IBM Enterprise Storage Server

IBM

Web Interface User's Guide for the ESS Specialist and ESS Copy Services

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> **Note!**
>
> Before using this information and the product it supports, be sure to read the general information under "Notices" on page 141.

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About this guide

This publication provides instructions for using the IBM® StorWatch™ Enterprise Storage Server™™ Specialist (ESS Specialist) interface to configure your IBM Enterprise Storage Server. It also includes guidelines for using the IBM ESS Web Copy Services for data-copy functions, including disaster recovery.

Who should use this guide

This publication is for storage administrators, system programmers, and performance and capacity analysts.

Frequently used terms

The following terms are used throughout this publication to describe the IBM Enterprise Storage Server (ESS) and its configuration.

Term	Definition
array	An arrangement of related disk drive modules (DDMs) that you have assigned to a group. Also referred to as a rank. For the ESS, an array is a group of up to eight DDMs.
cache hit	When a read operation is sent to the cluster, a *cache hit* occurs if the requested data resides in cache.
cache miss	When a read operation is sent to the cluster, a *cache miss* occurs if the data is not in the cache.
cluster	A partition of a storage server that is capable of performing all functions of a storage server. When a cluster fails in a multiple-cluster storage server, any remaining clusters in the configuration can take over the processes of the cluster that fails.
control unit image	A S/390 or zSeries term for a logical subsystem that you access with an ESCON I/O interface. One or more control unit images exist in each ESS. Each image appears to be an independent control unit, but each image shares a common set of hardware facilities. The ESS can emulate 3990-3, 3990-6, or a 3990-3 TPF control units.
Copy Services client	Software that runs on each ESS cluster in the Copy Services server group. It performs the following functions:
	• Communicates configuration, status and connectivity information to the Copy Services server.
	• Performs data-copy functions on behalf of the Copy Services server.
Copy Services server (active)	The ESS cluster that is currently running the Copy Services server code.

Copy Services server (backup)
The ESS cluster in the Copy Services server group that runs the Copy Services server code when the primary Copy Services server has failed. For maximum availability, the backup Copy Services server should be configured on a different ESS than the primary Copy Services server.

Copy Services server (primary)
Software that runs on one of the ESS clusters in the Copy Services server group. It manages the ESS clients that are part of the Copy Services server group and the data-copy operations performed in the Copy Services server group.

count key data (CKD)
A System/390 or zSeries host term that specifies the format of the logical data units on a logical device. The logical data unit consists of a count field, an optional key field, and an optional data field that can contain one or more records.

device adapter
A physical component of a storage controller that attaches to one or more disk drive modules (DDMs). It enables communication between the clusters (or cluster controllers) and the DDMs.

destage
The process of writing modified storage from cache to the disk drive module (DDM).

disk drive module (DDM)
The primary nonvolatile storage medium that is used by the storage server to store user data. The number and type of storage devices within a storage server may vary.

Enterprise Systems Connection architecture
1. An ESA/390 computer peripheral interface. The I/O interface uses ESA/390 logical protocols over a serial interface.
2. A set of IBM products and services that provide a dynamically connected environment within an enterprise.

ESCON
Enterprise Systems Connection architecture.

ESCON channel
A channel that has an ESCON channel-to-controller I/O interface that uses optical cables as a transmission medium.

ESCON host systems
System/390 or zSeries hosts that you attach to the ESS with an ESCON adapter. Such host systems run on MVS, VM, VSE, or TPF operating systems.

ESS Web Copy Services
The Web-based interface for setting up or managing the data-copy functions of FlashCopy, and PPRC. ESS Web Copy Services is accessible from the ESS Specialist Welcome panel.

fabric
Fabric is a term used in fibre-channel technology for a routing structure, such as a switch, that receives addressed information. It routes the information to the appropriate destination. A fabric

	can consist of more than one switch. When multiple fibre-channel switches are interconnected, they are said to be cascaded.
fibre-channel	Fibre-channel is an architecture that supports full-duplex communication over a serial interface that configures attached units to a communication fabric.
	The ESS supports fibre-channel communications for open system hosts through its fibre-channel adapters.
fibre-channel host system	Designates a host system that you attach to the ESS with a fibre-channel interface. Such hosts run UNIX, OS/400, Windows NT, or Novell Netware operating systems.
fixed-block (FB) devices	An architecture for logical devices that specifies the format of the logical data units on the device. The logical data unit is a block. All blocks on the device are the same size (fixed size). The subsystem can access them independently. This is the required format of the logical data units for host systems that you attach with a SCSI or fibre-channel interface.
gigabyte (GB)	When referring to hard-disk-drive capacity, GB means 1 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.
host adapter	A physical component in a storage server that enables the server to attach to one or more host I/O interfaces.
host system	A computer system connected to the ESS. The ESS supports both mainframe (System/390 or zSeries) hosts as well as open system hosts. System/390 or zSeries hosts are connected to the ESS via ESCON interfaces. Open-system hosts are connected to the ESS by SCSI or Fibre Channel interfaces.
IBM Enterprise Storage Server (ESS)	
	A member of the Seascape™ product family of storage servers and attached storage devices. The ESS provides integrated caching and RAID support.
IML	initial microcode load
logical control unit (LCU)	See *control unit image*.
logical device	An address to a logical volume on a storage server. The address enables a host system to access the logical volume. For the ESS, the logical device represents a logical volume.
logical path	For Copy Services, a logical path is a relationship between a source logical subsystem and target logical subsystem that is created over a physical path through the interconnection fabric used for copy services functions.

logical subsystem (LSS)	The LSS is a logical "container" for RAID 5 arrays, disk groups, and the volumes that are located on those arrays or disk groups. An LSS is primarily accessed by one device Adapter. One or more logical subsystems can exist on the ESS. In general, the ESS associates a given set of devices with only one logical subsystem.
	For System/390 or zSeries hosts, a logical subsystem represents a logical control unit (LCU). For S/390 or zSeries host, each control unit image is associated with one and only one logical subsystem. See *control unit image*.
logical unit	The Small Computer System Interface (SCSI) term for a logical disk drive.
logical unit number (LUN)	The SCSI term for the field in an identifying message that is used to select a logical unit on a given target.
logical volume	The storage medium associated with a logical device. A logical volume typically resides on one or more storage devices. For the ESS, you define this unit of storage.
	Note: The AIX® operating system views a logical volume as a logical disk or a hard disk (hdisk).
open system	One of the following types of host systems: a workstation running one of the UNIX variants, an IBM AS/400 running a version of OS/400, or an Intel-based personal computer running Windows NT or Novell Netware.
open-system storage	Storage arrays and logical volumes defined in the ESS, which you can connect to open-system hosts. This term is synonymous with Fixed Block (FB) storage.
panel	The formatted display of information that appears on a display screen.
path	A path is either a logical path or a physical path See *logical path* or *physical path*.
physical path	A single path through the I/O interconnection fabric that attaches two units. For copy services, this is the path from a host adapter on one ESS (through cabling and switches) to a host adapter on another ESS.
screen	The physical surface of a display device upon which information is shown to users.
SCSI	See *Small Computer System Interface*
SCSI host systems	This term is used in this publication to designate host systems that you attach to the ESS with a

	SCSI interface. Such host systems run on UNIX, OS/400, Windows NT, or Novell Netware operating systems.
SCSI ID	A unique identifier (ID) assigned to a SCSI device that is used in protocols on the SCSI interface to identify or select the device. The number of data bits on the SCSI bus determines the number of available SCSI IDs. A wide interface has 16 bits, with 16 possible IDs. A SCSI device is either an initiator or a target.
service personnel	Individuals or a company that you have authorized to service your ESS. This term also refers to a service provider, a service representative, or an IBM service support representative (SSR). An IBM SSR installs your ESS.
Small Computer System Interface	
	An ANSI standard for a logical interface to computer peripherals and for a computer peripheral interface. The interface uses a SCSI logical protocol.
source	A system that makes a request to a target. For the ESS, a source would be a host system attached to the ESS. Also see *target*. For ESS Web Copy Services, source is the primary site of a volume, logical subsystem, or server that you have identified for a FlashCopy or PPRC action.
staging	The process of moving data from an off-line or low-priority device back to an on-line or higher priority device, usually on demand of the system or on request of the user.
storage server	A unit that manages attached storage devices and provides access to the storage or storage-related functions for one or more attached host systems.
System/390 storage	Storage arrays and logical volumes defined in the ESS, which you can connect to S/390 or zSeries servers. This term is synonymous with count-key-data (CKD) storage.
target	A storage device to which information is written by a source system. The ESS is a target storage device. Also see *source*. For ESS Web Copy Services, a target is the end site for a volume, logical subsystem, or server, identifing the location to which the source will copy for FlashCopy and PPRC actions. For disaster recovery, you could locate the target at a remote Site.
terabyte (TB)	When referring to hard-disk-drive capacity, TB means 1 000 000 000 000 bytes; total user-accessible capacity may vary depending on operating environment.
volume	Refers to a *logical* volume.

Publications

This section describes the ESS library and publications for related products. It also gives ordering information for these publications.

The ESS product library

The ESS is an IBM Seascape architecture-based product. See the following publications for more information on the ESS:

- *IBM Enterprise Storage Server Introduction and Planning Guide*

  This guide introduces the product and lists the features you can order. It also provides guidelines on planning for the installation and configuration of the ESS.

- *IBM Enterprise Storage Server User's Guide*

  This guide provides instructions for setting up and operating the ESS, and for problem analysis.

- *IBM Enterprise Storage Server Host System Attachment Guide*

  This book provides guidelines for attaching the ESS to your host system and for migrating from SCSI to fibre-channel atachment.

- *IBM Enterprise Storage Server SCSI Command Reference*

  This book describes the functions of the ESS. It provides reference information for UNIX and Application System/400® (AS/400®) hosts, such as channel commands, sense bytes, and error recovery procedures.

- *IBM Enterprise Storage Server System/390® Command Reference*

  This book describes the functions of the ESS and provides reference information for System/390 hosts, such as channel commands, sense bytes, and error recovery procedures.

- *IBM Storage Solutions Safety Notices*

  This book provides translations of the danger notices and caution notices that IBM uses in ESS publications.

- *IBM Enterprise Storage Server Web Interface User's Guide*

  This book provides instructions for using the IBM StorWatch™ Enterprise Storage Server Web interfaces, ESS Specialist and ESS Copy Services.

- *IBM Enterprise Storage Server Configuration Planner*

  This book provides work sheets for planning the logical configuration of the ESS. This book is not available in hard copy. This book is only available on the following Web site:

  http://www.storage.ibm.com/hardsoft/products/ess/refinfo.htm

- *IBM Enterprise Storage Server Quick Configuration Guide*

  This booklet provides flow charts for using the StorWatch Enterprise Storage Server Specialist. The flow charts provide a high-level view of the tasks the IBM service support representative performs during initial logical configuration. You can also use the flow charts for tasks that you might perform during modification of the logical configuration.

  The hard copy of this booklet is a 9-inch × 4-inch fanfold.

Ordering publications

All of the publications that are listed in "The ESS product library" are available on a compact disc that comes with the ESS, unless otherwise noted. You can also order a hard copy of each publication. For publications on compact disc, order *IBM Enterprise Storage Server Customer Documents*, SK2T-8770.

All the customer documents listed above are available on the following ESS Web site:

http://www.storage.ibm.com/hardsoft/products/ess/refinfo.htm

Related publications

The following related publications are also available:

- *DFSMS/MVS® Version 1 Release 5 Software Support for the IBM Enterprise Storage Server*, SC26-7318

  This book describes the changes you need to make to operating systems for System/390 hosts for support of the ESS functions.

