Concentric Compares
Tape Emulation Software and Hardware and/or Data Deduplication Software	• **More up-front backup processing** often required for source-based deduplication that occurs at the most granular, bit-level. • **Increased hardware costs** due to added processing required or the need to scale the system in order to protect more data or more servers. • **Software- and bandwidth constrained**. Many tape emulation solutions need to still perform periodic full backups can cause backup slowdowns and bandwidth congestion. • **Hardware-constrained.** Many solutions require costly up-front capital investment in specific hardware. This reliance on specialized hardware can adversely impact: o Scalability o Performance • **Accountability**. Hardware-based deduplication solutions are often add-ons to an existing backup solution. When problems occur, which vendor does the customer need to call for resolution in a combined hardware/software architecture?	• **Less up-front backup processing**, achieving the perfect balance of quick file reads, less granular, delta (block-level) processing for data reduction, advanced compression, and further deduplication on the target. • **Minimal hardware cost.** Concentric uses Concentric agents that can be added quickly to protect any new or existing server or device—without modifications to the existing customer architecture. • **Fully optimized software architecture.** Concentric Managed Backup is optimized at multiple levels to speed backups, send only changed data without the need for more periodic full backups, and minimized bandwidth consumption. • **Full accountability and support.** With Concentric, there's never a worry about who to call in the event questions arise. Concentric fully supports all facets of its Managed Backup solution and is dedicated to resolving every customer issue or question.

3. An Overview: How Concentric Managed Backup, The Unified Recovery Platform Works

Concentric Managed Backup offers true online, disk-to-disk data protection, with no tapes to manage or shuttle off-site. This means the same, automated data protection for your corporate headquarters and remote office—without the need to rely on non-IT staff to change out tapes, slow backups and restores, tape-related mechanical and reliability issues, or the need to use less secure, external couriers to move sensitive business data to another location. Three key software modules are involved in every Concentric Managed Backup backup/recovery platform:

- **Web CentralControl:** An easy-to-use, web-based console that enables centralized administration, role-based security assignments, job scheduling, retention policy creation and management of operations for multiple Managed Backup agents and their backup jobs. Fast, point-and-click restores are also performed from Web CentralControl.
- **The Concentric Managed Backup Agent:** This is a software agent installed on each server or device needing data protection, without requiring changes to underlying server hardware. The agent installs directly onto multiple operating system environments with minimal overhead. Communicating closely with the other two modules, the agent initiates on-going, delta (or block-level change) processing of backup data. It also works to perform adaptive compression for more compact data transmission over LANs or WANs. The agent also can encrypt data prior to its being sent.
- **The Concentric Managed Backup Director:** The director authenticates and accepts data received from the agent(s), then stores and manages the backup data in separate storage pools on its electronic "vault". The Director resides at a Concentric data center.

