# ETERNUS SF
# AdvancedCopy Manager 13.4

# Overview

# Preface

## Purpose

This manual provides an overview of the ETERNUS SF AdvancedCopy Manager.
This manual describes the ETERNUS SF AdvancedCopy Manager product features that relate to backup and replication management in a large-scale storage area network and describes the functions provided by this product.

## Audience

This manual is intended for system managers who use or want to evaluate AdvancedCopy Manager. Knowledge of the following facilitates an understanding of the concepts described in this manual:

● Large-scale storage area networks
● The Fujitsu ETERNUS storage system
● The importance of backup and disaster recovery operations
● Ordinary hard copies, such snapshot, differential, and incremental copy
● Cluster environments

## Organization

This manual consists of 4 chapters.

### Chapter 1  Overview of AdvancedCopy Manager

This chapter provides an overview of ETERNUS SF AdvancedCopy Manager.

### Chapter 2  AdvancedCopy Manager Functions

This chapter explains the ETERNUS SF AdvancedCopy Manager functions.

### Chapter 3  AdvancedCopy Manager Features

This chapter explains the ETERNUS SF AdvancedCopy Manager features.

### Chapter 4  AdvancedCopy Manager Operating Environment

This chapter explains the operating environment for ETERNUS SF AdvancedCopy Manager.

## Related manuals

This ETERNUS SF AdvancedCopy Manager manual is included in the following series of manuals:

● ETERNUS SF AdvancedCopy Manager Overview
   Provides an overview of ETERNUS SF AdvancedCopy Manager (this manual).
● ETERNUS SF AdvancedCopy Manager Installation Guide
   Describes the installation procedure for ETERNUS SF AdvancedCopy Manager.
● ETERNUS SF AdvancedCopy Manager Operator's Guide
   Describes the operating procedures for ETERNUS SF AdvancedCopy Manager.
   A different operator's guide is provided for each supported operating system.
● ETERNUS SF AdvancedCopy Manager GUI User's Guide
   Describes the operating procedures for the Web-GUI of ETERNUS SF AdvancedCopy Manager.
● ETERNUS SF AdvancedCopy Manager Message Guide
   Explains the messages output by ETERNUS SF AdvancedCopy Manager and associated

troubleshooting information.
- ● ETERNUS SF AdvancedCopy Manager Operator's Guide for a Cluster Environment
  Describes the installation and customization procedures for ETERNUS SF AdvancedCopy Manager in a cluster environment.
- ● ETERNUS SF AdvancedCopy Manager Operator's Guide for a Tape Backup Option
  Describes the operating procedures for a tape backup with ETERNUS SF AdvancedCopy Manager.
- ● ETERNUS SF AdvancedCopy Manager Operator's Guide for Copy Control Module
  Describes the operating procedures for the ETERNUS SF AdvancedCopy Manager Copy Control Module.

## Abbreviation

- ● Microsoft(R) Windows(R) 2000 Professional, Microsoft(R) Windows(R) 2000 Server, and Microsoft(R) Windows(R) 2000 Advanced Server are abbreviated to Windows 2000.
- ● Microsoft(R) Windows Server(R) 2003, Standard Edition, Microsoft(R) Windows Server(R) 2003, Enterprise Edition, Microsoft(R) Windows Server(R) 2003, Enterprise Edition for Itanium-based systems are abbreviated as Windows Server 2003.
- ● Microsoft(R) Windows(R) XP Professional, and Microsoft(R) Windows(R) XP Home Edition are abbreviated as Windows XP.
- ● Microsoft(R) Windows Vista(R) Home Basic, Microsoft(R) Windows Vista(R) Home Premium, Microsoft(R) Windows Vista(R) Business, Microsoft(R) Windows Vista(R) Enterprise, and Microsoft(R) Windows Vista(R) Ultimate are abbreviated as Windows Vista.
- ● Solaris (TM) Operating System is referred to as Solaris.
- ● "ETERNUS SF AdvancedCopy Manager" is abbreviated as "AdvancedCopy Manager".
- ● A Manager of ETERNUS SF AdvancedCopy Manager is abbreviated to Manager of AdvancedCopy Manager.
- ● An Agent of ETERNUS SF AdvancedCopy Manager is abbreviated to Agent of AdvancedCopy Manager.
- ● ETERNUS2000, ETERNUS3000, ETERNUS4000, ETERNUS6000, ETERNUS8000, and ETERNUS GR series are referred to as ETERNUS storage system.
- ● The LT270, LT230, LT220, LT160, and LT130 are referred to as ETERNUS Tape Library.

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# Chapter 1   Overview of AdvancedCopy Manager

This chapter provides a product overview of the ETERNUS SF AdvancedCopy Manager (hereafter referred to as AdvancedCopy Manager).

# 1.1 What is AdvancedCopy Manager

## Purpose

ETERNUS SF AdvancedCopy Manager (ACM) is a Storage Management Software that provides reliable high-speed backup/restore and replication capabilities utilizing the Advanced Copy hardware functionality of Fujitsu ETERNUS storage systems.

AdvancedCopy Manager significantly reduces operational downtime for backup and replication requirements in large volume transaction intensive environments.

The product has been developed to collaborate closely with a range of mainstream database environments, including Symfoware Server, Oracle Database, SQL Server, DB2 and Exchange Server, to provide high speed reliable data copies where high uptime or continuous operation is paramount.

## Benefits of installation

Using the ETERNUS copy functionality, AdvancedCopy Manager facilitates copying between storage devices both within the same ETERNUS storage system and across multiple ETERNUS in the SAN or remotely located storage devices via high speed communications mediums.

These functions make ETERNUS SF AdvancedCopy Manager an effective and highly reliable disaster recovery solution, minimizing the risk of lost data and downtime.

## Features

The advantages of data copy using ACM with ETERNUS include:

- The backup command finishes within seconds, allowing the physical copying to take place in the background, in parallel with normal operations.
- Backup is performed internally by the ETERNUS storage system, minimizing the CPU usage on the host system.
- I/O is limited to within the ETERNUS storage system, where high-speed data copy can be maintained. Where Remote Equivalent Copy (REC) is used, there may be some additional overhead but the copy can still be maintained at a very high copy speed.
- Backup can be performed in a much shorter timeframe using the differential copy capability of the One Point Copy (OPC) and Equivalent Copy (EC) methods.
- Restorations can be performed at high speeds using the same advanced copy functionality depending on the type of backups originally performed.

## Provided functions

- Advanced Copy functions
    - Snapshot high-speed copy
    - Synchronous high-speed copy
    - Other copy functions
- Backup/Restore functions
- Replication functions
- Backup functions using the AdvancedCopy Manager Copy Control Module (hereafter called "AdvancedCopy Manager CCM")

# 1.2 AdvancedCopy Manager Architecture

AdvancedCopy Manager is structured into the following five components:

- ● Manager

  A management component that is installed on the Storage Management Server
- ● Agent

  An agent component that is installed on the Storage Server
- ● GUI

  A GUI component that is installed on the GUI client
- ● Tape Manager

  A tape component that is installed on the Tape server
- ● AdvancedCopy Manager CCM

  An AdvancedCopy Manager CCM component that is installed on the Copy Control Module server (hereafter called the "CCM server")

## 1.2.1 Storage Management Server

Only one Storage Management Server exists in any one AdvancedCopy Manager configuration. The AdvancedCopy Manager Management Module and Agent Module are installed on the Storage Management Server. If the Storage Management Server is also connected to ETERNUS, it can also perform the role of the storage server.

The Storage Management Server's primary role is briefly described as follows:

- ● Serve as centralized control center.
- ● Maintain a database of storage servers and associated devices such as transaction volumes, backup volumes and replication pairs.
- ● Accept commands from web base GUI and execute the relevant ACM function.

### Reference

A Storage Management Server is not required if only AdvancedCopy Manager CCM is used.

## 1.2.2 Storage Server

A Storage Server is a server that is connected to ETERNUS and executes the backup and replication related commands. The AdvancedCopy Manager Agent Module is installed on the Storage Server.