- *IBM Storage Area Network Data Gateway Installation and User's Guide, 2108 Model G07*, SC26-7304

  This book introduces the IBM Storage Area Network (SAN) Data Gateway and provides the procedures for installing and using it.

- *IBM Subsystem Device Driver*

  This book describes how to use the IBM Subsystem Device Driver on open host systems to enhance performance and availability on the ESS. The Subsystem Device Driver creates redundant paths for shared logical unit numbers. The Subsystem Device Driver permits applications to run without interruption when path errors occur. It balances the workload across paths, and it transparently integrates with applications.

  This publication is not available in hard copy. However, it is available on the compact disc that is delivered with your ESS. You can also view and copy this publication from the Web site:

  http://www.ibm.com/storage/support/techsup/swtechsup.nsf/support/sddupdates

- *IBM Advanced Copy Services*, SC35-0355

  This book provides detailed information about Copy Services functions such as peer-to-peer remote copy (PPRC), extended remote copy (XRC), and FlashCopy™.

- *OS/390 MVS System Messages Volume 1 (ABA - ASA)*, SG24-5465

  This book provides information on System/390 messages, including information on messages for Copy Services functions such as peer-to-peer remote copy (PPRC), extended remote copy (XRC), and FlashCopy.

- *IBM Enterprise Storage Server*, SG24-5465

  This book, from the IBM International Technical Support Organization, introduces the IBM Enterprise Storage Server (ESS) and provides an understanding of its benefits. It also describes in detail the architecture, hardware and functions of the ESS.

- *Implementing the IBM Enterprise Storage Server*, SG24-5420

  This book, from the IBM International Technical Support Organization, can help you install, tailor, and configure the IBM Enterprise Storage Server (ESS) in your environment.

- *IBM Enterprise Storage Server Performance Monitoring and Management*, SG24-5656.

  This book, from the IBM International Technical Support Organization, provides guidance on the best way to configure, monitor, and manage your Enterprise Storage Server (ESS) to ensure optimum performance.

- *IBM System/360™ and System/370™ I/O Interface Channel to Control Unit Original Equipment Manufactures' Information*, GA22-6974

  This publication provides a description of the interface between System/360, System/370, and System/390 channels and controllers that are designed to operate with this interface. This publication covers the parallel I/O interface. It

does not cover the interface between the controller and the I/O device, nor does it cover the ESCON-I/O interface for the System/390.

This publication is for designers of programs and equipment that are associated with parallel I/O interfaces and for service personnel that maintain the equipment. Anyone concerned with the functional details of this interface will also find it useful.

- *Fibre Transport Services (FTS) Direct Attach, Physical and Configuration Planning*, GA22-7234

  This publication provides information about fibre optic and ESCON trunking systems.

- *DFSMS/MVS Version 1 Remote Copy Guide and Reference*, SC35-0169

  This publication provides guidelines for using remote copy functions with System/390 hosts.

Web sites

For general information about IBM storage servers, see the following Web site:

http://www.storage.ibm.com/hardsoft/products/ess/ess.htm

To view and print the IBM Enterprise Storage Server publications, see the following Web site:

http://www.storage.ibm.com/hardsoft/products/ess/refinfo.htm

To get current information about host system models, the operating systems, and adapters that the ESS supports, see the following Web site:

http://www.storage.ibm.com/hardsoft/products/ess/supserver.htm

For information about the IBM Subsystem Device Driver, see the following Web site:

http://www.ibm.com/storage/support/techsup/swtechsup.nsf/support/sddupdates

To attach a SAN or host system that uses industry-standard fibre-channel arbitrated loop (FC-AL) through the IBM 2108 SAN Data Gateway Model G07, see the following Web site:

http://www.storage.ibm.com/SAN Gateway

Summary of Changes

Revision bars (|) indicate technical changes to this publication. Minor editorial changes to this book are not marked. This edition includes the following major changes:

- Instructions for using ESS Specialist to change a host attachment on the ESS from SCSI to fibre channel
- Description of the new field on the Modify Host System panel for fibre-channel configuration
- Instructions for assigning a fibre-channel attached host system to a specific ESS fibre port.
- Instructions about closing browsers before you reload microcode
- Guidance on use of browsers
- Modification to the Add Volumes panel
- Instructions for manually restarting ESS Web Copy Services

Major changes to the ESS Web Copy Services information include:

- Instructions about getting started with ESS Web Copy Services
- Updated graphics for Paths, Volumes, Storage Servers, Tasks, and Configuration panels
- Specification of what data-copy functions that can be performed simultaneously on a logical volume
- Guidelines for naming tasks
- Modification to the Paths panel
- Instructions on using the Paths panel to:
  - Establish paths
  - Remove paths
  - Add paths
  - Remove a group of established paths
  - Remove a single path from a group of established paths
  - Create a PPRC consistency group
  - View information about a path
- Instructions on using the Volumes panel to:
  - Establish a PPRC copy pair
  - Suspend a PPRC copy pair
  - Resynchronize a PPRC copy pair
  - Terminate a PPRC copy pair
  - Establish multiple volume-pair relationships
  - Establish a FlashCopy pair
  - Withdraw a FlashCopy pair
  - Find volumes
  - Filter volumes
  - View information about a volume
- Information on the additional uses of the Configuration panel
- Information on the Configuration Refresh function

- Instructions on defining the userid and password for open-systems host that use the command-line interface
- Guidance on problem analysis
- Guidelines on creating companion tasks for normal operations and disaster recovery
- Guidance on performing PPRC or FlashCopy on open-systems hosts
- Guidance on disaster recovery
- Linkages to related publications

Chapter 1. IBM Enterprise Storage Server overview

The IBM Enterprise Storage Servers (ESS) are complete storage facilities that provide data storage for SCSI and fibre-channel attached host systems and for System/390 and zSeries host systems.

The IBM Enterprise Storage Server (ESS) supports hosts with Windows NT, Windows® 2000, Novell Netware, UNIX, and OS/400® operating systems. It also supports System/390 and zSeries hosts with MVS, VM, VSE, and TPF operating systems.

While building on existing technology, the ESS offers improved performance and many advanced features indispensable for today's networked environment of high-powered super-servers and mission-critical applications.

The ESS consists of between 1 and 3 racks, which house disk drive modules (DDMs).

The ESS can be subdivided into multiple disk groups, which you can configure as either fault-tolerant (RAID-5) arrays or non-fault-tolerant storage (non-RAID). Each disk group can be further subdivided into individual partitions (volumes), which can then be assigned to the various attached hosts.

The ESS features both storage sharing and data sharing among homogeneous host systems.

Storage sharing
> You can partition the total installed storage capacity into multiple volumes, which you can then assign to the individual attached hosts. This partitioning allows multiple independent host systems to share storage space from the same storage server.

Data sharing
> Individual volumes may be assigned to one or more of the attached hosts, allowing several homogeneous hosts to share the same data.

The ESS offers improved performance and the following functions independent of the host system software:

* Fault-tolerant design with redundant arrays of independent disks (RAID-5)
* *Fast-write* caching, which writes data to nonvolatile memory and reduces the time an application must wait for I/O operations to complete
* Improved availability due to device sparing capabilities

Architectural overview

The IBM Enterprise Storage Server is divided internally into two independent clusters. Each cluster consists of:

* A processing unit that provides the management functions of the storage server.
* One or more device adapters.
* Device interface adapters that allow you to attach one or more 8-packs (eight disk drive modules), which provide the storage capacity. You configure an 8-pack as a disk group.

Under normal conditions, approximately half of the attached storage is managed by each cluster. In the event of a cluster failure, transactions are routed to the remaining cluster. Note that the host adapters installed in the ESS are accessible by both clusters of the machine.

ESS components

To effectively use the ESS interfaces, you need a basic understanding of the physical and logical characteristics of the ESS. This section describes the components of the ESS.

Cluster Controllers

The ESS uses high-performance IBM RISC System/6000® processors to manage its operations. Each cluster has a 4-way symmetrical multiprocessor (SMP) system. Each controller also has a CD-ROM drive, diskette drive, and a hard disk drive. The hard disk drive is used to store the currently active IBM licensed internal code (LIC), as well as older levels of the LIC for backup.

The cluster controllers also contain the cache memory of the ESS. As commands from the host system are processed, if the requested data resides in the cache, an immediate data transfer takes place. If the data is not in the cache, the controller sends a staging request to the device adapter to retrieve the requested data.

In addition, the cluster controllers each contain an Ethernet communications adapter. The Ethernet adapter provides a connection to the ESSNet or to the local IP network. This allows you to use the ESS Specialist Web-user interface to view and perform machine configurations.

Furthermore, the cluster controllers also contain the serial ports used by the IBM service support representative (SSR) to connect the IBM Mobile Services Terminal (MoST). The SSR uses the MoST to set up and test the ESS and to perform upgrades and repair operations.

Cache Storage

The cache storage is used to store both read and write data to improve ESS performance for the attached host systems. Each cluster has its own non-shared cache.

When a read operation is sent to the cluster, a *cache hit* occurs if the requested data resides in cache. *cache hits* result in better performance. A *cache miss* occurs if the data is not in the cache. The I/O device is disconnected from the host and a stage operation[1] takes place. *cache misses* result in lower performance.

Note: A low *cache-hit* ratio is normal for open systems.

Nonvolatile storage (NVS)

Nonvolatile storage is used to store a second copy of write data to ensure data integrity should a power failure or a cluster failure occur. The NVS for cluster 1 is located in cluster 2 and the NVS for cluster 2 is located in cluster 1. Should a cluster fail, the remaining cluster can access the NVS of the failed cluster and destage all the unwritten data. The destaging process ensures that no data is lost even in the event of a component failure. Each NVS is protected by a battery that protects the data in the event of a total power outage.

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1. A stage operation is the term used for reading data from the physical disk (disk drive module) into the cache.

Device adapters

The device adapters provide the interface between the clusters and the DDM. Each device adapter pair supports two independent loops. The loops are between device adapter pairs, which means that all the DDMs can be accessed by both clusters. During the configuration process, each group of eight DDMs (an 8-pack) is configured to be accessed by only one of the clusters. Should a cluster failure occur, the remaining cluster can take over all the DDMs on the loop.

A loop consists of two physical links, one in each direction, between the two devices in an adapter pair. The physical links allow two read operations and two write operations to be performed simultaneously around the loop. Should a DDM failure occur, the loop reconfigures itself into two loops, one on each side of the failed device. Once the disk has been replaced, the loop is restored to normal operation.

Note: Failure of a disk in a non-RAID group will result in a loss of data. Failure of a DDM in a RAID array will not cause a loss of data, since the data on the failed device is automatically reconstructed on a spare device. The ESS will usually reserve two spared DDMs on each loop containing RAID arrays. If for some reason there are no spare DDMs available on the loop where a failure occurred (perhaps because of prior failures), the RAID array is placed in a degraded mode, which means that only read operations are allowed to proceed. If an additional DDM should fail in a degraded array, all data on the array is lost. Because write operations might further jeopardize the integrity of the remaining disk in an array, write operations are not allowed for degraded arrays.

Host adapters

With the ESS, each host-adapter bay is connected to both clusters, so that there is no cluster affinity for the installed host adapters. Each bay supports up to four host adapters, for a total of 16. Each host adapter supports two SCSI ports, one fibre-channel, or two ESCON channels. Each host adapter can communicate with either cluster.

For improved availability, it is important to spread the host adapter connections across all the adapter bays. For example, if you have four ESCON links to a host adapter, each connected to a different bay, then the loss of a bay for repair or upgrade would only impact one link out of four. This spread of connections also optimizes performance.

