

## White Paper

# Network Backup Solution

### *NETWORK BACKUP OF VOS DATA STORED ON EMC SYMMETRIX USING A NETWORK BACKUP FACILITY AND StorGate Storage Gateways*

#### **Introduction:**

Many VOS users currently have Network Backup solutions such as Tivoli (TSM), VERITAS, or IBM's ADSM to back up other systems such as IBM, HP, Sun, Compaq, Dell, and other host computers. Many would like to be able to use these systems to back up their VOS data as well. This solution works especially well for Stratus VOS customers who currently store VOS data on EMC, IBM, or Hitachi RAID systems, which are already well-integrated with their Network Backup solutions. However, these products are not VOS file aware and therefore, without special intervention, cannot normally be used to back up VOS data.

DRA now provides a method for using Network Backup facilities to back up VOS data using SuperSync Enterprise Backup. The following explains the general methodology employed by DRA. StorGates and SuperSyncs can be attached to Continuums via SCSI or Fibre Channel and to V Series processors via Fibre Channel.

#### **General Concept of VOS Network Backups:**

DRA uses VOS disks mounted as raw disk partitions on EMC Symmetrix RAID systems. This feature eliminates operating systems-specific attributes of the partition, thereby allowing a Network Backup Server to recognize the VOS partition as a raw disk. Network Backup facilities such as VERITAS, Tivoli, and ADSM are able to recognize such raw partitions and to back them up as raw disk images. These backups are then handled by the Network Backup Server in the same automated fashion as they handle data generated by other systems for which they are file aware, with the exception that files are stored at the disk image level only. Thus VOS data can be stored and accessed on the enterprise tape silo via the Network Backup Server.

Once the raw disk images are backed up, they can be restored at the disk image level to any reserved raw partition selected by the user, provided that it is of the exact size as the original partition. Disk image restoration does not require operating system intervention the way a restore of a file level save does, so restores occur at hardware speeds. Once restored, the disk images can be accessed as active disks. Searches are accomplished using the same OS facilities as any other disk on the system.

## **Reserve Disk Capacity for Restoring Network Backups:**

DRA's approach to network backups provides the required reserve data capacity on which to store the restored disk images once they are retrieved from the Network Backup Server. This is accomplished by using one or more additional units of DRA's StorGate Storage Gateways. Each StorGate is mounted on the Stratus as up to 12 SCSI or 14 fiber virtual Stratus disks.

If it were not for this additional disk capacity, it would be necessary to overwrite an existing partition on the Symmetrix in order to gain access to the restored data. Since most users want to view the restored data while continuing to access their active VOS data, it would be intolerable to overwrite active data in order to view restored data.

## **Timestamping of Network Backups:**

As with VOS saves, the integrity of the files contained in a system backup is affected by the state of the application at the time the backup takes place. Important factors include operations that occur in main memory, application data, system data, and disk caching.

The only certain way to timestamp backups to guarantee the integrity of all files used in the application is to shut down the application. However, a number of less drastic measures provides an acceptable level of integrity for most users. These include:

- Dismounting a disk
- Closing a file
- Performing backups at times of low I/O activity

## **Enhanced Timestamping of Network Backups:**

Although it is possible to back up active open files, the best way to timestamp a backup is to create a realtime copy of the active disk and then break the synchronization between the two disks at a known optimal time. This creates an offline copy with a known timestamp.

Enterprise RAID's contain software utilities such as EMC's TimeFinder to accomplish this. TimeFinder creates Business Continuance Volumes (BCV) that are realtime copies of the active data volumes. When synchronization is terminated, these BCVs become timestamped offline copies that are ideal for backup.

The Network Backup facility creates a tape copy of a BCV which can be fully restored to the Enterprise RAID where it can be accessed by the same host or another designated host as an active disk. Therefore, StorGate makes this method available to VOS data.

## **Method for Performing Network Backups:**

Once timestamping has occurred, the backup of the Data Volume or BCV can commence immediately (note: the customer determines when this occurs after timestamping). This is accomplished automatically by the scheduler which is part of the Network Backup Server. The

Network Backup Administrator will schedule backups at a time agreed upon with the Stratus Administrator. No further effort is required. The backup occurs without the involvement of the Stratus computer, the StorGate(s) used to access the EMC Symmetrix, or the StorGate used to provide reserve partitions.