## 1.2.3 Tape Server

A Tape Server performs backup tasks to tape media in conjunction with Storage Server backup tasks. Either one or more Tape Servers can be configured in one system. The AdvancedCopy Manager Tape Manager must be installed on a Tape Server. ETERNUS SF TSM (hereafter referred to as TSM) is also installed on a Tape Server. TSM is a file backup management product which is called internally by the Tape Server to perform backup management.

## 1.2.4 GUI Client

The 'GUI Client' is an application that runs on the user's local machine. It can be used to monitor and manage the AdvancedCopy Manager environment. For details refer to "Workbench" in the "ETERNUS SF AdvancedCopy Manager GUI User's Guide".

## 1.2.5 CCM Server

The CCM Server is a server that performs backup without the need to install the AdvancedCopy Manager Agent on the server that is the backup source. The AdvancedCopy Manager Copy Control Module must be installed on the CCM Server.

For details, refer to "What is the AdvancedCopy Manager CCM?" in the "ETERNUS SF AdvancedCopy Manager Operator's Guide for Copy Control Module".

# 1.3 AdvancedCopy Manager Configuration Options

The Fujitsu storage system ETERNUS requires a Storage Management Server and at least one Storage Server. It is possible for both of these components to exist on a single server. However, if AdvancedCopy Manager CCM is used, a Storage Server is not required.
This section describes three possible configuration scenarios, excluding AdvancedCopy Manager CCM.

Reference
For information on the operating modes of AdvancedCopy Manager CCM, refer to "Supported functions" in the "ETERNUS SF AdvancedCopy Manager Operator's Guide for Copy Control Module".

## 1.3.1 Single Server

If there is only one Storage Server, install the Manager component of AdvancedCopy Manager. Since the Manager also provides AdvancedCopy Manager Agent functions, the Storage Management Server role and Storage Server role can be performed on one Storage Server.

**Figure: Single Server Configuration**
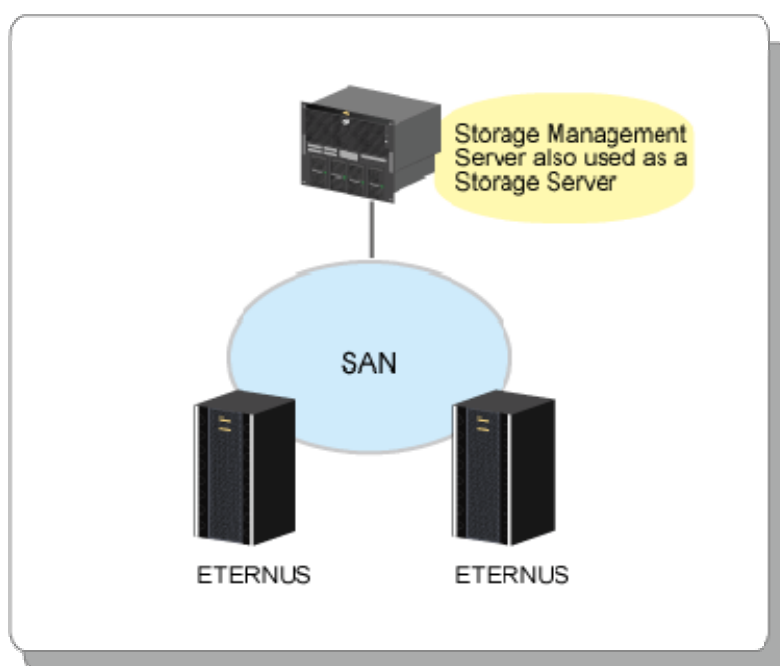


## 1.3.2 Multiple Storage Servers

If two or more Storage Servers are installed, the following two configurations are possible:
- A single Storage Server can perform the role of both Storage Management Server and Storage Server managing one or more ETERNUS storage systems.
- A server dedicated to the role of Storage Management Server can manage one or more Storage Servers
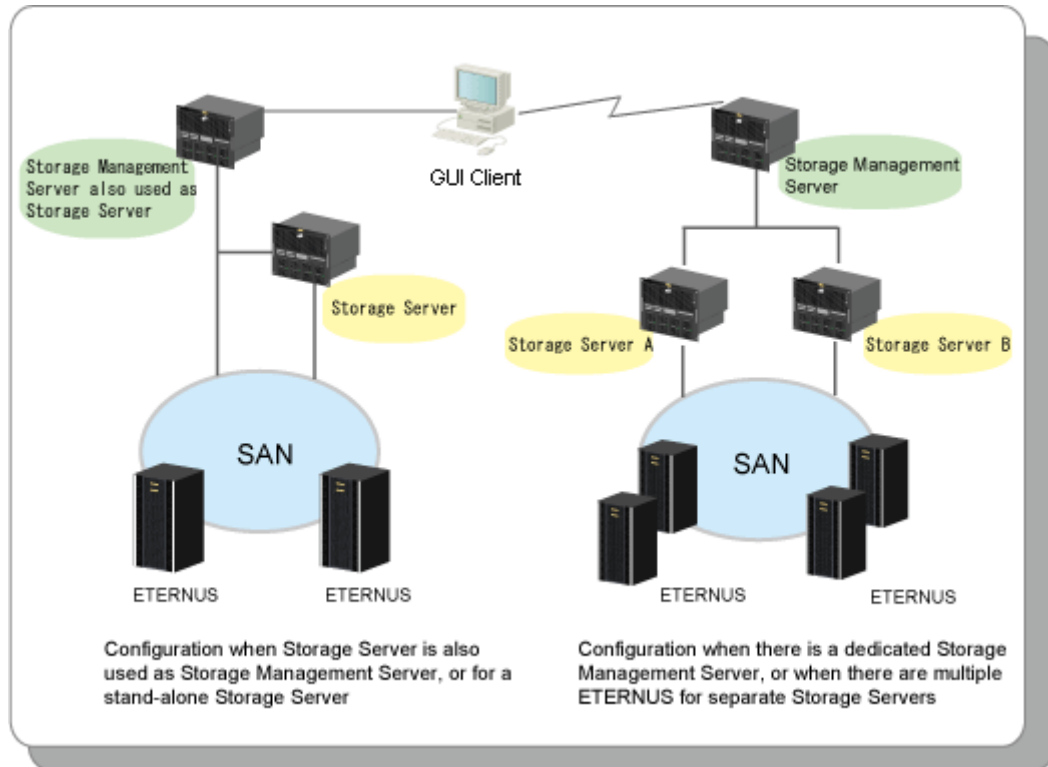
Multiple Storage Servers can manage multiple ETERNUS storage systems hosted by different Storage Servers, all of which are managed by a single Storage Management Server.
A Web Client can used to manage one or more AdvancedCopy Manager configurations via an internet connection.

The Management Module uses some system resources so the performance of a Storage Server on which it is installed may be adversely affected. For this reason it is recommended that the Storage Management Server functionality (the Management Module) should be installed on a dedicated server.

The following figure shows a configuration containing multiple Storage Servers.

### Figure: Multiple Storage Server configuration



Backup can only function within a single ETERNUS storage system connected to a single Storage Server, while Replication can be performed across multiple Storage Servers or ETERNUS storage systems.

The following table shows the available copy modes.

### Table: Copy Mode Availability

| | | Intra-ETERNUS | Inter-ETERNUS |
|---|---|---|---|
| Intra-Server | Function ality | Backup and replication | Only replication |
| | Copy Mode | OPC/EC/QuickOPC/SnapOPC/SnapOPC+ | REC |
| | Diagram |  |  |

| | | Intra-ETERNUS | Inter-ETERNUS |
|---|---|---|---|
| Inter-Server | Functionality | Only replication | Only replication |
| | Copy Mode | OPC/EC/QuickOPC/SnapOPC | REC |
| | Diagram |  |  |

## 1.3.3 Other configurations

AdvancedCopy Manager is supported in the following cluster systems but may vary according to the host operating system version:

- ● SynfinityCLUSTER
- ● PRIMECLUSTER
- ● VERITAS Cluster Server
- ● Sun Cluster
- ● Microsoft Cluster Server
- ● MC/ServiceGuard
- ● High Availability Cluster Multi-Processing

The following table shows the cluster systems that can be used with various types of operating systems.