The ESS supports up to 32 ESCON or SCSI ports, two per host adapter. The ESS supports 16 fibre-channel ports, one port per adapter. You can have a mixture of ESCON, fibre channel, and SCSI host adapters. The host adapters should be spread across all the host-adapter bays equally to optimize performance.

Disk groups

A disk group is a logical grouping of eight DDMs. You can configure the disk group as a RAID-5 array or eight independent DDMs (non-RAID). A RAID array as well as individual non-RAID disks are owned by one logical subsystem (LSS) only, either a fixed-block-architecture LSS (for open systems) or a count-key-data LSS (for OS/390).

You can subdivide each RAID-5 array or non-RAID DDM in a disk group into a set of logical volumes. The maximum number of logical volumes in a disk group depends on the size of the DDMs in the group and the sizes of the individual volumes.

A DDM group of eight independent DDMs is not RAID protected. If a DDM fails, all data on that DDM is lost.

Logical configuration

A *logical volume* is a data partition in the DDM group. The size is defined by the CKD device emulation mode (for OS/390 or z/OS) or the open-systems requirements.

The *logical subsystem* is a group of generic device definitions for open systems and a S/390 or zSeries server representation of a control unit (3990) for OS/390 or z/OS.

The *logical device* is a pointer used for the host to access the logical volumes. For S/390 or zSeries server control units, it can be seen as the device address of a 3390.

For open systems, the logical device has a logical unit number (LUN), which is assigned to a logical volume. The LUN is a serial number generated by the storage server that contains the logical volume ID and a portion of the storage server machine serial number. The LUN provides you with a volume identifier that is unique among all IBM Enterprise Storage Servers.

Chapter 2. Configuring using IBM StorWatch Enterprise Storage Server Specialist

The IBM StorWatch Enterprise Storage Server Specialist (ESS Specialist) is the Web user interface that is included with your IBM Enterprise Storage Server (ESS). You can use ESS Specialist to view the current status of the ESS and to modify the ESS configuration.

This chapter includes:

- Using task maps (quick guides to configuration tasks)
- Using the ESS Specialist interface
- Accessing the ESS Specialist interface
- Getting started
- Checking ESS status
- Configuring communications
- Allocating storage
- Configuring open-systems storage
- Configuring System/390 or zSeries storage
- Checking licensed internal code
- Signing off ESS Specialist and closing all browser windows

Using task maps

If you have used ESS Specialist before, see Table 1 and Table 2 to go directly to the desired tasks. These task maps refer you to the sections that describe the tasks.

Table 1. ESS Specialist task map for SCSI or fibre-channel attached hosts

Configuration Task	Related Section
Add, modify, or delete host systems	"Defining host systems attached to the ESS" on page 34
Configure an open-system port	"Configuring host-adapter ports" on page 44
Configure a custom host type	"Defining a custom SCSI bus configuration" on page 47
Configure disk groups	"Configuring fixed-block disk groups" on page 49
Add volumes	"Adding fixed-block volumes" on page 50
Assign or modify volumes to be shared	"Modifying volume assignments or assigning shared volumes" on page 55

Table 2. ESS Specialist task map for System/390

Configuration Task	Related Section
Configure logical control units (LCUs)	"Configuring logical control units" on page 59
Configure count-key-data (CKD) disk groups	"Configuring CKD disk groups" on page 60
Add count-key-data (CKD) volumes	"Adding volumes to an LCU" on page 62

Table 2. ESS Specialist task map for System/390 (continued)

Configuration Task	Related Section
Add or remove parallel access volumes (PAVs)	"Adding PAV volumes to an LCU" on page 64

Using the ESS Specialist user interface

The ESS Specialist user interface consists of four major components:

- The information frame

  The information frame is the long bar at the top of the Web page. It identifies the interface. It also contains the global help button and the IBM logo on the right side of the bar.

  Click the question mark (**?**) at any time to bring up a new browser window that displays the Help system. See "Using the Help system" on page 8 for a description of the Help system.

- The navigation frame

  The navigation frame is the column of buttons on the extreme left of the interface. These buttons indicate the categories of the ESS status and configuration that you can view or modify with ESS Specialist. You can click any of these buttons at any time, and the work frame will switch to display the information associated with the particular button that you clicked.

- The work frame

  The work frame is the main area in the center of the browser window. It contains the actual information being displayed by the interface, and it allows you to perform configuration tasks. Every panel displayed in the work frame contains a page-help icon (**?**) in the upper right corner.

  When you click the help icon, it links to the Help system and displays the information specific to the current work frame panel. You may have to switch from the main browser window to the help browser window after clicking the help icon to actually see the displayed help information.

  In addition to the Help icon, other panels in the work frame contain buttons that allow you to manipulate the interface.

  In general, these additional buttons can be one of three types:

  - Buttons near the top of the work frame manipulate the view of the information currently being displayed.

    These types of buttons generally do not link to other panels, but display an alternate view of the same information in the current panel. This could take the form of a tabular view versus a graphical view (for example, on the Storage Allocation panel), or it could be as simple as modifying the sorting order in one of the tables (for example, on the Modify Fixed Blocked Volume Assignments panel).

  - Buttons near the bottom of the work frame generally link to some other panel in the same configuration category as the current panel. For example, the Problem Notification panel links to the Modify Emails, Modify Pagers, and Modify SNMP panels.

  - The **Perform Configuration Update** and **Cancel Configuration Update** buttons, which also appear at the bottom of the configuration panels, allow you to apply the indicated configuration changes to the storage server or to cancel out of the current configuration panel.

    The majority of the configuration panels eventually return to their individual parent panels after you click the **Perform** or **Cancel** buttons.

- The message frame

  The message frame is the long bar at the extreme bottom of the interface. ESS Specialist uses this frame to display messages to the user when necessary. The two most commonly displayed messages are:

  – `Message 2108, Retrieving the machine configuration data`

    The ESS displays this message when it is obtaining the latest configuration data. This message disappears once the latest data has been received from the machine.

  – `Message 1533, Downlevel Data ... please wait a few minutes and try again`

    This message indicates that the absolute latest configuration data is not currently available and that the information displayed on the panel does *not* represent the latest configuration.

    This message does not disappear until you manually reload the panel. You should wait a minute or two, then click the last-clicked button again or click **Data Refresh** to reload the configuration data.

Using ESS Specialist tables

In several of the ESS Specialist panels, information is presented in the form of tables, with a fixed number of columns and a variable number of rows. This section describes some of the common behavior of tables in the ESS Specialist user interface.

Note: You can print the ESS Specialist tables from a Web browser.

Sorting on table columns

Tables that are sortable have a set of drop-down list boxes with sort choices displayed above each of the table columns. To sort these tables:

1. In the drop-down list boxes above each of the columns in the table are several choices: No sort, Sort First, Sort Second, and Sort Third. Select one of the choices for those columns that you would like to sort by. When you select a sort choice for one of the columns, it is no longer shown (and therefore cannot be selected) for the other columns.

2. Click **Perform Sort** near the top of the screen, to rearrange the table according to the sort options that you selected.

   The sort will always be in ascending order. The rows in the table are ordered such that the row with the smallest data value in the column selected with the Sort First choice is the first row in the table, and the row with the largest data value in the column selected with the Sort First choice is the last row in the table.

   If one or more table rows have the same data value in that column, the order of those rows is determined by their respective data values in the column selected with the Sort Second choice. If one or more table rows have the same data value in that column as well, then the order is determined by the column selected with the Sort Third choice. The order of any table rows that contain the same data values in all three Sort columns is undetermined.

Selecting multiple table rows

To select multiple contiguous rows:

1. Click the first row in the sequence.
2. Scroll down to the last row in the sequence.
3. Hold down the Shift key.

4. Click the last row

5. Release the Shift key. All rows from the first row and through the last row are selected.

To select multiple non-contiguous rows:

1. Click the first row in the sequence.

2. Hold down the Control (Ctrl) key.

3. Click on each desired row.

4. Release the (Ctrl) key. Each of the individually clicked rows are selected.

Using the Help system

The ESS Specialist provides three types of help:

Content help
Content help includes a list of topics. Click on the topic of interest to see information about the topic.

Glossary help
Glossary help includes a list of the terms that are used in the Web interface. Click on a term to see its definition.

Task help
Task help includes a list of tasks you perform to configure the ESS. Click on the task you want to perform to see instructions on how to do it.

Using Web browsers

IBM includes a Web browser as part of the IBM Enterprise Storage Server Network (ESSNet). You can access ESS Specialist through the ESSNet workstation. IBM preloads the ESSNet workstation with Microsoft Internet Explorer.

You can access ESS Specialist from your own workstation if you connect the ESSNet into your intranet by using one of the ports on the ESSNet hub. If you use your own workstation IBM recommends at least 128MB of memory in the workstation. Access ESS Specialist by using a browser that is enabled for Java™ 1.1.x. See "Setting up Java security options on MSIE" on page 9 for the procedure for enabling Java for MSIE. ESS Specialist supports the following browsers.

Note: If you have problems using a browser at a certain level, upgrade to the highest-available level.

• Netscape Navigator:
  – Windows NT and Windows 95
  – Version 4.04 or greater

  Note: Version 4.04 requires Java 1.1 fixpack. Later versions such as 4.5. may not require this fixpack. For better web performance, IBM recommends using Netscape Navigator Version 4.5.1 or greater.

• Microsoft Internet Explorer:
  – Windows NT and Windows 95
  – Version 4.0 or greater

  Note: Version 4.0 requires Service Pack 1.

Note: If you have problems using a browser at a certain level, upgrade to the highest-available level.

Setting up Java security options on MSIE

In order to access the ESS Specialist from MSIE, you will need to set up Java security options. Follow these guidelines:

Note: The procedures may vary slightly among the different releases of MSIE.

1. Start MSIE.
2. Click **Tools->Internet Options** from the menu pull down.

   This brings up a new panel called Internet Options.
3. Click **Security**.
4. Click **Internet Zone**.
5. Click **Custom Level.**

   This brings up the Security Settings panel.
6. Scroll through to the Java section and click **Custom Permissions**.
7. Click **Java Custom Settings** at the bottom of the Security Settings panel.

   This brings up the Internet panel.
8. Click **Edit Permissions**.
9. Click **enable unsigned content**.
10. Click **OK** on the Internet panel
11. Click **OK** on the Security Settings panel
12. Click **OK** on the Internet Options panel

You can use the dotted decimal Internet Protocol (IP) address or hostname alias that you have assigned to each ESS cluster controller as the Web address to access the user interface from the browser. Each cluster provides the same information, so you need to connect to only one at any given time. IBM provides two cluster controllers for fault tolerance.

Closing the browsers during microcode reload

When you reload ESS microcode, be sure to close the browser: then restart it after the reload.

Closing the browsers for data security

Because browsers retain previously entered passwords in memory, you must close down the ESS Specialist and all browser windows completely to prevent unauthorized users from accessing the ESS Specialist. Access through an open browser window could give unauthorized users access to your IBM Enterprise Storage Server. **It is recommended that you close your browsers when the current set of tasks is done.**

Tips for improving browser performance

Browser performance can at times be inconsistent. The following tips can help improve performance:

- Closing and restarting the browser often improves performance and refreshes the graphical displays in the ESS Specialist with up-to-date information.
- Minimizing the number of open browser windows will maximize the performance of ESS Specialist applications.

Accessing the ESS Specialist user interface

You can connect to the ESS Specialist interface from the ESSNet workstation, or from any workstation on the local intranet, if the ESSNet is connected to the local intranet.