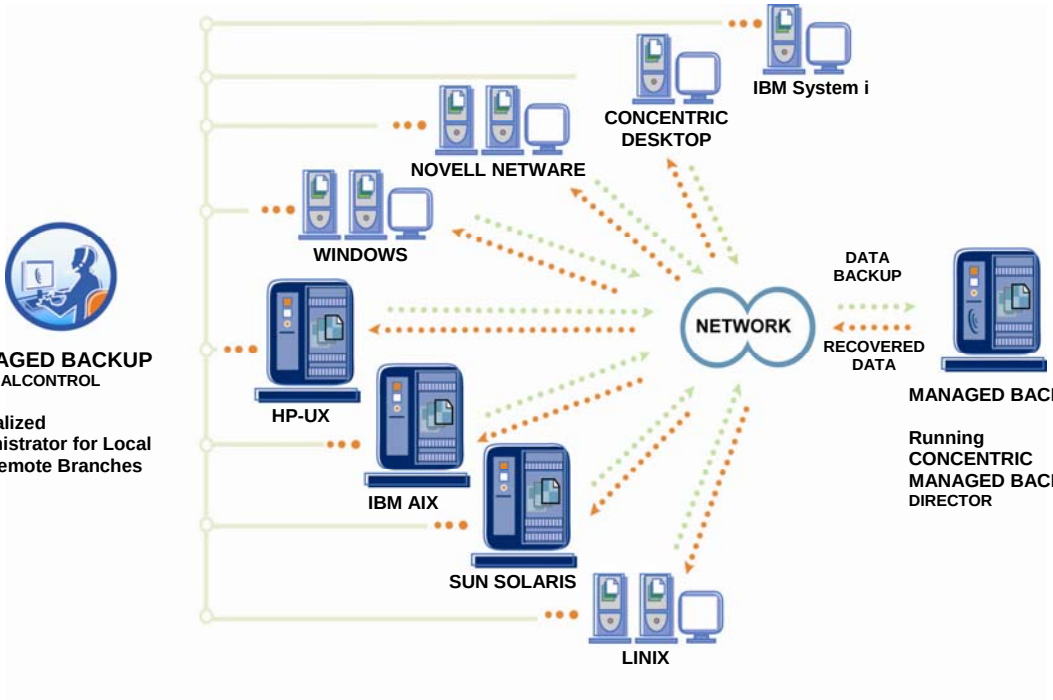

Figure 1. The Concentric Managed Backup Unified Recovery Platform Supports Multiple Operating Systems and Remote Office Data.

3.1 Reporting with Concentric Reports

The **Concentric Reports** module is an intuitive web-based interface with an in-depth view into the backup jobs stored within the Director "vault." With the ability to schedule automated email delivery of select backup data set reports to a group of users, **Concentric Reports** includes over a dozen reports to indicate everything from which backup jobs succeeded or failed (the Backup Status Report) to graphical depictions showing how much data storage has been used on the vault for all or some of a customer's backup jobs (the Storage Totals Report). Many compliance and auditing needs are easily addressed through **Concentric Reports**. Likewise, storage resource planning or future acquisitions are easier to estimate based on trend-based report data.

3.2 Application-Centered Backup/Recovery via Application Plug-Ins

Concentric Managed Backup integrates with today's most popular applications via application-specific plug-ins. Supporting more applications than most solutions, plug-ins perform "hot" application backups and recover critical data within individual databases, mailboxes, portals or cluster nodes. Available plug-ins support:

- Microsoft® Exchange
- Microsoft SharePoint Portal Server
- Oracle
- Microsoft SQL Server
- Microsoft Cluster Services
- VMware

In addition, Concentric Managed Backup offers integration with industry-leading Open File Manager (OFM) and Open Transaction Manager (OTM) to back up open files and applications such as Microsoft® Outlook®, Microsoft Office, IBM Lotus Notes, IBM Lotus Domino, and Novell GroupWise.

With this integration, customers can perform “hot” backups on such environments without needing to shut down their applications or close files.

3.3 Integration with Major Platforms

Concentric Managed Backup also offers broad operating system support for virtually any combination of platforms and applications, including:

- Microsoft Windows
- Novell NetWare
- Sun Solaris
- IBM AIX
- VMware
- Linux
- HP-Unix
- IBM System i

3.4 Support for Virtual Server Environments

Concentric Managed Backup offers integrated functionality with virtual server environments such as those running VMware. Using a fully functional VMware application plug-in, Concentric Managed Backup is able to offer disaster recovery protection of the entire virtual environment, including all guest systems and applications. The VMware plug-in backs up the virtual machines while they are online. Flexible, single-pass restores allow the virtual machines and critical applications to be recovered to either the original or alternate location. When teamed with ESX Server Agent, file-level restores also become an easy reality. Concentric Managed Backup’s Web CentralContol unified management console is then used to protect both physical and virtual environments.

3.5 Proven Recovery with Single-Pass Restores

Concentric Managed Backup performs a number of data integrity checks throughout to ensure backup data sets are always sound and readily available to be restored, when needed. Although only changed backup data is sent to the vault, Concentric Managed Backup operates quite differently from a typical incremental, tape-based backup. Building virtual “full” backups dynamically when the jobs arrive at the vault, Concentric Managed Backup makes data immediately available for recovery with a simple point-and-click, one-step restore process that Concentric calls a **single-pass restore**. The Web CentralControl management interface lets end users restore their own data, if the customer prefers.

4. Main Features of the Concentric Managed Backup Unified Recovery Platform

Concentric Managed Backup is a highly comprehensive backup and recovery platform that provides companies with the building blocks for successful data protection -- from high performance and efficiency to ease of use, flexibility, and scalability. Managed Backup also offers high levels of reliability and availability of backup data when you need it. Supporting a wide range of operating systems and applications, Concentric Managed Backup protects both physical and virtual environments simultaneously. Able to handle data at both corporate headquarters and remote offices, Concentric Managed Backup is known for fast performance, dramatic backup reductions and rapid restore capabilities.