### Table: Cluster systems usable with operating system types

| OS type | Cluster system |
|---|---|
| Solaris | SynfinityCLUSTER<br>PRIMECLUSTER<br>VERITAS Cluster Server<br>Sun Cluster |
| Linux | PRIMECLUSTER |
| Windows | SynfinityCLUSTER<br>Microsoft Cluster Server |
| HP-UX | MC/ServiceGuard<br>VERITAS Cluster Server |
| AIX | High Availability Cluster Multi-Processing<br>VERITAS Cluster Server |

Refer to "Support" in the "ETERNUS SF AdvancedCopy Manager Operator's Guide for a Cluster Environment" for details.

# Chapter 2    AdvancedCopy Manager Functions

This chapter describes the typical functions of AdvancedCopy Manager.

# 2.1 Advanced Copy Functions

AdvancedCopy Manager supports two distinct copy modes:

● Snapshot high-speed copy
Snapshot high-speed copy uses the ETERNUS OPC function. This creates a snapshot of the data, and records the update history in the history backup management information repository of AdvancedCopy Manager. Copy types available using this feature are:
— One Point Copy (OPC)
— QuickOPC
— SnapOPC
— SnapOPC+

● Synchronous high-speed copy
Synchronous high-speed copy uses the synchronization function of ETERNUS. This function maintains the transaction volume and the backup volume pair in a state of equivalence. Both volumes remain fully accessible to any application until a split is performed and the update history is recorded in the history backup management information repository (until a backup image is created). Both volumes are temporarily rendered inaccessible while the split is performed then immediately restored to a state where they are again accessible.
Copy types available using this feature include:
— Equivalent Copy (EC)
— Suspend/Resume
— Remote Equivalent Copy (REC)

Both snapshot and synchronous high-speed copying can be performed differentially. Once an initial copy has been made, only the updated parts are copied. Using the ETERNUS remote copy function snapshot or synchronous high-speed copying can be performed between ETERNUS storage systems at different locations.

# 2.1.1 Snapshot High-Speed Copy

AdvancedCopy Manager supports both Snapshot backup and differential copying. Point in Time recovery for high transaction database environments where roll-forward has been enabled is also available.  These features are particularly effective in minimizing system downtime and server I/O load.

## One Point Copy (OPC)

OPC executes a disk copy of the entire volume. The copy can be performed while the source volume remains fully accessible using the ETERNUS priority copy feature.

When the OPC command is invoked, ETERNUS creates a point in time snapshot of the source volume and then immediately returns a notification to the operator that the backup is complete, before any physical copying has even occurred. This allows for access to be returned to the transaction or source volume with little or no interruption while the copy is performed as a background process at the hardware level in the ETERNUS.

OPC is highly effective for the following applications:
● Generation backups where near continuous uptime is critical such as internet business applications
● OPC is the primary method for restoration from a backup volume irrespective of the backup copy method thus minimizing resultant downtime

● Maintenance of data used for archival purposes
● Where minimizing server I/O load is critical to overall business application performance.

The following diagram represents the process used in a One Point Copy (OPC).

**Figure: One Point Copy (OPC)**
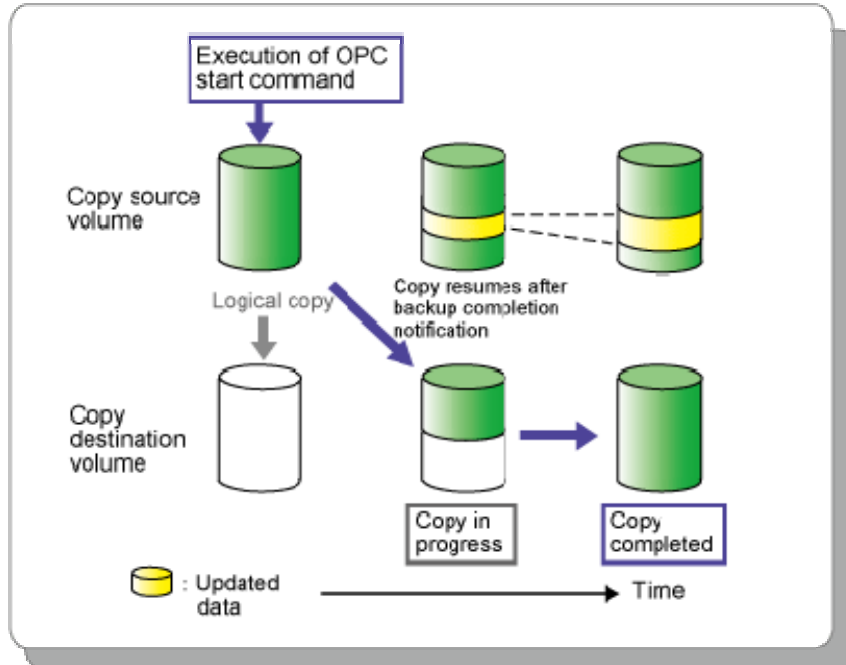


## Quick One Point Copy (QuickOPC)

QuickOPC is differential copy and requires that an initial copy exists.

When the QuickOPC command is invoked, it will determine if an initial copy exists, then will copy only updated blocks of data that have been tracked since the initial copy was created to the backup volume for that specific QuickOPC session.

If QuickOPC detects that an initial copy does not exist, it will create the initial copy using OPC. The differential copy method used in QuickOPC significantly reduces the time required for physical data copying in order to create a Point in Time snapshot whilst minimizing the I/O load on the storage system host server.

QuickOPC is highly effective where:
● Backup to disk where uptime is critical
● Creation of frequent restore points or generation backups

The following diagram represents the differential copy process used in a QuickOPC Copy after an initial copy has been created.

Figure: Quick One Point Copy (QuickOPC)
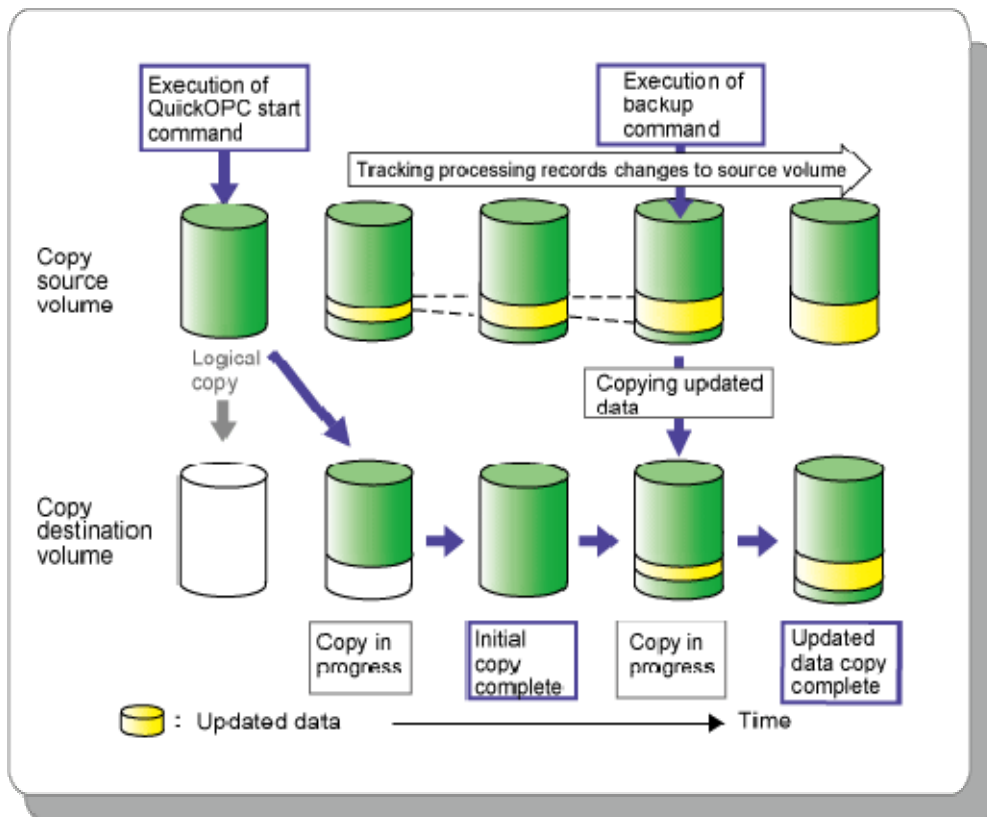
## Snapshot One Point Copy (SnapOPC)

SnapOPC uses the Copy-On-Write method to create a copy of the source volume as it was before any updates are made.