After you start the Netscape Navigator or Microsoft Internet Explorer browser on the workstation and type in the Web address (URL) of one of the cluster controllers, the ESS Specialist Welcome panel (Figure 1) is displayed.
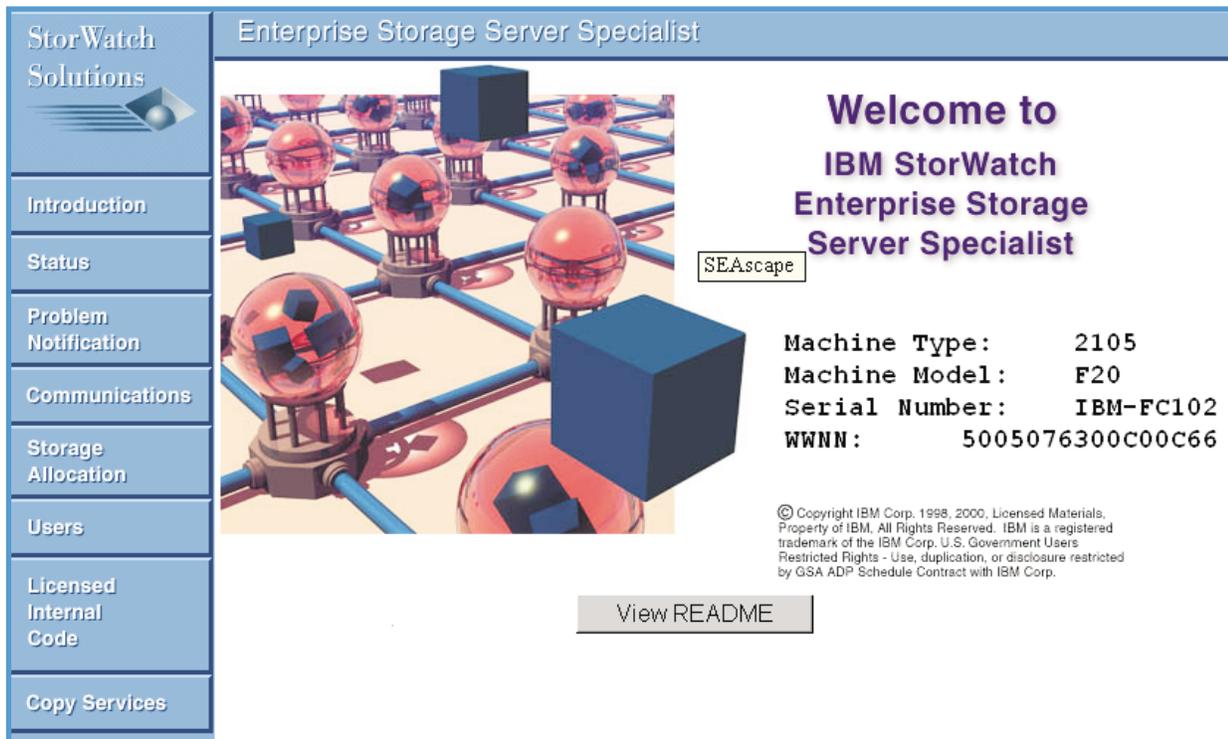
S008849R

Figure 1. ESS Specialist Welcome panel

The Welcome panel provides the following information about the ESS machine you have accessed:

- The machine type, 2105
- The machine model, for example E20 or F20
- The serial number, for example MMM–FCA04
- The world-wide node name (WWNN) of the ESS, for example 5005076300c00c04

The navigation frame on the left side provides buttons for accessing the tasks you can perform with subsequent panels of the ESS Specialist.

Access security

All data sent between the ESS and the ESS Specialist is encrypted to avoid unauthorized modification of configuration commands during transit. As a result, the Web browser warns the user that an encrypted site is being accessed by displaying a sequence of access panels.

Click on any of the option buttons in the navigation frame to initiate the access security panels. You see the New Site Certificate panels if you use the Netscape Navigator browser. You see Security Alert panels if you use the Microsoft Internet Explorer browser. The following panels show examples of the New Site Certificate panels.

Note: The access security panels also change if you change the Java permissions on MSIE.
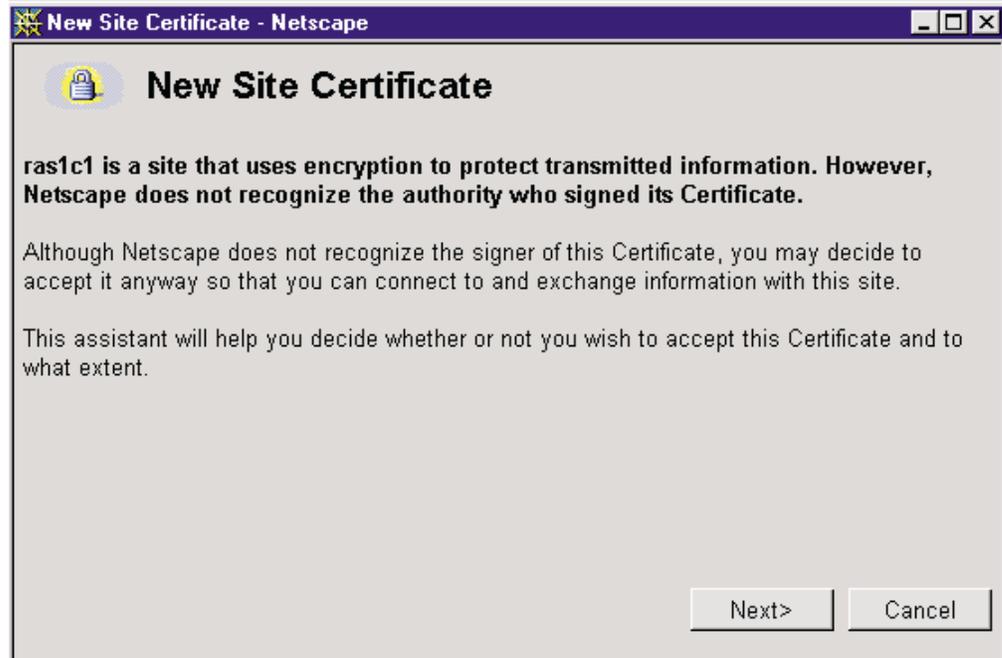
Figure 2. Example of Netscape Navigator access security panels
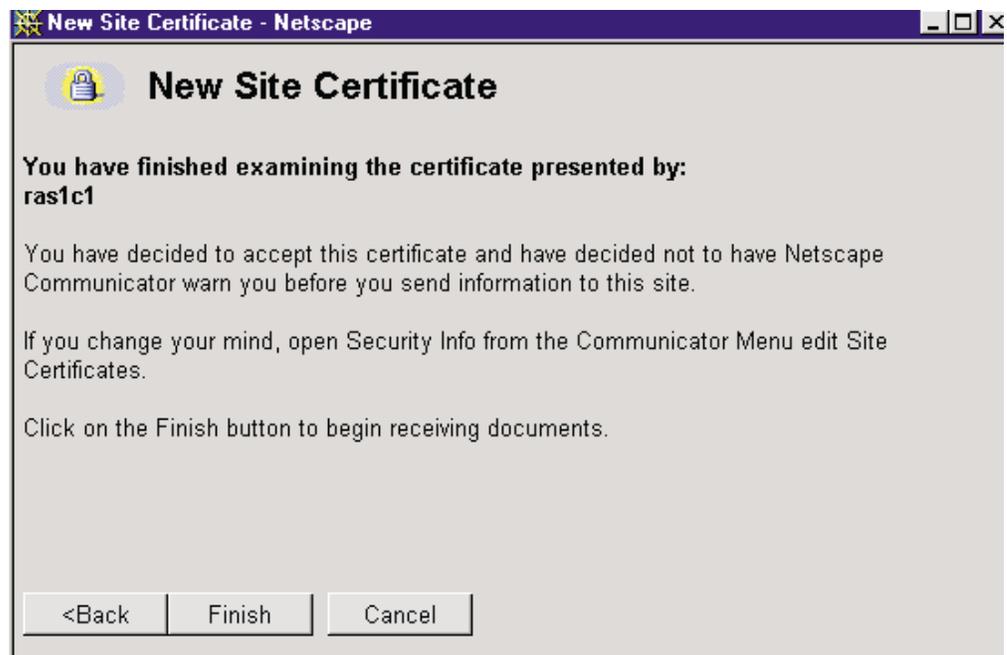
Figure 3. Example of Netscape Navigator access security panels

With the site-access security panels, you tell your Web browser that the Web site represented by the ESS Web address should be treated as a trusted site and that encrypted communications should be allowed between your Web browser and this site.

User authentication

In addition to security by encryption, access to the ESS Specialist interface is protected by user names, passwords, and authorization levels. Access to each Enterprise Storage Server through the ESS Specialist interface requires a valid user name and password for that server. After clicking on any of the buttons in the navigation frame and going through the encrypted-site sequence of windows, the Web browser prompts you for a user name and password.

If this is the first time you are accessing this IBM ESS, you can use the following default authorization:

1. Enter `storwatch` in the **User Name** field.
2. Enter `specialist` in the **Password** field.
3. Click **OK**.

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Figure 4. Sign-on panel

Note that both the user name and password are case sensitive. This default user name and password pair are automatically deleted from the ESS after the first administrative user ID is configured. Your first action as the storage server administrator should be to set up a user ID with administration authority.

If for some reason all of your administration userids are deleted, the default userid (storwatch) and password (specialist) are automatically restored within 30 minutes.

If this is not your first time accessing this particular ESS, just enter a valid user name and password combination. Your browser remembers your user name and password, so it will not prompt you again while accessing the same storage server, until you close your browser application.

As an option, the ESS Specialist can be configured to require particular user name connections to originate from a specified IP address or range of IP addresses. See the description of the User Administration panel in "Managing your user's access authority" on page 15 for more details about this feature.

Getting started

Once you access the ESS Specialist Web interface, the navigation frame is displayed on the left side of the page (see Figure 1 on page 10.)

For initial configuration, click on the buttons and perform the tasks in the following order:

1. Users

   From the User Administration panel, click **Modify Users** to grant access to ESS Specialist for other users in your organization. See "Managing your user's access authority" on page 15 for details.

   Note: Only a user with administration level authority can modify this panel.

2. Status

   When you click **Status**, the Status--Graphical View panel is displayed. See "Checking ESS status" on page 17 for details.

   Note: Resolve any configuration problems before selecting **Storage Allocation**.

3. Communications

   From the Communications panel, you can select **Modify Remote Support** or **Reset PE Password** (at the bottom of the panel). Use these panels to enable call home and remote service access and to set or change the passwords that authorize access by service personnel. See "Configuring communications" on page 20 for details.

   The Communications panel also displays TCP/IP information. TCP/IP information is initially configured by IBM during installation. This information must be correct or ESS Specialist will not function correctly.

   Note: Only users with administration, configuration, or operation levels of authority can modify these panels.

4. Problem notification

   From the Problem Notification panel you can select **Modify e-mail**, **Modify Pager**, or **Modify SNMP**. Use these panels to enable the various types of problem notification and to give the destination of these notifications.

   Note: Only users with administration or configuration levels of authority can modify these panels.

5. Storage allocation

   From the Storage Allocation panel you can view all the storage that is currently defined in your ESS. In addition you can access additional panels which allow you to define and configure other available storage.

   Note: You use the work sheets in the *IBM Enterprise Storage Server Configuration Planner* to plan your initial storage allocation for the ESS.

   Use the **System/390 Storage** button to view and allocate count-key-data (CKD) storage for S/390 or zSeries host systems. This is storage that is accessible by the host systems through the ESCON interfaces installed in the ESS.

   Use the **Open-System Storage** button to view and allocate fixed block (FB) storage for open system hosts. This is storage that is accessible by the hosts systems through the SCSI or fibre-channel interfaces that are installed in the ESS.