4.1 Concentric Managed Backup: Optimized at Every Level for Fast Performance and Efficient Storage

The Concentric Managed Backup recovery platform is naturally fast and efficient in its backup and restore processes due to several features that optimize performance. Offering end-to-end deduplication, minimized traffic and reduced data footprints, Concentric Managed Backup is a sleek engine for driving rapid, reliable disk-based backup and recovery.

Table 3. Optimization Levels within the Concentric Managed Backup Platform Architecture.

Level	Concentric Optimization Features Used at This Level
1. Optimized at the Source (Concentric Agent)	• **Concentric Managed Backup** block-level delta processing technology optimizes processing of backup data and dramatically reduces the data stored at all backup phases. • **Reliance on Existing Resources.** Concentric agents can be added to existing servers or hardware, with the Concentric Director (vault) able to reside on new or existing basic "white box" hardware. • **Initial Seed Options** (the first full backups) may need to be performed to move backup data off-site. In these cases, Managed Backup offers several options for "seeding" the data to minimize disruption. These include: ***1) Deferred Backup*** (customers specify certain times of day for initial backup "seed" data transmission); ***2) QuickShip Vault*** (Concentric ships a mini-vault/Director unit for local, initial seed backups, then customers ship the unit back to Concentric for faster backup.).
2. Optimized in Transit	• **Adaptive Compression—**Reduces data blocks transmitted by 50% to 90%. • **Dynamic Bandwidth Throttling—**Lets customers control the amount of network bandwidth to be used for backup jobs. Especially useful for more frequent backups of more critical data or environments with limited bandwidth available. • **Backup/Restore Transfer Protocol (BRTP)—**Managed Backup's custom-developed, secure protocol runs transparently on top of TCP/IP. BRTP offers many levels of error-checking, error recovery and connection recovery for assured data integrity, continuation or resumption of backup sessions after a network outage. If a backup can't be completed, data backed up that far is valid. BRTP also ensures data encryption in transit.
3. Optimized at the Target (Concentric Director or Vault)	• **Deduplication at the Director Level**—further reduces the amount of backup data stored by typically 20%. By removing duplicate files or data blocks, deduplication achieves even greater reductions in the amount of backup data stored. • **Storage Pool Optimization**—enables longer data retention in smaller footprints. Optimization features include: • **Automatic Removal/Reclamation of Expired Blocks**—Per the customer's retention policy, the oldest backup blocks no longer required are deleted or moved to a different storage tier, with related storage space reclaimed. • Defragmentation of the Vault's Data. This further tunes the storage pool. • Verification of Safeset (Backup Data) Integrity

4.2 How They Work: Concentric Managed Backup, Compression, and Data Deduplication

The keys to fast backups and reduced storage space in the Concentric Managed Backup recovery platform are its Concentric Managed Backup, compression, and data deduplication technologies. Figure 2 shows them in operation.