In a SnapOPC copy, the destination volume does not need to be of the same size as the source volume, using a Snap Data Volume (SDV in ETERNUS) instead as the copy destination. The SDV is usually only a fraction of the size of a source volume.

When an update is required to be made to the source volume, the change is held in an internal table while the original data on the source volume is first copied to the SDV. The change is then applied to the source volume. This method of backup copy is called Copy-On-Write. The Snap Data Volume (SDV) stores only original data that is to be modified or updated on the source volume.

The size of the SDV is relative to the rate of modification on the source volume and a utility is used to provide an accurate estimate of the size. If the source volume is relatively stable, only a relatively small SDV volume is required.

Although the physical size of the SDV maybe smaller, the logical size (that is, the size presented to the O/S) of the destination volume is in effect the same as the source volume. ACM achieves this by combining the original data copied to the SDV with the unmodified data on the source volume to form a logical view of the destination volume.

However, it should be understood that SnapOPC may be unsuitable for some purposes as the copy method can reduce access performance in the source volume, and any loss of data on the source volume would render the copied data unusable.

SnapOPC is typically used for:
● Temporary source for a cascade copy to alternate media such as tape
● Backup to disk for file servers and other data with a low modification rates

## Figure: Snapshot One Point Copy (SnapOPC)
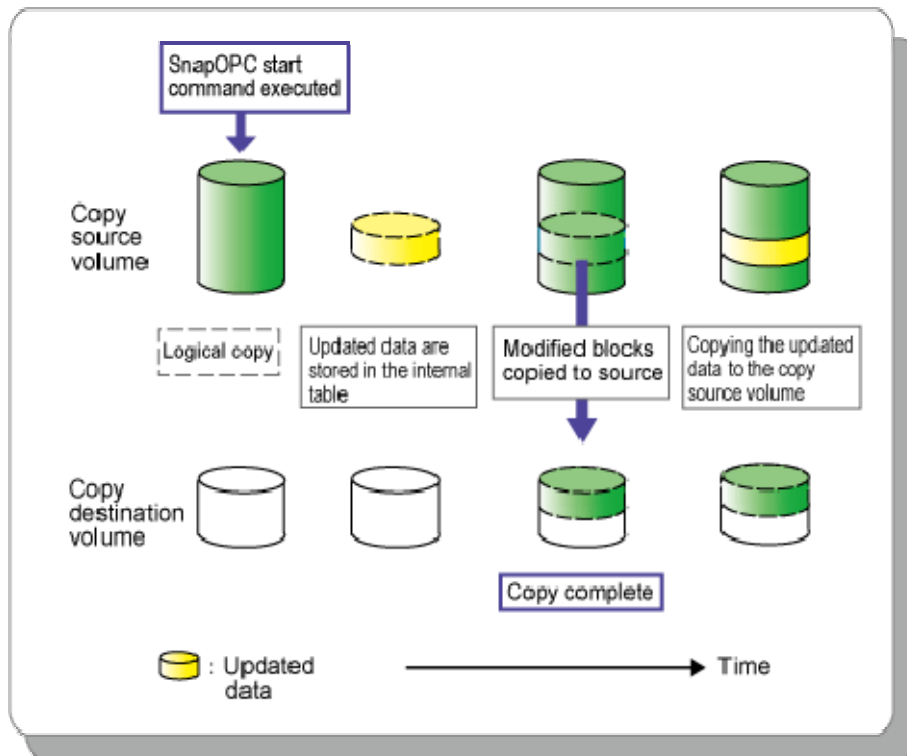


## Snapshot One Point Copy+ (SnapOPC+)

Like SnapOPC, SnapOPC+ uses the Copy-On-Write method to create a copy of the source volume as it was before any updates are made.
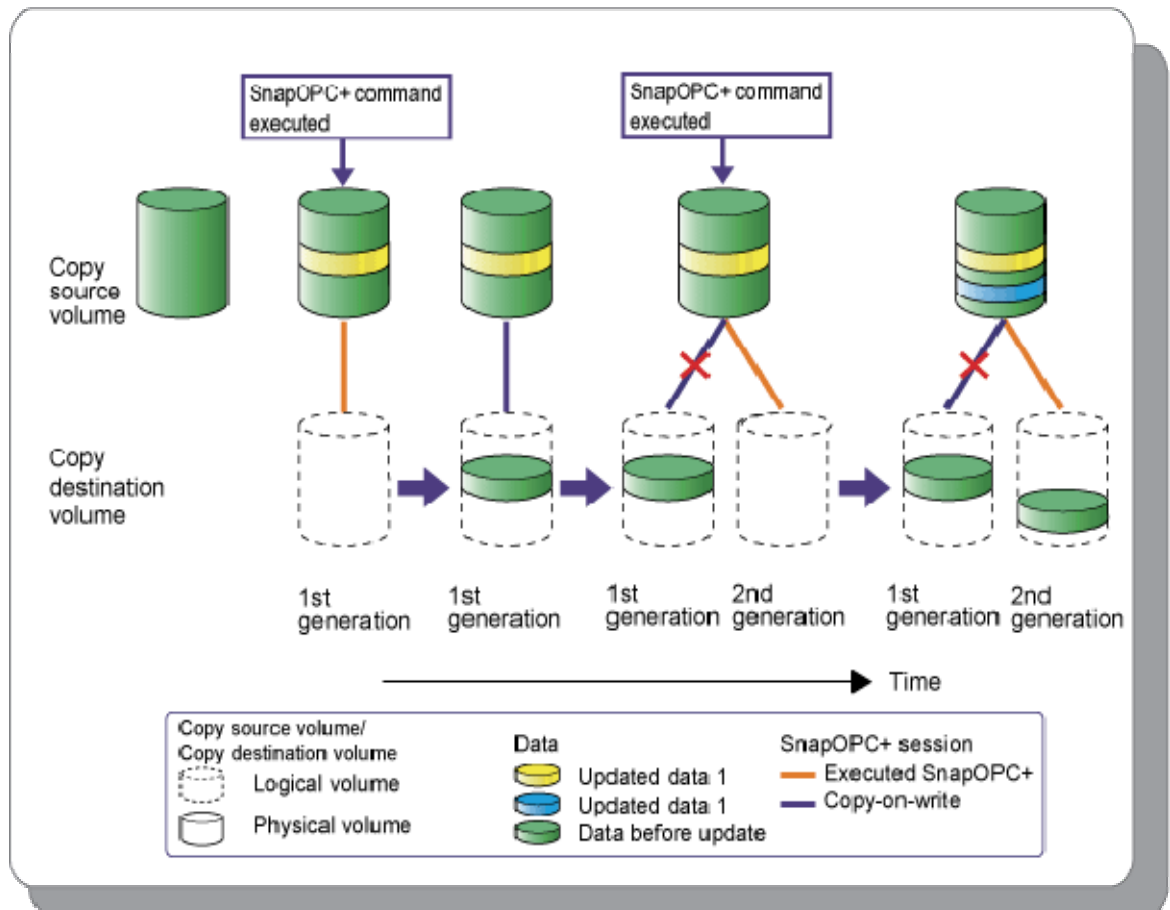
SnapOPC+ can save the copy source volume data as it was before any updates are made in snap generation units (units in which replication volumes were created). Since copy is performed only to the new copy destination volume, the access load on the copy source volume and the physical size used on the copy destination volume can be smaller than with SnapOPC. However, the replication function cannot be used for restoration when SnapOPC+ is used. If restoration is required, use manual copy from the copy destination volume.