   To allocate storage to disk groups and then to volumes, IBM recommends the following task sequence.

   Note: Only users with administration or configuration level authority can modify the storage allocation panels.

a. Use the graphical view of the Storage Allocation panel to view all host and device adapters that IBM has installed on the ESS. Identify your attached host systems and any storage allocation already configured for you by IBM on the ESS. Your ESS may already be logically configured with one of the following options.

   Note: See "Allocating storage" on page 28 for details.
   - OS/390 logical configuration, formatted for 3390 Model 3 devices
   - OS/400 logical configuration, formatted for a maximum number of 9337 Model 5BC LUNs per array
   - Windows NT or Windows 2000 logical configuration, formatted with the LUN size equal to the array size
   - UNIX logical configuration, formatted for a maximum number of 8 GB LUNs per array
   - UNIX logical configuration, formatted for a maximum number of 16 GB LUNs per array

   You can use ESS Specialist to customize these basic logical configurations.

b. Use the Open-Systems Storage panel to display your open-systems configuration. Use the following panels to configure fixed-block (FB) storage:

   Modify Host Systems
   Use this panel to modify the list of host systems that are defined in the ESS Specialist. Host system nicknames are used in the ESS Specialist to aid in the configuration of the ESS.

   Note: The ESS adds an Anonymous host whenever you have configured the access mode to `access any` for the ESS. The Anonymous host represents all hosts on the storage area network which are not explicitly defined to the ESS, but which have access to one or more volumes configured on the ESS.

   Configure Host Adapter Ports
   Use this panel to configure the ESS fibre-channel ports, and to identify which ESS SCSI ports are connected to which host systems.

   Note: ESCON ports and their attached S/390 or zSeries hosts are identified to the ESS and ESS Specialist when you make the physical connection between the hosts and the ESS. This is a feature of the ESCON adapter cards.

   Configure Disk Groups
   Use this panel to configure fixed-block disk groups as RAID or non-RAID disk groups. All disk groups that IBM has physically installed are displayed in a list on this panel. Once you have selected and configured the disk groups, ESS Specialist displays the group on the Storage Allocation panel.

   Add Volumes
   Use this panel to allocate fixed-block volumes in the available disk groups and assign the added volumes to a selected host or port.

   Modify Volume Assignments
   Use this panel to:
   - Configure shared volume assignments with another host or port
   - Remove volume assignments from another host or port

- Assign volumes to another host or port

System/390 Storage
Use this panel to display your System/390 or zSeries configuration. Use the following panels to configure count-key-data (CKD) storage.

Note: ESCON-attached hosts are identified to the ESS when you make the physical connection between the hosts and the ESS. ESS Specialist displays ESCON hosts as a single icon in the graphical presentation.

Configure LCU
Use this panel to configure the logical control units (LCUs) that are presented to all attached S/390 or zSeries host systems, and to define parallel access volumes (PAVs).

Configure CKD Disk Groups
For each LCU, use this panel to configure CKD disk groups as RAID or non-RAID. In addition, you can use this panel to automatically allocate standard volumes in any newly configured RAID array.

Add CKD Volumes
For each LCU, use this panel to allocate custom volumes to the previously configured RAID arrays, or non-RAID disks.

Managing your user's access authority

The User Administration panel (see Figure 5) displays a list of users who are authorized to use ESS Specialist. The list includes the user's level of access authority. With administration level authority, you can grant access to other users in your organization.

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Figure 5. User Administration panel

Enterprise Storage Server Specialist

Modify Users

User Account

| Name |
| |
| Password |
| |
| Password Verification |
| |
| Access Level |
| Administration |
| IP Address Range (Optional) |
| |
| Comments (Optional) |
| |

Add >>

<< Remove

User List

| Username | Access Level | IP Address Range |
| storwatch | Administration | |

Perform Configuration Update   Cancel Configuration Update
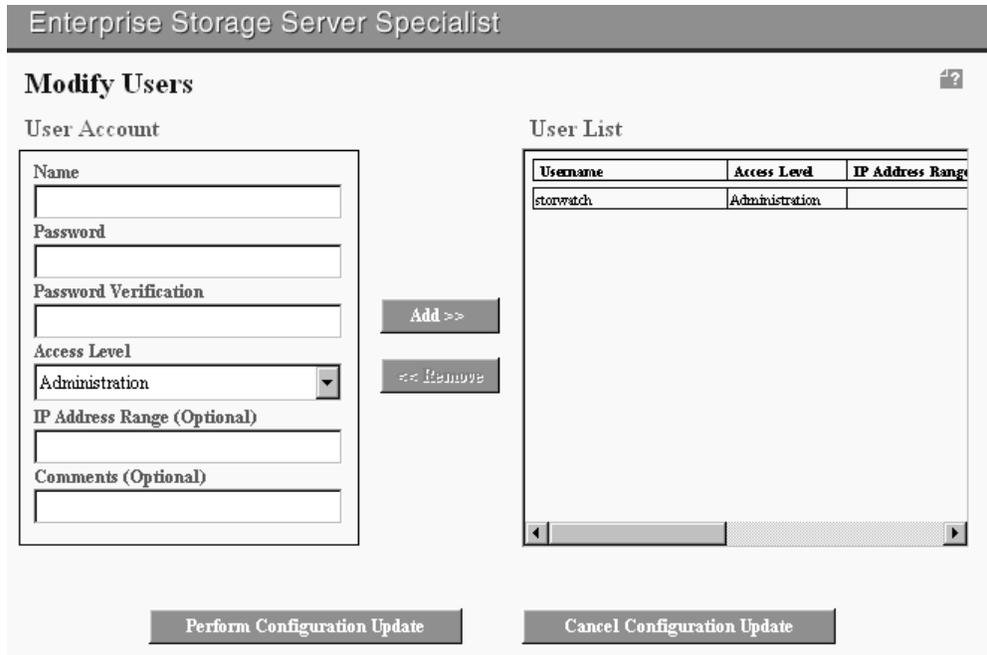
S008926N

Figure 6. Modify Users panel

Use the spin buttons at the top of each column to set sort priorities. For example, when your list of users is extensive, you could set the sort button for the Access Level column to sort first, then click **Perform Sort**. You would then be able to see what type of access you (or another administrator) had assigned to the users.

Click **Modify Users** at the bottom of the User Administration panel to display the Modify Users panel.

Use the Modify Users panel to:
- Assign a user's access authority
- Change a user's access authority
- Remove a user

The ESS Specialist prompts you for the correct user name and password from the list you just configured when you:
- Modify or delete the username and password that you used to log into the current ESS Specialist session
- Add the very first administration-level username and password

Assigning a user's access authority
Perform the following steps to assign a user's access authority:
1. Type the user name in the **Name** field in the User Account box.
2. Type the user password in the **Password** and **Password Verification** fields in the User Account box.
3. Select the user access authority in the **Access Level** field in the User Account box. The access authorities restrict a user ID to one of the following access levels:

   View   Allows users to view the ESS status and configuration.

Operation
> Allows users to perform view and operation functions, such as changing the remote service and PE passwords.

Configuration
> Allows users to perform view, operation, and configuration functions, such as defining and modifying the storage on the ESS.

Administration
> Allows users to perform view, operation, configuration, and administration functions, such as authorizing access to other ESS Specialist users.

4. Type the user's IP address range in the **IP Address Range** field. This is an optional entry that allows you to define the IP address or IP address range, from which the user can initiate client communications with the ESS Specialist.

   Note: You can use an asterisk (*) as a wild-card character to specify an IP address range.

5. You can type comments about the user in the **User Comment** field. This is an optional field for entry of information about a user, such as their job title or how long they should have access authority.

6. Click **Add** to add the user to the User List.

7. Click **Perform Configuration Update** when you have finished adding access, modifying access, or deleting users. Click **Cancel Configuration Update** if you do not want to make the changes to the User List.

Changing a user's access authority
Perform the following steps to change a user's access authority:

1. Select the user name in the User List.

2. Click **Remove** to move the entry to the User Account window.

3. Select the new access level in the **Access Level** field.

4. Click **Add** to add the user, with the modified access level, to the User List.

5. Click **Perform Configuration Update** when you have finished adding access, modifying access, or deleting users. Click **Cancel Configuration Update** if you do not want to make the changes to the User List.

Removing a user
Perform the following steps to remove a user:

1. Select the user name that you want to remove in the User List.

2. Click **Remove**.

3. Click **Perform Configuration Update** when you have finished adding access, modifying access, or deleting users. Click **Cancel Configuration Update** if you do not want to make the changes to the User List.

Checking ESS status

Before using ESS Specialist to initialize or modify the ESS configuration, you should review the ESS Specialist Status panel for problem records that require service attention. Ensure that the Status panel shows that all machine resources are in the normal state and that there are no problem records listed.

1. From the navigation frame, click **Status** to access the Status panel.

2. Click **Refresh Data** at the top of the Status panel to display the current status.

3. ESS Specialist displays a graphical view of the ESS.

Status graphical view

The graphical view of the Status panel (see Figure 7) shows a simplified logical representation of the internal components of the server. The display highlights any components that are experiencing difficulty. You should not proceed with configuration changes until the problems are resolved by IBM or your service provider.
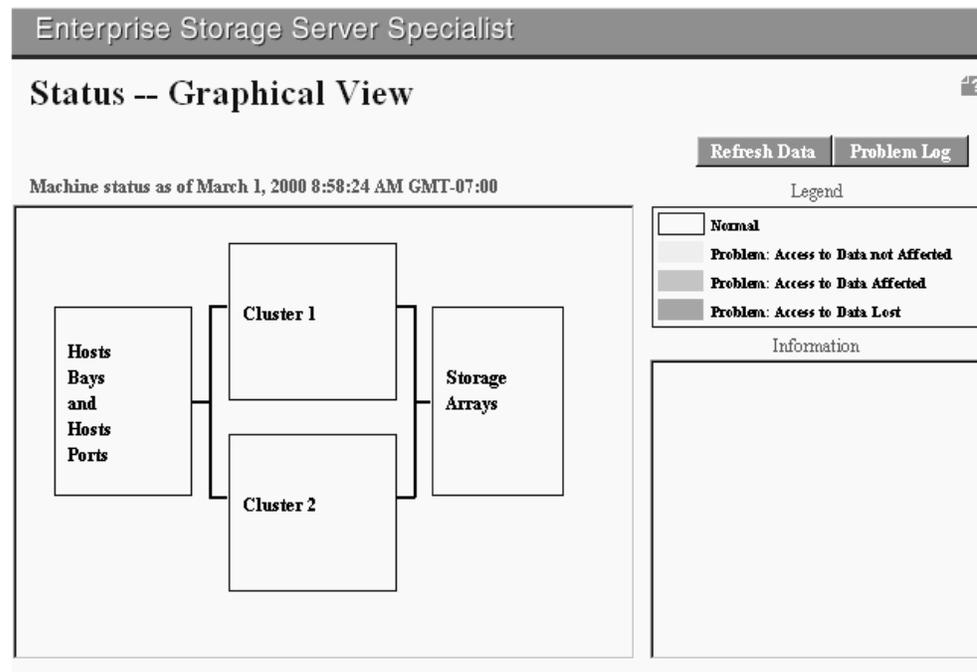
S008920N

Figure 7. Graphical view of the Status panel

The connecting lines represent the physical data paths between the components:

- Host adapters
- Cluster controllers
- Storage arrays

If any component is failing, the server alerts the user by highlighting the element that corresponds to the location of the failed component. The color indicates the severity of a problem and shows its status:

White   Normal status. No failure has occurred.

Yellow
> Problem. Access to data is not affected.

Light orange
> Problem. A component has failed and access to data is affected but not lost. Performance may be degraded.