The following diagram shows a sample simplified configuration using two Stratus modules:

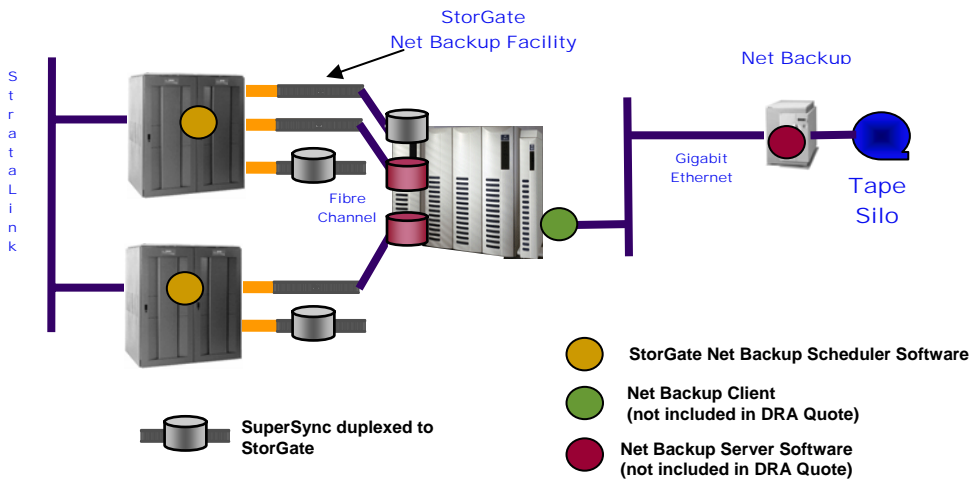
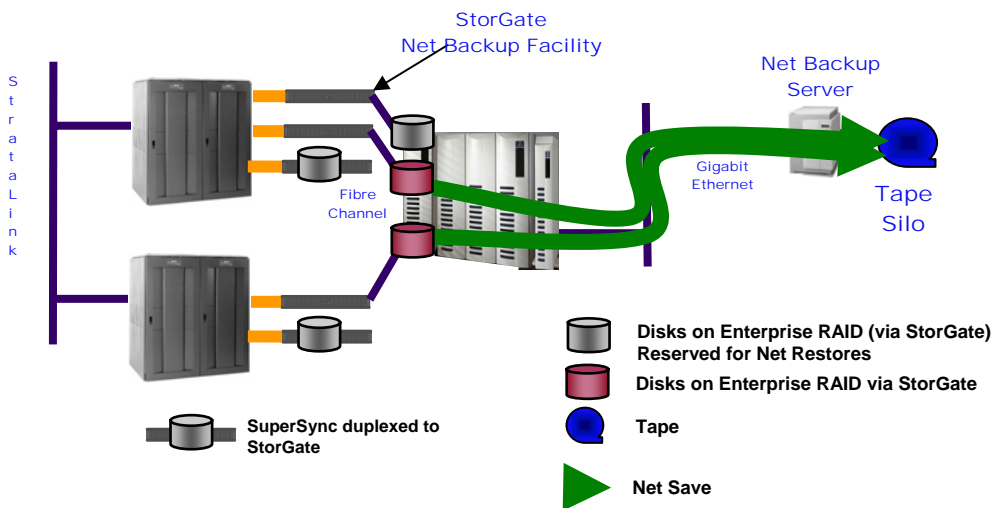


Figure 1: Sample Configuration during Network Backup Phase

Note that the configuration utilizes existing capacity and features of the EMC Symmetrix and the Network Backup facility for storing data and for performing backups. The StorGate is the only additional equipment or software required. This equipment is used only during the restoration of data from the Network Backup Server.