Due to the mechanism and features of SnapOPC+, it is assumed that SnapOPC+ is used as a backup to enable recovery if soft faults, such as operator mistakes and software errors, occur. In order to also be prepared for hardware faults, Fujitsu recommends that, in conjunction with SnapOPC+, OPC/QuickOPC/EC/REC should be used to make a complete copy of data.

SnapOPC+ is typically used for:
- ● Temporary source for an cascade copy to alternate media such as tape
- ● Backup to disk for file servers and other data with a low modification rates

Figure: Snapshot One Point Copy+ (SnapOPC)

## 2.1.2 Synchronous High-Speed Copy

### Equivalent Copy (EC)

The Equivalent Copy feature of AdvancedCopy Manager invokes a process of synchronization between source and destination volumes to create a synchronized copy of the source volume. The purpose of the synchronization is to reach and maintain a state of equivalence with the source volume in order to create a temporary copy or archival backup.

The source volume remains available and accessible as there is no need to stop or suspend access to the source volume while the copy is built using the synchronization process.

When a state of equivalence with the source volume has been attained, the destination volume continues to be maintained as an image of the source volume.

At any subsequent point while the source volume and the destination copy are in this state of equivalence, the destination copy can be split from the source, thus creating a backup with history or a replica copy as at that point in time.

Equivalent Copy is highly effective for:
- ● Making backups much more quickly than with conventional backup processes, because backup data can be collected in parallel with ordinary transactions
- ● Reducing processing time and costs by means of distributed processing using copy data

## Figure: Equivalent Copy (EC)
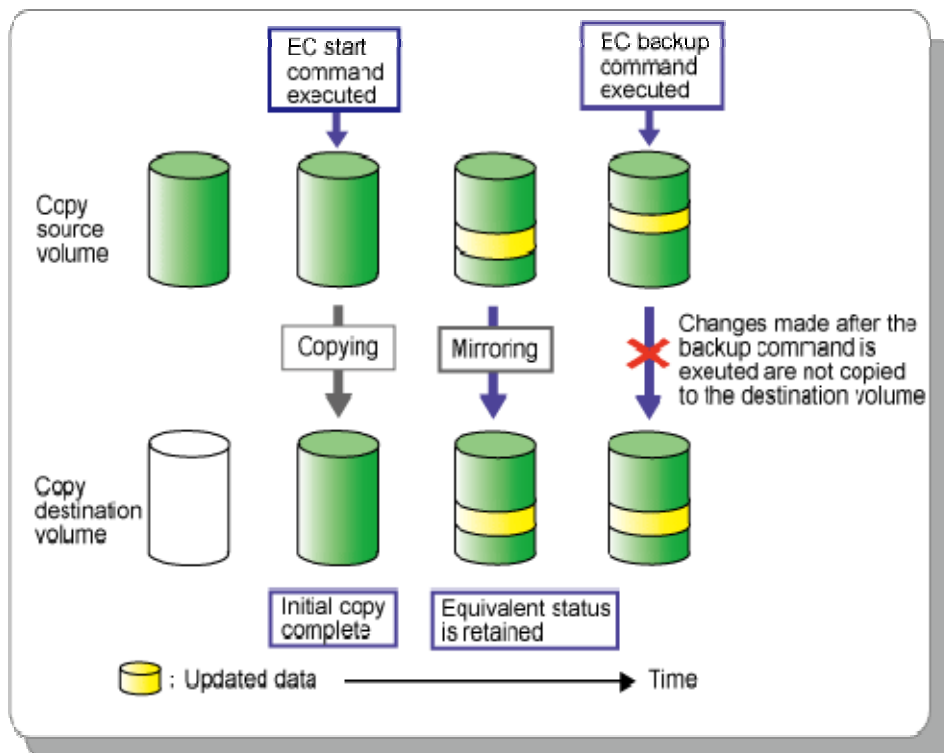


## Suspend/Resume Function (EC)

The *Suspend/Resume* option of the AdvancedCopy Manager Equivalent Copy (EC) function is used to create a backup after an initial copy has been built using the EC synchronization process. At this point, the copy source and copy destination volumes (Volume Pair) will have attained a state of equivalence.

The EC session is then suspended using the *Suspend* option, detaching the destination volume from the EC session to create a copy which can be used as a backup with history or as a source volume for a subsequent copy to an archive device. This copy could also be mounted and become available for use by other applications.

While the session is suspended all updates to the copy source volume continue to be tracked so that they can be applied to the destination volume should that EC session be subsequently resumed.

This allows the same destination volume to be reused as the base for a continuing backup, thus reducing the time required for backup.

The *Resume* option will invoke a re-synchronization process of the same source and destination volume pair where all of the tracked changes to the source volume will be applied to the destination volume to attain a state of equivalence again.

A suspend and resume process can be performed on the same volume pair as many times as required.

**Figure: Suspend/Resume function (EC)**
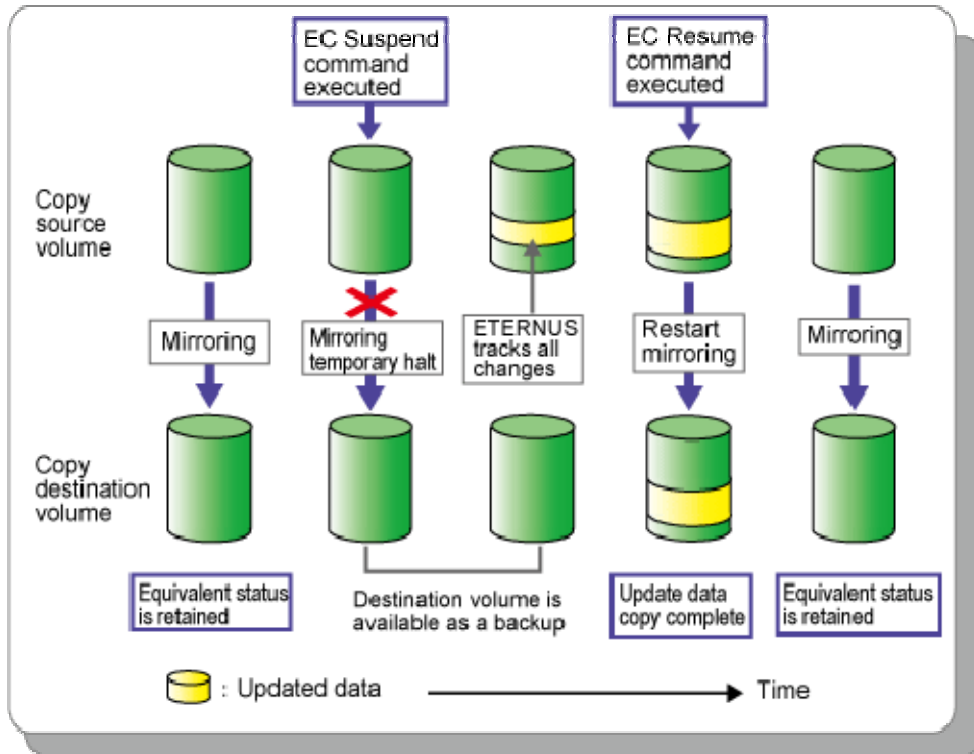


## Remote Equivalent Copy (REC)

Remote Equivalency Copy (REC) is used to perform EC in the following circumstances:

● REC replication is possible between different ETERNUS storage systems but hosted by a common Storage Server. These may exist on the same SAN but may be in geographically remote locations.

● REC Replication is possible between ETERNUS storage systems hosted by different Storage Servers.

REC has two transmission modes; synchronous and asynchronous.

Synchronous mode guarantees that the copy destination will always match the copy source.

Asynchronous transfer mode is typically used in the following circumstances:

● where there may be a significant communications lag between the devices

● used to avoid adversely affecting server performance and write performance on the copy source.

Asynchronous mode has two primary sub-modes which provide greater control over data transmission according to transaction intensity and or data volume, or available bandwidth between copy source and copy destination.

The default Asynchronous mode must however be selected to perform a split (create a backup or replica).