Dark orange
> Problem. A component has failed, and access to data is lost. One or more hosts have lost access to one or more logical volumes defined in the storage facility.

Color can also indicate that service actions are occurring on the machine or that logical configuration is in progress. See the Information box for more details about a service action. For details about a particular problem, click **Problem Log** to access the Status--Problem Log panel.

Status--problem log

This section describes the information in the Status--Problem Log panel (see Figure 8.)
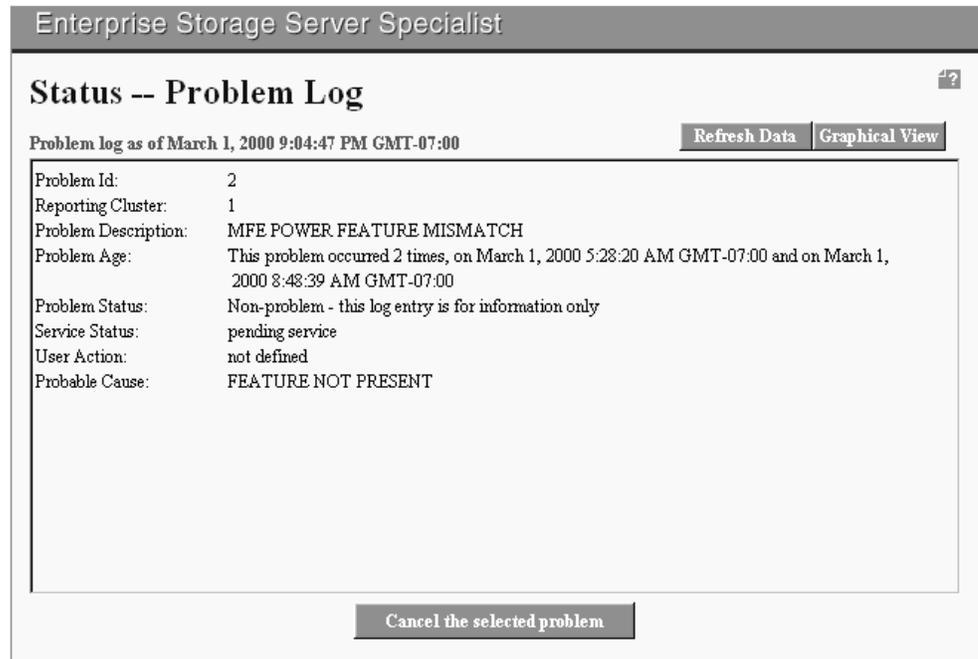
S008921N

Figure 8. Problem log view of the status panel

Use the problem log to help you to identify any components or functions that are degraded or temporarily unavailable due to problem conditions or service actions. You should not proceed with configuration changes until any problems that are listed are resolved by IBM or your service provider. Follow these procedures:

1. Access the problem log from the Status Graphical View panel by clicking **Problem Log**.
2. Click **Refresh Data** at the top of the panel to display the most current Problem Log.

   The log lists all problems that are currently open for the server. It gives you the following information:

Problem ID	The unique problem identification number
Reporting cluster	Cluster 1 or 2
Problem description	A description of the problem
Problem age	The date, time, and frequency that the problem occurred
Problem status	The problem severity
Service status	Status of the problem resolution

User action	Any corrective action that you can perform
Probable cause	A list of the probable causes of the problem
Additional information	Additional information about this problem, if any

To remove a resolved problem from the log:

1. Select the problem by clicking the appropriate Problem ID.
2. Click **Cancel the selected problem** at the bottom of the page.

> **Note:** Your SSR can remove a problem from the Problem Log when they perform the required service.

To return to the Status--Graphical View panel, click **Graphical View** at the upper right corner of the panel.

Configuring communications

The Communications panel displays TCP/IP information that is initially configured by IBM during installation of your machine. If this information is incorrect, the ESS Specialist will not function correctly. You also will be unable to initiate the Copy Services Web interface.

Each ESS cluster controller contains an Ethernet communications adapter. This adapter provides a network connection between the cluster controllers and the ESSNet workstation and to the local IP network, if the ESSNet has been connected to your local intranet. For network communications to work correctly, the cluster controller's TCP/IP setting must be configured appropriately. This is handled by IBM during initial installation and configuration of the ESS. A description of the TCP/IP fields follows:

Hostname
> The host name assigned to cluster *n* for access over the network. For example, Storage01.

IP (Internet) address
> The dotted decimal address assigned to cluster *n* of this machine. For example, 9.113.152.149 .

Subnet mask
> The dotted decimal network mask applied to TCP/IP on this machine. For example, 255.255.255.0.

Default Router
> The dotted decimal IP address of the default gateway.

Domain
> A Domain name, for example: sanjose.ibm.com.

Domain Name Server
> The dotted decimal IP address(es) of the name server(s), if any.

Use the Communications panel to:

- Set up communications between the ESS and IBM service
- Configure the remote-support settings
- Reset the PE password

Click **Communications** from the navigation frame to access the Communications panel (See Figure 9.)

Enterprise Storage Server Specialist

Communications

TCP/IP

	Cluster 1	Cluster 2
Hostname	rpk105c0	rpk105c1
IP Address	9.115.60.72	9.115.60.73
Subnet Mask	255.255.254.0	255.255.254.0
Default Router	9.115.61.1	9.115.61.1
Domain		
Domain Name Server	9.115.0.250	9.115.0.250
	9.115.1.250	9.115.1.250

Remote Support

Call Home
Status - Disabled
Remote Service Access
Status - Disabled

Modify Remote Support   **Reset PE Password**

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Figure 9. Communications panel

Configuring remote support settings

This section provides the procedures for entering the remote support and call home settings in the Remote Support Modification panel.

The ESS uses the modems installed in the ESSNet workstation to automatically initiate outgoing service calls when necessary and to receive incoming calls from service personnel. However, network attachment of the cluster controllers and the ESSNet are essential for this communication to work properly.

The ESS supports two types of outside service access. Both types of access use the modem installed in the ESSNet workstation and depend on proper network communication between the ESS cluster controllers and the ESSNet. Both types of access can be enabled or disabled by the local storage administrator of the ESS through the ESS Specialist Web user interface. The two types of outside service access are as follows:

Remote support access
You can enable or disable remote support access from the Modify Remote Support panel. The service access password, which can also be set or changed on this panel should only be given out to authorized service support representatives (SSRs). If remote support is enabled, an SSR can dial into the ESSNet and access the ESS cluster controllers, provided that the correct service password is entered. Once logged into an ESS cluster processor, the SSR can perform a limited set of nondisruptive diagnostic activities to aid in problem determination.

Product engineering (PE) access
You can enable or disable PE access from the Communications panel by

resetting the PE access password. The PE access password is automatically invalidated after 7 days. This means that a new PE access password must be generated and given to the IBM product engineer (PE) in order to provide continued PE access to the ESS machine. The product engineer has unlimited access to the ESS licensed internal code and the ESS configuration files. Therefore, it is imperative that you only give the PE access password to authorized IBM product engineers.

The Remote Support Modification panel lets you authorize or deny service personnel access to your ESS by:

Enabling or disabling the remote login feature
You control this remote access. IBM recommends that you enable this service. It allows service personnel to login to your ESS remotely. With access to the ESS, service personnel can perform service tasks, such as viewing error and problem logs and initiating trace or dump retrievals.

Setting the optional remote access password
This password adds further security to the support login ID and should be set in agreement between you and IBM service personnel.

Enable outgoing modem calls
You control this remote service. When you enable outgoing-modem calls, the ESS places the call-back password in the header of each call home record. The call-back password allows your service provider to login to the ESS in response to the service call.

Modifying remote support access
You can change the remote login and remote access password features from the Communications panel (Figure 9 on page 21) by performing the following steps:

1. Click **Modify Remote Support** to display the Remote Support Modification panel. (See Figure 10 on page 23.)

2.
   a. Select **Enable** or **Disable** in the **Call Home** field.
   b. Select **Enable** or **Disable** in the **Remote Service Access** field.
   c. Type an appropriate password in the **Remote Access Password** field.
   d. Type the same password again in the **Password Verification** field.

3. Click either **Perform Configuration Update** when you have finished the modifications to remote support or **Cancel Configuration Update** if you choose not to make the changes.

Enterprise Storage Server Specialist

Remote Support Modification

Call Home

Disable

Remote Service Access

Disable

Remote Access Password

Password Verification

Perform Configuration Update   Cancel Configuration Update

S008923N

Figure 10. Remote Support Modification panel

Resetting the PE password

The PE password allows a product engineer or service support representative to access your ESS. Complete the following steps to change the PE password.

1. Click **Reset PE Password** at the bottom of the Communications panel. The machine resets the password.

2. Click **Yes** on the warning panel (See Figure 11.)
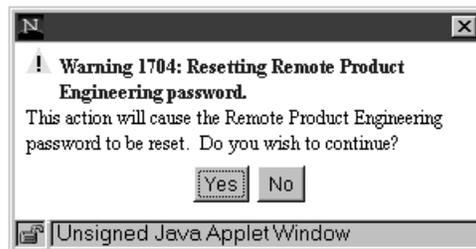
S008924L

Figure 11. Warning about resetting a remote product engineering password

3. The new password is displayed in the password verification panel
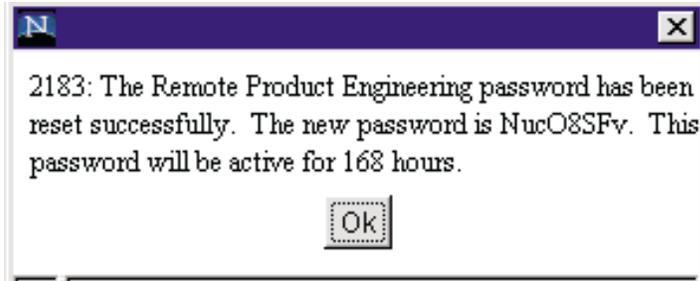
Figure 12. Verification after resetting a remote product engineering password

> Write down or remember the password; you cannot retrieve it from the ESS Specialist. The password is good for 168 hours (7 days).

4. Click **OK** on the password verification panel.

Configuring problem notification

Use the Problem Notification panel to view the ESS's current problem notification configuration, and to enable the various types of problem notifications. The ESS can send the problem notifications to one of the following destinations:

- An e-mail address
- A pager
- An SNMP trap

From the Navigation frame, click **Problem Notification**. (See Figure 13 for an example of the Problem Notification panel.) To modify the configuration and specify the particular destinations, you can select **Modify Email**, **Modify Pager**, or **Modify SNMP**.

Figure 13. Problem Notification panel

Configuring e-mail notification

The ESS sends e-mail messages to the addresses that you specify on the Modify Email panel (See Figure 14.)

The ESS generates two types of e-mail messages: error messages and informational messages. The ESS sends error messages when it detects a situation that requires corrective action.

Informational messages provide information such as:
* Notifications when the ESS receives a new level of licensed internal code (LIC)
* Notifications when the service personnel run diagnostic tests to verify that your addresses are receiving e-mail messages

CS000056

Figure 14. Modify Email panel

In the Modify Email panel:

1. Type the number of notifications you want to receive per problem in the **Maximum Emails per problem** field. This field is in the top left corner. The allowed range for maximum e-mails per problem is between one to five inclusive.

   Problem notifications occur at eight-hour intervals. Notifications cease when an SSR initiates a service action for a problem record or when the specified maximum number of notifications have occurred.

2. Type the user addresses in the **Email Address** entry field.

3. Select the **Receive informational Email** check box to authorize the destination to receive informational messages. If you do not select the check box, informational messages are not sent.