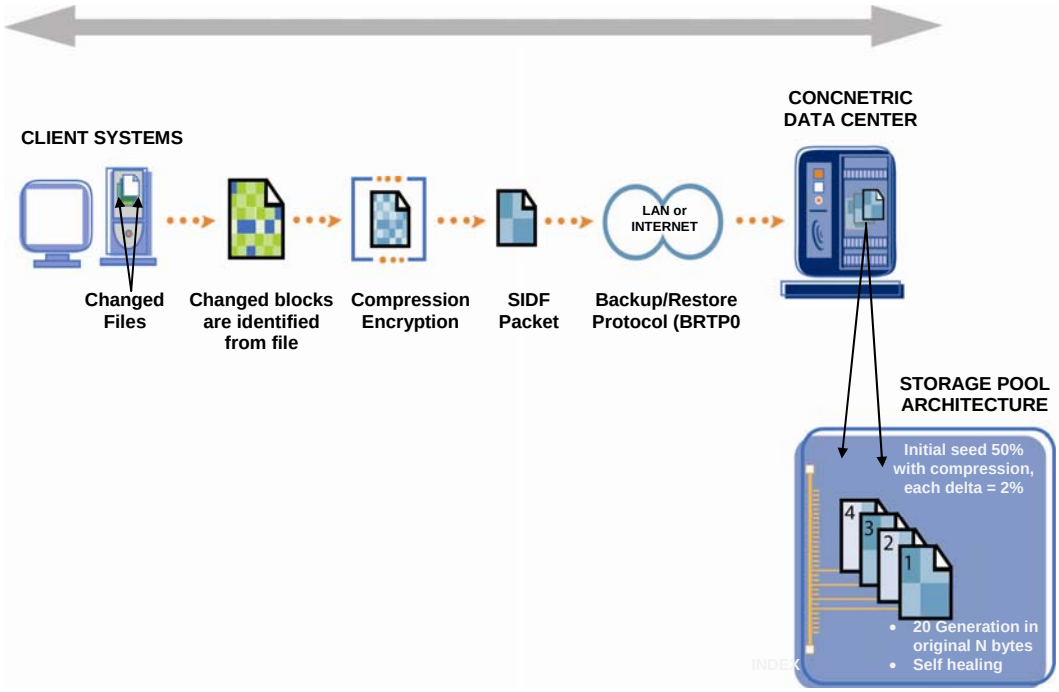

Figure 2. Concentric Managed Backup, Compression, and Data Deduplication in Operation

During the backup process, Concentric Managed Backup converts backup data into a common, system independent data format that is highly compatible with future systems or upgrades. This format also allows data to be easily restored from any other compatible system on the network.

4.3 Understanding Concentric Managed Backup Technology with Adaptive Compression

Concentric Managed Backup is the main method used by Concentric Managed Backup to dramatically reduce the amount of backup data transmitted to the Director. Over the years, Concentric Managed Backup technology has been updated, enhanced and field-proven to provide the best balance between storage optimization and optimal backup performance.

Concentric Managed Backup is a delta-block processing technology that searches, finds and transmits only those new or changed data blocks in files since the last backup. (An example of Concentric Managed Backup appears in Figure 3.) This up-front functionality offers customers storage capacity savings of upwards of 50:1 over traditional file-based backup methods. Some solutions may claim to process block-level changes, but their definition of a block is more in line with the size of traditional files. In contrast, Managed Backup identifies each 32KB of data as a block. Instead of processing file-level changes or changes to blocks smaller than 32KB, Concentric found 32KB to be the most efficient block size to reduce the amount of data transferred while speeding block-level processing.

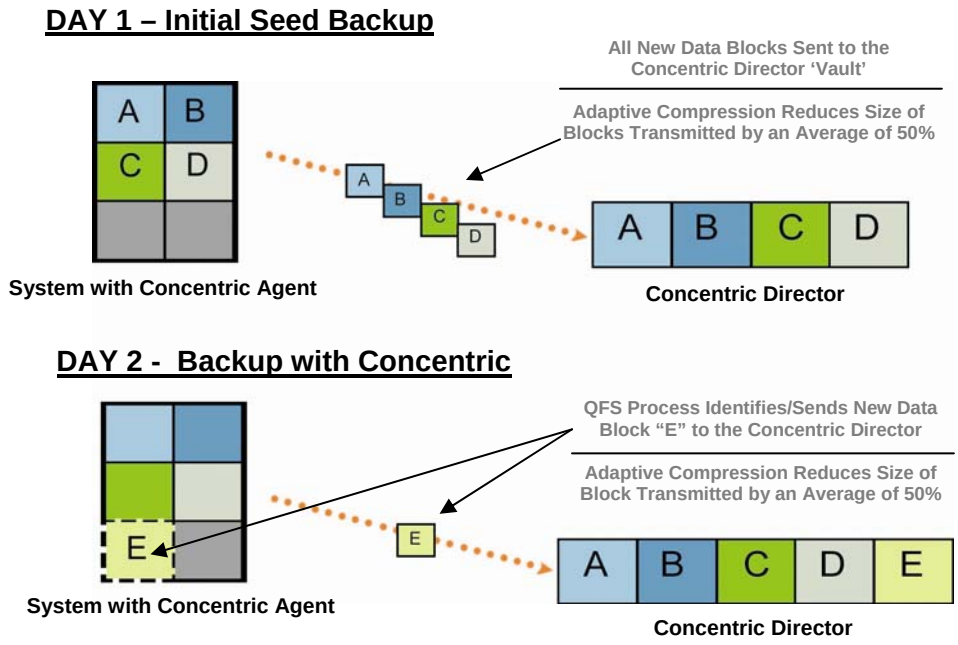

Figure 3. Concentric Managed Backup with Adaptive Compression.