REC is highly effective for:

● Remote backup of a disaster countermeasure system or similar

Figure: Remote Equivalent Copy (REC)
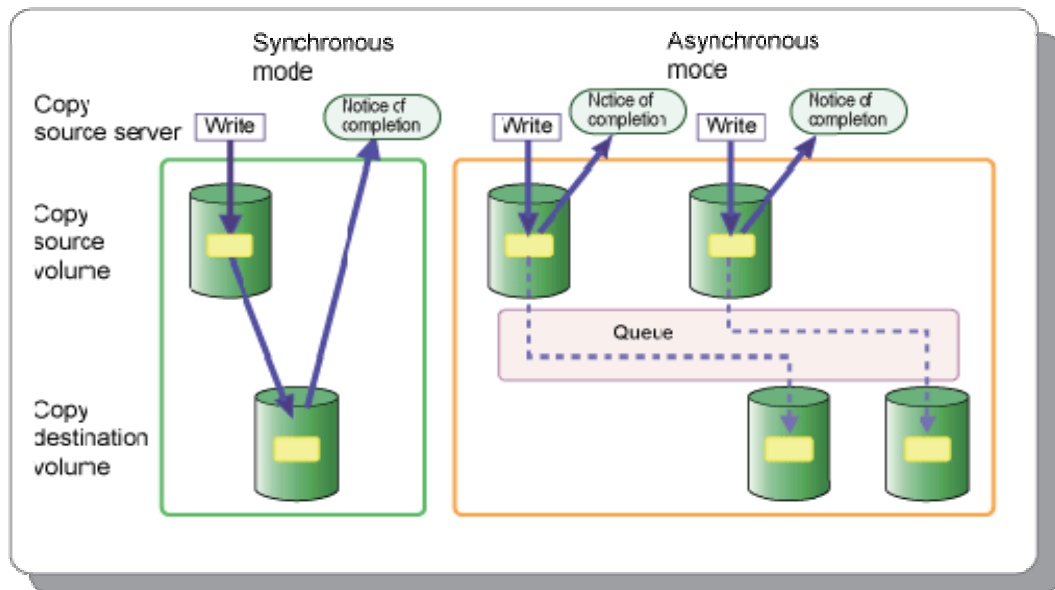


## 2.1.3 Additional Features

### Concurrent Copying

The AdvancedCopy Manager multiple copy function allows concurrent copying from a single source volume to multiple destinations. Only one of these destinations can be in a different ETERNUS.

### Cascade Copying

Cascade copying involves specifying the destination of one copy process as the source of a subsequent copy. One copy might be used as a nearby operational backup and another as a remote copy for disaster recovery or archive.

Possible copy combinations for cascade copy are:
- ● A copy made with OPC used as the source for REC
- ● A copy made with EC used as the source for REC
- ● A copy made with REC used as the source for OPC
- ● A copy made with REC used as the source for SnapOPC
- ● A copy made with REC used as the source for EC

# 2.2 AdvancedCopy Manager Backup and Restore

This section describes the backup and restore functions provided by AdvancedCopy Manager.

## 2.2.1 Backup

Features of backup using AdvancedCopy Manager include the following:
- High-speed backup between volumes regardless of volume capacities
- The advanced copy functions of ETERNUS (One Point Copy and Equivalent Copy) are used to significantly reduce the operational impact of a backup or restoration.
- Online backup is supported in mainstream database environments.
- Faster backups can be made by performing updates of differential copies.
- AdvancedCopy Manager can automatically select destination volumes to be used for backup. Alternatively, you can define explicit relationships between source volumes and backup volumes.

## 2.2.2 Restore

The backup management information stored by AdvancedCopy Manager allows data to be restored from the most suitable backup volume to a transaction volume. This is performed using the OPC hardware function and the history management information saved by AdvancedCopy Manager to restore to a point in time.
By default, data will be restored to the transaction volume that was the backup source; however, it is possible to change the restore destination.

## 2.2.3 Tape Backup

AdvancedCopy Manager provides an integrated tape backup capability that delivers disk to disk to tape backup functionality when used in conjunction with an ETERNUS Tape Library. Backup to tape is enabled by installing dedicated Tape Server and AdvancedCopy Manager software.
Backup to disk is implemented as normal using the same hardware functions of ETERNUS (One Point Copy and Equivalent Copy) and a subsequent backup to tape is then performed from the AdvancedCopy Manager backup volume to tape.
In addition, data saved to tape for disaster recovery purposes can be recovered to a disk array unit if that suits the data recovery environment.
This maximises transaction volume uptime by taking advantage of the ETERNUS hardware functions.

# 2.3 Replication

Replication in AdvancedCopy Manager uses the same advanced copy functions (OPC and EC) of ETERNUS to perform high-speed replication. It can be used explicitly as a replication mechanism or as an online backup function with history.

For the purpose of this overview, replication is defined as copying that is intended for concurrent use by other applications. The destination volume in a replication remains accessible, unlike destination volumes in backup which are typically unmounted.

Replication is not limited to within a single Storage Server or a single ETERNUS storage system. Using REC, the replication can also be performed across different ETERNUS storage systems regardless of geographical locations.

Features of replication using AdvancedCopy Manager
- ● With the AdvancedCopy Manager replication function, replication can be configured in two directional modes:
  - — Uni-directional: copying can only be performed from the source volume to the destination volume
  - — Bi-directional: copying can be performed in either direction between the two volumes
- ● If the copy source and copy destination volumes are both in the same ETERNUS and hosted by the same Storage Server, data can be copied in real-time.
- ● High-speed replication can be executed at the following databases without interrupting operations that are in progress:
  - — Symfoware Server (Fujitsu)
  - — Oracle Database (Oracle Corporation)
  - — SQL Server (Microsoft Corporation)
  - — Exchange Server (Microsoft Corporation)
  - — DB2 (International Business Machines Corporation)

# 2.4 Backup using AdvancedCopy Manager CCM

Features of backup using AdvancedCopy Manager CCM include the following:

- ● It is not necessary to install the AdvancedCopy Manager Agent on the server that is the backup source.
- ● Backup can be performed regardless of the OS that is running on the backup source server.
- ● By isolating the LAN connected to the backup source server from the CCM server, security can be enhanced.

For details, refer to the "ETERNUS SF AdvancedCopy Manager Operator's Guide for Copy Control Module".

# Chapter 3　AdvancedCopy Manager Features

AdvancedCopy Manager includes a number of features that support the ETERNUS hardware functions. Backup configuration and generation management are provided, and history information is managed to enable data restoration from the latest or previous generations of backed up data. AdvancedCopy Manager also provides web client operation and user authentication capabilities.

The table below provides a comparison of AdvancedCopy Manager features available in backup and replication.

Table: Comparison of AdvancedCopy Manager features in Backup and Replication

| AdvancedCopy Manager feature | Backup | Replication |
|---|---|---|
| Backup policy and generation management | Yes | No |
| History management | Yes | No |
| Storage management | Yes | Yes |
| Destination volume selection | Automatic / Manual | Manual |
| Command line operation | Yes | Yes |
| Web client operation | Yes | Yes |
| Authentication management | Yes | Yes |

# 3.1 Policy Management

The policy management function specifies the number of preserved backup generations and the number of days that should elapse between backups of a transaction volume. If this interval has been exceeded, the number of days' delay can be displayed.

# 3.2 History Management

The history management function manages information relating to preserved backup generations containing previously backed up data. Backup history can be displayed to check information such as the backup volume names and backup date of backup data under generation management.

# 3.3 Storage Configuration Management

The storage configuration management function manages the configurations of source volumes (volumes to be backed up) and destination volumes (volumes to which a backup should be saved).

# 3.4 Management using a Web Client

A comprehensive array of ACM functionality is available in a Web Browser Client interface as a user friendly alternative to executing tasks manually at the CLI. The computer on which the web client is running does not need to any AdvancedCopy Manager software installed. The following functionality is available using the web client:

- ● Security management
- ● Device configuration
- ● Progress status
- ● Backup management
- ● Replication management

# Chapter 4   AdvancedCopy Manager Operating Environment

This chapter describes the AdvancedCopy Manager operating environment.