4. Select the **Receive error Email** check box to authorize the destination to receive error messages. If you do not select the check box, error messages are not sent.

5. Click **Add** to add the destination to the destination list.

> **Note:** Remove a destination by means of the following steps:
> > a. Select the unwanted destination from the destination list.
> > b. Click **Remove** in the center of the panel.

6. Select the **Send test Emails** check box to authorize the destinations to receive test messages. If you do not select the check box, test messages are not sent.

  Test messages are sent for all newly configured, as well as all previously configured e-mail addresses when you click **Perform Configuration Update**.

7. When you have completed your modifications to e-mail notifications, click **Perform Configuration Update** at the bottom of the panel or click **Cancel Configuration Update** to cancel the changes.

Configuring pager notification

The ESS sends pager messages about problems to the pager telephone numbers that you specify on the Modify Pager panel (see Figure 15). This configuration is optional.

Figure 15. Modify Pager panel

In the following procedure, steps 2 through 7 request information unique to each destination pager, while steps 1, 8 and 9 request information that is common to all destination pagers:

1. Use the scroll buttons to select the maximum number (1 - 5) of page notifications you want to receive per problem in the **Maximum pages per problem** field. The scroll button field is in the top left corner of the panel.

2. Type the pager telephone number in the **Pager Number** field. The telephone number should include area codes, but must not exceed 64 characters.

> **Note:** The pager number is the pager company's TAP/IPO modem phone number. See *IBM Enterprise Storage Server Introduction and Planning Guide*.

3. Select the **Enable for Notifications** check box to enable or disable a pager destination.
4. Select your pager type in the **Pager Type** field. This could be numeric or alphanumeric.

    Note: The information the machine can send to a numeric pager is limited. In the case of a numeric pager, the information is presented in the following format:

      The numeric pager test message is: `01234-56789`

      The normal pager message is: `111-aaaaaa-222-bbbbbbb-333-c-444-ddd`

      where:

        aaaaaa is the numeric characters from the product serial number

        bbbbbbb is the customer voice phone number

        c is the cluster number (0 or 1)

        ddd is the Problem ID

5. Type the personal identification number (PIN), if your pager has one, in the **Pin Number** field.

    Note: The Pin number is unique for the pager. See *IBM Enterprise Storage Server Introduction and Planning Guide*

6. Type the password, if you have one, in the **Password** and **Password Verification** fields.
7. Click **Add** to add the destination and the functions you enabled for each destination to the Destination List.
8. To remove a destination from the list, select it from the destination list. Then click **Remove**.
9. Select the **Send test pages** check box to authorize the destination to receive test messages. If you do not check the box, test messages are not sent.

    Test messages are sent for each new and configured pager address when the **Perform Configuration Update** option is selected.
10. When you have completed your modifications to the Modify Pager panel, either click **Perform Configuration Update** at the bottom of the panel or click **Cancel Configuration Update** to cancel the changes.

Configuring SNMP notification

The ESS generates Simple Network Management Protocol (SNMP) traps and supports a read-only Management Information Base (MIB). The ESS generates both generic and product-specific SNMP traps. Product-specific traps provide information about problems that are detected by the ESS that require corrective action.

The ESS sends information to the trap addresses that you specify on the Modify SNMP panel. Complete the configuration in the following manner.

1. Click **Modify SNMP** from the Problem notification panel. The Modify SNMP panel is displayed. (See Figure 16 on page 28.)
2. Select or type the maximum traps (1 - 5) per problem notification on the **Maximum traps per problem** field. To ensure that traps are not lost, you may want to send each trap notification more than once.
3. Select the **Enable MIB read access, Enable generic traps,** and **Enable ESS server traps** check boxes at the top of the panel to enable these functions.

The ESS supports generic traps, such as cold start and warm start. ESS specific traps provide information on problems detected by the ESS that require action by you or a service provider. See the *IBM Enterprise Storage Server User's Guide* for more information on MIB and traps.

4. Type the SNMP trap addresses in the **SNMP Trap Address** field.

5. Click **Add** to add the address to the Destination List.

6. Type the SNMP community name, up to 31 characters, in the **Community Name** field. This is to authenticate requests. If you enter nothing, the default is *public* access.

7. Enter the name of the person that service personnel should contact about the machine in the **System Contact** field. This is an optional field.

8. Type the location of the machine for which the traps are generated in the **System Location** field. This is an optional field.

9. Select the **Send test traps** check box to authorize the destination to receive a test trap. If you do not check the box, a test trap is not sent.

   Test traps are sent for each new and configured SNMP address when the **Perform Configuration Update** option is selected.

10. Click **Perform Configuration Update** at the bottom of the page to enable these settings, or click **Cancel Configuration Update** to cancel these changes.

CS000054

Figure 16. Modify SNMP panel

Allocating storage

ESS Specialist displays the Storage Allocation panel after you click **Storage Allocation** from the navigation frame.

The Storage Allocation panel contains a logical view of the components of the ESS storage facility. It shows the server's logical configuration of host systems, host

ports, storage adapters, arrays, and volume assignments. Your user ID, along with configuration or administration authority, allows you to select options that modify the server configuration.

The Storage Allocation panel consists of two views, a graphical view and a tabular view. The graphical view (see Figure 17 on page 30) depicts the server hardware components with interconnecting lines to indicate a particular assignment or logical connection while the tabular view (see Figure 18 on page 31) presents the same information in table format.

Using the graphical view of the Storage Allocation panel

The graphical view is interactive, allowing you to explore the path of a particular host to a particular adapter:

- The top row contains icons for the installed host system. ESS Specialist adds the Anonymous host whenever you have configured the fibre-channel LUN access mode to **access any**. The Anonymous host represents all hosts on the storage area network which are not explicitly defined to the ESS, but which have access to one or more volumes configured on the ESS. See "Volume access" on page 48 for more information about setting access modes.

- When you click a host icon to select it, the Information box on the right side of the panel displays information about the host nickname and operating system.

- The second row contains icons for the host adapters. Each SCSI adapter has two selectable ports. Each fibre-channel adapter has one port. When you select a host, the configured ports are highlighted in yellow, and lines appear between the host icon and the port icons.

- When you select a port or adapter, the ESS Specialist highlights the arrays with volumes that you can access from the host that you selected. The Information box displays information about the adapter and its location. For a fibre-channel adapter, it also displays information about whether the fibre channel uses point-to-point or arbitrated loop protocol.
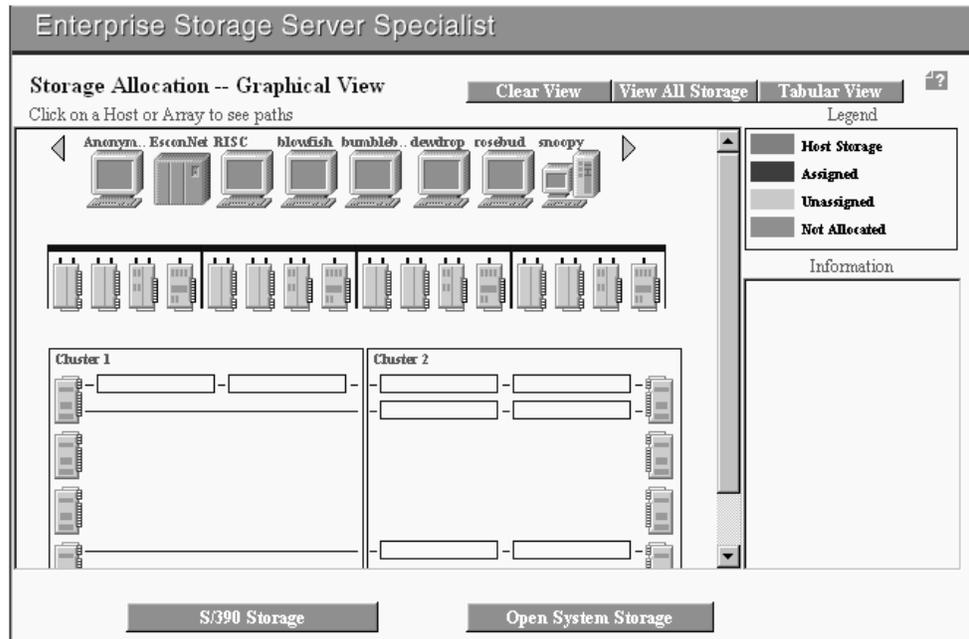
Figure 17. Graphical view of the Storage Allocation panel

The bottom of the Storage Allocation--Graphical View panel has two buttons:

S/390 Storage
Click this button to go to the main panel for System/390 or zSeries hosts (ESCON attached).

Open System Storage
Click this button to go to the main panel for open-systems (SCSI and fibre-channel attached hosts).

Note: If the ESS has no ESCON host adapters, ESS Specialist grays out the **S/390 Storage** button. If the ESS has no SCSI or fibre-channel host adapters, ESS Specialist grays out the **Open System Storage** button.

Using the tabular view of the Storage Allocation panel

The tabular view of the Storage Allocation panel (Figure 18 on page 31) presents the same information as the graphical view but in table format. Individual table columns represent the hardware components. The tabular view shows only those volumes that are assigned to a host . The table does not display volumes that are not assigned to a host. For open-systems hosts, go to the Modify Volume Assignment Panel to view all volumes (assigned and unassigned). The information displayed is static with the exception of the buttons located in the upper right corner:

• Click **Print Table** to print a copy of the storage allocation that the ESS displays in the table.

• Click **Perform Sort** to sort on different columns. See "Sorting on table columns" on page 7 for more information about sorting.

• Click **Graphical View** to return to the graphical view of the Storage Allocation panel.

Enterprise Storage Server Specialist

Storage Allocation -- Tabular View

List of Assigned Volumes   Print Table   Perform Sort Graphical View

no sort ▼	no sort ▼	no sort ▼	no sort ▼	no sort ▼	no sort ▼	no sort ▼	no sort ▼
Host/SSID	**LSS/LCU**	**Volume**	**Type**	**Size**	**Host Adapter**	**Location**	**Shared**
Anonymous	LSS: 016	605-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5605	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 005	Yes
Anonymous	LSS: 016	604-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5604	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 004	Yes
Anonymous	LSS: 016	603-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5603	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 003	Yes
Anonymous	LSS: 016	602-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5602	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 002	Yes
Anonymous	LSS: 016	601-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5601	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 001	Yes
Anonymous	LSS: 016	600-FCA31	Open System	016.0 GB	Fibre Channel FC Port A ID 00, LUN 5600	Device Adapter Pair 4 Cluster 1, Loop A Array 4, Vol 000	Yes
Anonymous	LSS: 016	608-FCA31	Open System	016.0 GB	Fibre Channel	Device Adapter Pair 4	Yes

CS000057

Figure 18. Tabular view of the Storage Allocation panel

The following section provides you with an overall view of the process of allocating storage::

1. Access ESS Specialist. You need configuration-level access to allocate storage.

    Note: IBM has installed your ESS and performed an initial standard configuration as defined by you in the work sheets from the *IBM Enterprise Storage Server Configuration Planner*. If you are using ESS Specialist to perform a *custom* configuration, use these work sheets and follow the instructions for custom logical configuration in the Configuration Planner.

2. Select the graphical view of the Storage Allocation panel to perform the configuration tasks.

3. From the Storage Allocation panel, click **Open System Storage**. The Open System Storage panel identifies the configured host systems with their attached storage. Use this panel to configure new host systems and storage or to modify existing configurations. The following panels are available from the Open System Storage panel by clicking the appropriate buttons:

    a. **Modify Host Systems**. Use this panel to identify host systems that you are attaching to the ESS.