Concentric Managed Backup incorporates a number of optimized processes to ensure rapid, front-end processing and reductions in data footprints. Common Concentric Managed Backup processes include:

- **Patented Quick File Scan (QFS).** Performs a rapid scan of files on every system or server containing an Concentric agent to identify any data blocks added or changed since the prior backup. Up-front processing time is extremely low while this process runs, ensuring optimal backup windows.
- **Adaptive Compression.** Reduces data blocks transmitted by an average of 50-90%. Concentric Managed Backup selects the best compression algorithm based on available CPU and network bandwidth.
- **Enhanced CPU Utilization.** Automatically splits backup jobs across multiple CPUs.
- **Self-Healing Backup.** Automatically recreates the delta index file if it is corrupted or missing. This way, Concentric Managed Backup continues to function and identify only new or changed blocks.

4.4 Understanding Concentric Managed Backup Deduplication Technology

Beyond Concentric Managed Backup's ability to reduce backup data footprints through its Managed Backup technology, Concentric goes one step further by also performing deduplication at the target (or vault), once backup data is stored on the Director system. This post-processing deduplication functionality ensures backup jobs perform optimally, yet continues to look for any duplicate data within each backup job "pool" that may have been renamed, but was not subsequently identified as a duplicate during front-end QFS and Concentric Managed Backup processing. Data deduplication at the Director level uniquely identifies matching blocks across all files in a backup job and eliminates

duplicates, where needed. Unlike competing solutions, this back-end process does not adversely impact the backup window or slow performance of backup jobs. Back-end deduplication can, however, help reclaim typically 20% more storage space on the Director system.

4.5 Understanding Concentric Security and Encryption Technology

A key benefit for many Concentric Managed Backup customers is their ability to perform easy, end-to-end encryption for all aspects of their backup data transactions—from the point of backup job creation to data transmission and data at-rest on the vault. Concentric customers are often quick to attest to the benefits of encrypting their highly sensitive backup data with Concentric Managed Backup.

- **Role-based security.** Role-based security options enable the customer to choose who has ultimate power to restore, encrypt and decrypt data, or perform other backup/restore related functions. With Concentric Managed Backup, the customer is the only holder of the encryption key. Once a customer sets up an encryption password and specifies encryption settings during setup of a backup job, backup data will not be able to be decrypted unless the same encryption password is supplied. In the event Concentric manages data at an off-site vault, no Concentric personnel can ever view the encrypted data. No Concentric personnel ever have access to a customer's encryption key. In information security circles, this is known as a "trust no one" security paradigm.
- **Encryption at creation, in transit, and at rest.** When configuring backup jobs, customers can choose from either 128-bit AES encryption or 256-bit AES encryption. Encrypted data remains on the vault or Director in its encrypted state. Since most data is transmitted as block-level changes, this offers further security for the transmission process. Customers transmitting data across external WAN connections can also transmit the data with 128-bit AES encryption over the wire. Concentric Managed Backup can even encrypt Web CentralControl communications via Secure Sockets Layer (SSL) encryption.

Conclusion

Concentric couples its field-proven Managed Backup technology with some of the most flexible and scalable delivery options in the industry. Backed by top-notch support and services that its customers have come to rely on, Concentric continues to evolve, refine and improve its Managed Backup architecture. It offers the best balance between fast, disk-based backups and reduced backup data footprints. Recovery also becomes an easy, one-step process.

Concentric uses the same technology and interface in its solutions—regardless of whether customers decide they want Concentric itself to store and manage their backup data or they'd rather do it themselves. Recognized for its end-to-end encryption methods, innovative disk-based vaulting concept and Managed Backup technology, Concentric offers customers a unified platform for rapidly updating and restoring backup data.

Learn how Concentric can help transform awkward backup processes into streamlined operations that you truly can "set and forget." Contact a Concentric representative today to schedule a demo. Call 866-500-9696 or email sales@concentric.com.