# 4.1 System Conditions

Both Manager and Agent Modules of a Storage Management Server are supported on the following operating platforms:
- Windows
- Solaris
- Linux

The Storage Server agent module is additionally supported on the following operating platforms:
- HP-UX
- AIX

The Tape Server is supported on the following operating platform:
- Solaris

The GUI client is supported on the following operating platform:
- Windows

The CCM Server is supported on the following operating platform:
- Windows

Different product levels of AdvancedCopy Manager have differences in functionality. Therefore, Fujitsu recommends that the Management Module and Agent module have the same revision level.

Refer to the following for compatibility details:
- "ETERNUS SF AdvancedCopy Manager Installation Guide".
  - "Hardware requirements"
  - "Software requirements"
- "ETERNUS SF AdvancedCopy Manager Operator's Guide" for the relevant platform/function.
  - "AdvancedCopy Manager operating environment"
  - "Operating environment"

# 4.2 Supported Devices

AdvancedCopy Manager supports backup at the device level, and supports partition, volume group, slice, and similar devices. Volume compatibility depends on the active system configuration.

Refer to "AdvancedCopy Manager device support" in the "ETERNUS SF AdvancedCopy Manager Operator's Guide" for the relevant operating platform for details.

For details on AdvancedCopy Manager CCM, refer to "Supported functions" in the "ETERNUS SF AdvancedCopy Manager Operator's Guide for Copy Control Module".

# Glossary

The special terms used in this manual are explained below.

## Access path

Path required by a server to access disks in an ETERNUS storage system

## Active site

The ACM backup environment that is normally active

## Advanced copy function

Hardware-based copy function of ETERNUS storage systems. This is a generic name of EC and OPC.

## AdvancedCopy Manager agent

Generic term referring to the daemons and applications used for backup or replication.

## AdvancedCopy Manager client

Generic term referring to the GUI Client that operate in a storage management client.

## AdvancedCopy Manager database

Generic term referring to management information such as registry, repository and management files for AdvancedCopy Manager.

## AdvancedCopy Manager manager

Generic term referring to AdvancedCopy Manager-related services and applications existing in a Storage Management Server.

## AdvancedCopy Manager tape agent

Generic term referring to the applications used for tape backup

## AdvancedCopy Manager tape manager

Generic term referring to the Tape Server daemons and applications related to AdvancedCopy Manager in the Tape Server

## Affinity Group

Management information on the ETERNUS storage system that shows the association between the Logical Unit Number (LUN) that can be recognized by the host, and the Logical Volume Number managed within the ETERNUS storage system.

## Authentication management files

Generic term for the file where authentication management saves information on users and usage. There are two or more types and it is kept for every Storage Server with a repository.

## Backup history

Backup data that is managed by backup management, and other backup related information

## Backup management files

Generic term for files used during backup operations containing management information such as volume and server details. These files are stored in each Storage server and can be backed up by the resource backup command.

## Backup management screen

GUI Client screen for backup management.

## Backup server operation

The type of operation that uses a dedicated backup server that copies the copies destination volume to a tape device. The server is only connected to the copy destination volumes.

## Backup synchronous processing

The process of synchronizing the contents of a transaction volume and a backup volume in preparation for synchronous backup operations.

## CA (Channel adapter)

The adapter card used as an interface with server HBA/switch found in a Storage Server.

## Cascade Copy

Group two or more concurrent copy processes by assuming the copy destination of one to be a copy origin of another.
Refer to the SA/SE handbook of the ETERNUS Series for the requirement of the cascade copy.

## CCM Server

The server where the Copy Control Module is installed.

## CM (Controller module)

The controller that manages devices within ETERNUS. The CM to be used as the access route (the CM in charge) is set separately for each RAID group in order to achieve load balancing.

## Copy Control Module (CCM)

A tool that enables backup using the Advanced Copy function of the ETERNUS storage system. One advantage is that it can be used without installing the AdvancedCopy Manager Agent on the backup source server (the transaction server).

## COS

The service class of the fibre channel. Classes 2 and 3 are general now, and the difference between classes 2 and 3 is that only class 2 requires the acceptance confirmation for frame notice assignment.

## Day management backup

Backup operation that manages backups according to a specified number of preservation days. This backup operation is available only for backing up data to tape.

## Device map file

File that describes both the relationship between transaction volumes and backup volumes for backup management, and the relationship between copy source volumes and copy destination volumes for replication management

## Differential OPC

This is a previously used term for QuickOPC. Refer to the paragraph on QuickOPC for an explanation.

## Disaster Recovery site

An environment prepared at a different location to be used for data recovery after a disaster.

## EC

This is an abbreviation for Equivalent Copy. It is one of the copy functions of the hardware devices in the ETERNUS storage systems. This function maintains the mirror state between the disks in a hardware device. When detach control is executed from software, a copy of such a disk is created.

## Equivalency maintenance state

A state in which the EC function maintains the contents of a transaction volume and backup volume in precise equivalence.

## ETERNUS

Brand name for Fujitsu's storage systems
AdvancedCopy Manager provides high-speed backup and replication functions by linking with the following devices:
● ETERNUS disk array
  (ETERNUS2000/ETERNUS3000/ETERNUS4000/ETERNUS6000/ETERNUS8000/ETERNUS GR series)
● ETERNUS NR1000F series network disk array
● ETERNUS tape library (ETERNUS LT series)

## ETERNUS GR series

Generic name for Fujitsu's disk array devices (GR720/730/740/820/840).

## ETERNUS VSS Hardware Provider

The ETERNUS VSS Hardware Provider (hereafter called "VSSHP") is software that provides the ETERNUS storage system service, based on the interface provided with the Microsoft Volume Shadow Copy Service (hereafter called "VSS").
In AdvancedCopy Manager, during backup of the Exchange database, the VSSHP function may be used to perform backup.
For details on VSSHP, refer to the "ETERNUS VSS Hardware Provider software manual".

## ETERNUSmgr (ETERNUS Manager)

Software product for monitoring and displaying the status of the ETERNUS2000/ETERNUS3000/ETERNUS4000/ETERNUS6000/ETERNUS8000 machine and for setup and maintenance

## Fabric

Topology using the fibre channel interface. A fibre channel switch is used and two or more communications between nodes can be performed simultaneously.

## FC-AL (Fibre Channel Arbitrated Loop)

Topology using the fibre channel interface. A fibre channel that now allows the connection between two or more nodes using a hub. This topology is mostly used for 1 to 1 connectivity between devices. A port that is connected to the fibre channel is either an NL port or an L port.

## Fibre channel

One of the interfaces used to perform serial transfer of data. High-speed forwarding of data and the long distance transmission with the server are features of this transfer type.

## Fibre channel hub

This is a hub that is only used for fibre channel networks. It is a device that connects two or more fibre channel node devices in a loop. It operates with the FC-AL topology.

## Fibre channel switch

This is a switch used only on fibre channel networks. Its primary function is to facilitate communication between two or more fibre channel nodes at the same time. It exceeds a fibre channel hub in performance and reliability and operates with the fabric topology.

## File unit backup

Direct specification that performs backup to tape of only the specified data in a directory or file on a disk that is mounted on the backup target server

## File unit backup agent

Software that performs backups on a file basis.
Starts the TSM client and specifies file unit backup or restore to a tape

## FL port

The port of the fabric topology (fibre channel switch) connected to the NL port.

## F port

The port of the fabric topology (fibre channel switch) connected to the N port.

## Framework

Generic name referring to applications such as communication services and configuration management that form the foundation of the AdvancedCopy Manager product suite.

## GDS Snapshot

Abbreviation of PRIMECLUSTER GDS Snapshot, which is an optional product of PRIMECLUSTER GDS (hereinafter referred to as GDS). With this product, you can create a snapshot of a GDS logical volume (ie, a replica at a certain time). AdvancedCopy Manager supports the backup and replication operations of logical volumes in linkage with GDS Snapshot.

## Generation management backup

Backup operation that performs management with the specified number of preservation generations

## Generation overflow

This is the situation that arises when the number of backups specified as backup generations have already been used. If the next backup is performed, the backup volume having the oldest backup history is deleted from the generation management. This is called generation overflow. The actual number of backup generations is specified by the backup policy configuration command.