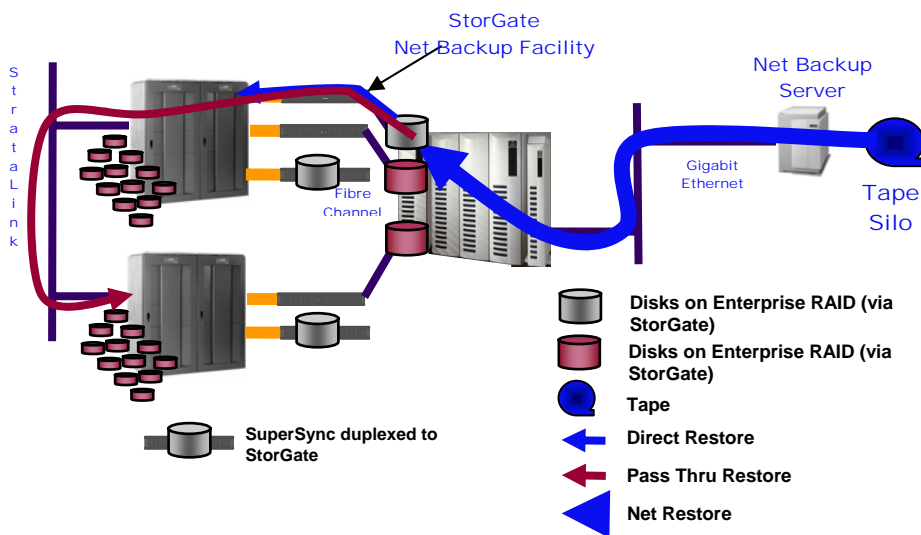
The following diagram depicts the save paths that would occur in the above configuration:



## Method for Performing Restores of Network Backups:

StorGate functionality is only employed when restores occur. When the disk images (Data Volumes or BCVs) are restored from tape, the restored volumes have the same disk ids as the active volumes from which they were copied. They cannot be restored by VOS on the originating Continuum until they have been re-named, a function automatically provided by the StorGate. StorGate Network Backup resolves this issue by a process called disk masking in which StorGate utilities examine the disk image at block level and re-label the disk to that of an otherwise unassigned disk id.

The following diagram depicts the restore paths that occur during restoration of a network backup:



Disk images (Data Volumes and BCVs) are thereby restored and mounted on VOS without interfering with the ongoing application operations. There is no affect on the live data. The result is all disks can be restored exact copies of the live data as it existed at the moment the timestamp occurred. All backups and restores occur at hardware speeds. There is no use of Continuum host cycles in either of these operations.

## Roll-Back Recovery Option:

Depending on the amount of data being backed up, often the StorGate partitions will contain sufficient excess storage for multiple copies of the backed up data. In such a case, it is feasible to pre-install one or more versions of the backed up disks (depending on how big the data base is). These copies then reside on the SuperSync ready for a single file search or even mounting of an entire system image. This also allows for a feature called "Roll-Back Recovery". This is useful, for instance, if there is a sabotage of data or a bad application upgrade is installed. In this case the user can instantly roll back to the most recent known good image of the disk.

Roll-Back Recovery is accomplished by scheduling a restore to the reserve partitions immediately following completion of a backup. This is a resourceful use of the automated features of the

Network Backup facility, requiring only that the initial setup includes a scheduled restore immediately following a scheduled backup. The user can then decide which sets are overwritten on future backup/restore operations. Assuming sufficient capacity, it is thus possible to reserve the last end of day, the last end of week, the last end of month, and/or the last backup prior to a system or application upgrade.

#### **File Level Searches:**

Note that once a backup has been pre-restored as described above, the entire backup can be searched at file level at will.

#### **Other Features of Network Backups:**

The proposed backup solution is as dynamic as the existing Network Backup facility infrastructure at the customer site. If the Network Backup facility infrastructure supports bi-directional, site-to-site (cross) backup for other platforms, the proposed backup solution will also support that functionality for the VOS platforms. This is a simple matter of network configuration under control of the Network Backup Administrator.

#### **Summary:**

StoreGate enables VOS users to include VOS data in their Network Backup solution thereby streamlining operations and reducing costs. StoreGate provides the conduit by which to store VOS data on EMC Symmetrix RAID systems which are then backed up by Varitas, Tivoli, and ADSM.