## GR Manager, GRmgr

Storage management software of GR720/730/740.

## Hard disk driver

Hard disk driver software of a host server. Controls a disk array unit instead of the sd driver. This driver must be installed to perform multipath control.

## HBA (Host bus adapter)

The adapter card used as an interface with the storage port/switch CA carried in a server.

## HDDV

See "Hard disk driver."

## Inter-server replication

Replication in which the source and destination are volumes connected to different servers

## Host Affinity Group

Management information on the ETERNUS storage system that shows the association between the World Wide Name of the host and the Affinity Group.

## Load share

One of the operation modes of a cluster system. It enables systems that are structured from multiple active nodes to be handled logically as one database.

## Logical node

Name of a logical server in a cluster system

## LUN

Abbreviation for Logical Unit Number. The logical unit is defined under a channel adapter on a storage unit.

## LUN Mapping

Assigns and sets up a LUN which shows a Logical unit LUN (Logical Unit Number) defined as the channel adapter subordinate in GR720/GR730/GR740 storage equipment from the HOST side, and real LUN (mapping). Therefore, HOST to LUN0 and visible Logical unit can be set up with real Logical unit LUNxx.

## MPHD

See "Multipath disk control."

## MPLB

See "Multipath disk control, load balance option."

## Multipath disk control

Driver software that performs multipath disk control of the host server.
Failover driver software that merges two physical access paths into one logical path to avoid stopping access to a disk array unit because of the failure of one physical access path.

## Multi path disk control, load balance option

Driver software that performs multipath disk control of the host server. This driver has both load balance (path load distribution) and multipath (two to eight paths) functionality in addition to the multipath disk control failover function. It is superior in terms of reliability, operability, and performance and is the most suitable driver software for a SAN operation server.

## NAS backup

The TSM backup function that uses the NDMP functions of the NAS device to back up the data on a NAS device without sending the data via a network

## NAS device

The network disk array device of the ETERNUS NR1000F series

## NAS directory

A directory created under a NAS volume

## NAS volume

A disk volume on a NAS device.

Disk volumes are defined under /vol, and take the form /vol/vol0, /vol/vol1, and so on.

## NDMP

NDMP (Network Data Management Protocol) is a communications protocol that manages data on an NAS device.

## NL-Private port

The port of the FC-AL topology which has not made a fibre channel switch connection.

## NL-Public port

The port of the FC-AL topology which is making a fibre channel switch connection.

## N port

The port used by Fabric topology (switch environment) or Point-to-Point in a fibre channel.

## OPC

This is an abbreviation of the term "one point copy" which is a hardware function of ETERNUS storage systems. This function executes disk copy at high speeds at the hardware level. When software issues a copy request, a physical copy operation is performed by the hardware. However, the emulation function makes it look like the copy is completed at the software level.

## Ordinary transaction volume

Volume to be backed up and not provided with a database space.

## Point-to-point

Topology using the fibre channel interface. Although it is the topology of 1 to 1 connection of an N port, the main part of the present 1 to 1 connection is the 1 to 1 connection of FC-AL.

## Pre-processing or post-processing

Scripted processing that is executed immediately before or after advanced copying at the time of backup or replication. The pre-processing and post-processing scripts are called as part of the command processing of backup or replication management.

## PRIMECLUSTER

Software product for cluster configuration

## PRIMECLUSTER GDS

Software product that improves data integrity by mirroring disk units

## PRIMECLUSTER GFS

Software product that creates a multivolume file system that offers robustness and improves data availability. This file system is completely compatible with UFS, which is the standard API of UNIX.

## QuickOPC

This is a copy method generally used to copy only the data that is updated after a physical copy of all data by OPC is completed.

It is a suitable copy method for Disk to Disk backup.

Differential OPC is an old name for QuickOPC.

## REC

Abbreviation for "Remote Equivalent Copy". REC uses a hardware function of ETERNUS storage systems to achieve EC (Equivalent Copy) between different cabinets.

## Registry

AdvancedCopy Manager environment definition file.

## Replication management files

Generic term referring to the files where replication management saves the usage information. There are two or more kinds. It is kept for every Storage Server with a data repository.

## Repository

The repository contains all management and operational information required by AdvancedCopy Manager and its domain.

It is comprised of data contained in a management database hosted in a Storage Management Server.

The information on the device to be managed, and information on backup and replication management, etc. are all stored in a repository.

This repository is created at the time of installation of AdvancedCopy Manager.

## RMI daemon

The RMI server to an AdvancedCopy Manager client.

## ROPC

Abbreviation of "Remote One Point Copy". ROPC uses a hardware function of ETERNUS storage systems to achieve OPC between different cabinets.

## SafeFILE

Software product that creates a multivolume file system that offers robustness and improves data availability. SafeFILE extends the UNIX file system (UFS) and improves availability and performance.

## SAN (storage area network)

Abbreviation for "Storage Area Network". It is a server storage network. Broadly speaking, this also refers to the implementation of centralized storage, data sharing among different servers, and integrated storage management.

## SDX object

Virtual resource managed by PRIMECLUSTER GDS or SynfinityDISK. It is a general term for classes, groups, disks, volumes, and slices. An SDX object is sometimes called an "object."

## Session

Unit of copying execution that is performed by the advanced copy function

## Snap Data Disk

This is a disk for storing the copy used as the SnapOPC destination. It is necessary to define a Snap Data Disk in advance of SnapOPC being invoked.

## SnapOPC

A copy method used when updating data. This method copies the pre-update status of the data parts that are to be updated, and matches the original non-updated parts to preserve the pre-update status (a copy-on-write copy method).

This method can be used for efficient data copying since it reduces the data size at the copy destination.

This copy method is suited to backing up file servers.

## SnapOPC+

This method copies only the pre-update status of the data parts that are to be updated, and saves the data in snap generation units (a copy-on-write copy method).

This method can be used for efficient data copying since it reduces the data size at the copy destination and data can be saved in snap generation units. This copy method is suited to backing up file servers.

## Snap shot type high-speed backup

Backup using the one point copy (OPC) function of ETERNUS storage systems.

## Storage

A generic name of external storage devices such as disk array devices and tape units. These devices include ETERNUS storage systems, F649x series and Spectris/Platinum.

## Storage management client

This term refers to a client machine that the AdvancedCopy Manager GUI Client is operated.

## Storage Management Server

Server in which AdvancedCopy Manager's Manager exists.

## Storage Server

Server in which AdvancedCopy Manager's Agent exists.

## Suspend/Resume function

This function sets Suspend or Resume for the EC equivalency maintenance status. The synchronous backup operation can be made faster because the function can create a differential copy from the Suspend state.

## Suspend specification

The act of specifying the -suspend option in the backup execution command (swstbackup) to back up using the Suspend/Resume function

## Synchronous backup

This involves using the Equivalent Copy (EC) function of the disk array GR series to perform backup.

## Tape library unit

A device that holds a large number of magnetic tapes and uses the controller in the device to automatically replace magnetic tapes in order to gain access to the tapes. It includes ETERNUS LT270 and ETERNUS LT230.

## Tape Server

Backup Tape Server for processing requests regarding tape backup operations

## TOC

The backup data table of contents provided from a NAS device in parallel with NAS backup operations. TSM uses the obtained TOC to restore data when executing NAS disk unit restore or NAS file unit restore.

## TSM

The abbreviation of file backup management product "Tivoli Storage Manager". Tape servers deliver a backup management function by calling TSM internally.

## TSM client GUI

Starts the TSM client and issues file unit backup and restore instructions to a tape. Commands and a GUI are provided for the TSM client, and processing instructions can be issued from the GUI interface.

## TSM Web backup/archive client

A TSM processing interface that enables use of a Web browser to connect from an operations terminal to a TSM client.
This enables backup and restore instructions to be issued from an operations terminal to a tape.

## Volume Shadow Copy Service

The Volume Shadow Copy Service is a function that provides a communications foundation for backup software, server applications and storage hardware. It is installed as standard with Windows Server 2003.

## VSS

Refer to "Volume Shadow Copy Service".

## VSSHP

Refer to "ETERNUS VSS Hardware Provider".