        Note: ESCON-attached hosts (S/390 or zSeries) are identified to the ESS and ESS Specialist when you make the physical connection between the hosts and the ESS.

    b. **Configure Host Adapter Ports**. Use this panel to identify which host ports and IDs are used to attach host systems to the ESS by SCSI cables, to set the topology for fibre-channel ports, and to see the fibre-channel access modes of the ESS.

> **Note:** ESCON ports and their attached S/390 or zSeries hosts are identified to the ESS and ESS Specialist when you make the physical connection between the hosts and the ESS. This is a feature of the ESCON adapter cards.

   c. **Configure Disk Groups**. This button links you to the Fixed Block Storage panel. Use this panel to define fixed-block disk groups as RAID or non-RAID and to prepare them for volume assignment. This panel displays all disk groups that are undefined or defined as fixed block. Disk groups that you have defined as CKD are not displayed. Once you have selected and defined the disk groups, ESS Specialist displays the group on the Storage Allocation panel.

   d. **Add Fixed Block Volumes**. Use this panel to allocate fixed-block volumes in the available disk groups and to assign the volumes to a selected SCSI port storage map or to fibre-channel hosts.

   e. **Modify Volume Assignments**. Use this panel to:

- Share an assigned volume with another SCSI port or a fibre-channel host
- Remove a volume assignment from a SCSI port or fibre-channel host
- Add an unassigned volume to an eligible SCSI port or fibre-channel host

4. From the Storage Allocation Panel, click **System/390 Storage**. Use the System/390 Storage panel to display your System/390 or zSeries configuration and to select the following configuration tasks:

   a. **Configure LCU**. Use the Configure LCU panel to configure the logical control units (LCUs) that are presented to all attached S/390 or zSeries host systems.

> **Note:** You return to this panel after you have defined disk groups and volumes to create parallel access volumes (PAV) for existing base volumes.

   b. **Configure Disk Groups**. For each LCU, use this panel to configure CKD disk groups and standard 3390 volume types and to optionally define custom volumes.

   c. **Add Volumes**. For each LCU, use the Add Volumes panel to allocate CKD custom volumes to the available disk groups.

   d. **Configure PAVs for LCU**. Return to the Configure LCU panel to assign PAVs for base devices that you have defined. This is an optional step, and can be performed only if the appropriate feature is installed on the ESS.

Configuring open-systems storage

Use the **Open System Storage** panel to assign physical storage units for fibre channel- and SCSI-attached host systems.

1. Click Open System Storage on the Storage Allocation panel.

   The information on the Open System Storage panel is presented in the form of two tables:

   - **Host Systems**

     This table displays all host systems that have been defined to the ESS Specialist. If no host systems are defined, only the message `No host systems are currently defined` is displayed in the table area.
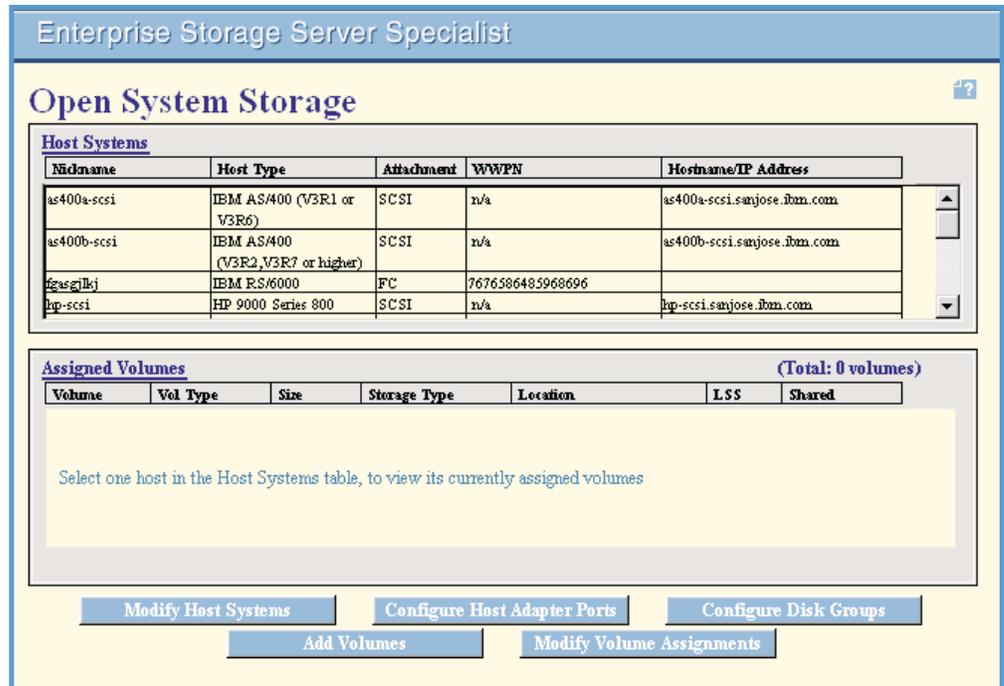
Figure 19. Open Systems Storage Panel

The following columns are displayed in the Host Systems table:

Nickname

The nickname of this host system. This name uniquely identifies the particular host or host attachment within the ESS.

Host Type

The hardware or operating system type of the host.

Attachment

The type of host attachment used by this host; either SCSI-attached or fibre-channel attached.

WWPN

The world-wide port name associated with the fibre-channel adapter installed in the host system. This field applies only to fibre-channel attached hosts.

Hostname/IP address

An optional Internet Protocol dotted decimal address, or host name alias.

- **Assigned Volumes**: This table displays all volumes that have been assigned to the host system that you selected in the **Host Systems** table at the top of the panel. If the selected host has no assigned volumes, only the message `There are no volumes assigned to the currently selected host system` is displayed in the table area.

The following columns are displayed in the Assigned Volumes table:

Volume

This column contains the logical unit (LUN) serial number associated with this volume. The LUN serial number of an ESS volume incorporates a portion of the ESS serial number. This allows the LUN serial numbers to uniquely identify not only volumes within a

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particular ESS but to uniquely identify volumes among all ESS machines installed in an enterprise.

Vol Type

This column identifies the type of the volume. This can be either `AS/400` for volumes allocated for AS/400 host systems, or can be `open-system` for volumes allocated to UNIX-based host systems or Intel-based personal computers (PCs).

Size   This column displays the size of the volume, in gigabytes. The value is rounded to two decimal places.

Storage Type

This column displays relative fault tolerance of the storage where the volume resides. The possible types are RAID array (fault tolerant) and non-RAID (non-fault tolerant).

Location

This column provides an identification of the physical location of the volume. This includes the number of the device adapter pair, the number of the cluster, the ID of the SSA loop, and the number of the disk group associated with the RAID array which contains the data for this volume. In case of a non-RAID volume, it also includes the number of the non-RAID disk within the disk group that contains the volume. In addition, the volume number is included to differentiate between different volumes on the same array or disk.

LSS   This column contains the number of the logical subsystem (LSS) which contains this volume. This value is important only for performing Copy Services operations on the volume. The ESS displays the LSS number as hexadecimal.

Shared

This column indicates whether or not this volume is shared. A volume is considered shared if multiple host systems have access to the volume. The only exception to this rule is if multiple hosts are connected to the same SCSI bus. The volumes connected to this bus are not considered shared by these hosts because access to these volumes uses the same host interface connection

2. At the bottom of the panel:

   a. Click **Modify Host Systems** to link to the Modify Host Systems panel.

   b. Click **Configure Host Adapter Ports** to link to the Configure Host Adapter Ports panel.

   c. Click **Configure Disk Groups** to link to the Fixed Block Storage panel.

   d. Click **Add Volumes** to link to the Add Volumes (1 of 2) panel.

   e. Click **Modify Volume Assignments** to link to the Modify Volume Assignments panel.

Defining host systems attached to the ESS

The Modify Host Systems panel allows you to modify the list of host systems that are defined in the ESS Specialist. Use the **Modify Host Systems** panel to:

- Add a host system to the list of host systems that are available to be attached to the ESS.
- Identify a SCSI or fibre-channel attached host system by type and name.
- Assign a world-wide node name.
- Remove a selected host from the Host Systems List.

- Modify the attributes for an existing host system.
- Assign a fibre-channel attached host system to a specific ESS fibre port.

For details and additional information regarding the hosts, operating systems, host adapters, and cables that the ESS supports, see the ESS Web site www.storage.ibm.com/hardsoft/products/ess/supserver.htm

For information on configuring a custom host type, see "Defining a custom SCSI bus configuration" on page 47.

On the left side of the Modify Host Systems panel displays the Host Attributes box displays the characteristics of individual host systems.

You can modify the following characteristics:

Nickname

Represents the name of the host system, as it is displayed in the ESS Specialist user interface.

Host Type

Indicates the type of host system. The ESS supports the following open-system host types:

- IBM RISC System/6000, including RISC System/6000 Series Parallel Complex, running AIX
- IBM AS/400, AS/400 Advanced Series, and AS/400e™ Series

  For AS/400 hosts, an additional distinction is made based on the operating system that is installed:

  – AS/400 hosts that are running the OS/400 operating system Version 3 Release 1, or Version 3 Release 6, only support one volume size, the emulated 9337-580 (4.19 GB).

  – AS/400 hosts that are running the OS/400 operating system Version 3 Release 2, Version 3 Release 7, or a higher level, support all AS/400 volume sizes, including the 9337-580 (4.19 GB), the 9337-590 (8.59 GB), the 9337-5AC (16 GB), and the 9337-5BC (32 GB).

    Note: AS/400 model designations that end in C are protected models and those that end in A are unprotected models. Software mirroring is supported on the AS/400 unprotected models.

- Sun Sparc or Ultra

  For Sun hosts, an additional distinction is made based on the operating system installed:

  – Sun hosts that are running the Solaris operating system at level 2.5.1 or are running the Solaris 2.6.0 base level only support a maximum of 8 logical unit numbers (LUNs) per SCSI device. This limits the number of volumes that the Enterprise Storage Server can assign to those hosts.

  – Later levels of Solaris support up to a maximum of 32 LUNs per device. This 32 LUN support is also included in the Solaris 2.6.0 level if the following patches are installed:

    - SunOS 5.6 kernel update patch 105181-06 or later
    - SunOS 5.6 kernel/drv/isp patch 105600-06 or later

- HP 9000 Series 800
- Compaq Alpha Server, running Tru64 UNIX or OpenVMS

- Data General Server, running DG-UX
- IBM NUMA-Q® Servers
- All Intel-based servers running Novell Netware
- All Intel-based servers running Windows NT 4.0 SP3 or higher, including Windows 2000.

Host Attachment
Shows the type of interface used to connect the host to the ESS. The available choices are SCSI or fibre channel. The choice depends on which host adapter cards you have installed in the ESS.

Hostname/IP Address
Displays the hostname alias or dotted decimal IP address, if the host is attached to the IP network. This field is optional.

World-Wide Port-Name
Represents the port name of the fibre-channel adapter installed in the host system. This field applies only if the host system is fibre-channel attached to the ESS.

Fibre-Channel Ports
Lists all of the fibre-channel ports that are installed in the ESS. The highlighted entries indicate which ports can be used by this particular host system to access its assigned volumes in the ESS. If the first entry, **All installed ports**, is highlighted, then the host system can use all fibre-channel ports in the ESS to access its assigned volumes. The default value for this field is **All installed ports**.

On the right side is displayed the Host Systems List table. The Host System List table all of the currently defined host systems and those that are pending definition. The columns in this table display all the host attributes. You can select a host from the list and move it to the **Host Attributes** fields for modification.

Adding a host system
Perform the following procedures to add a host system:

1. Click **Modify Host Systems** from the Open System Storage panel (See Figure 19 on page 33.) The Modify Host Systems panel is displayed. (See Figure 20 on page 37.)
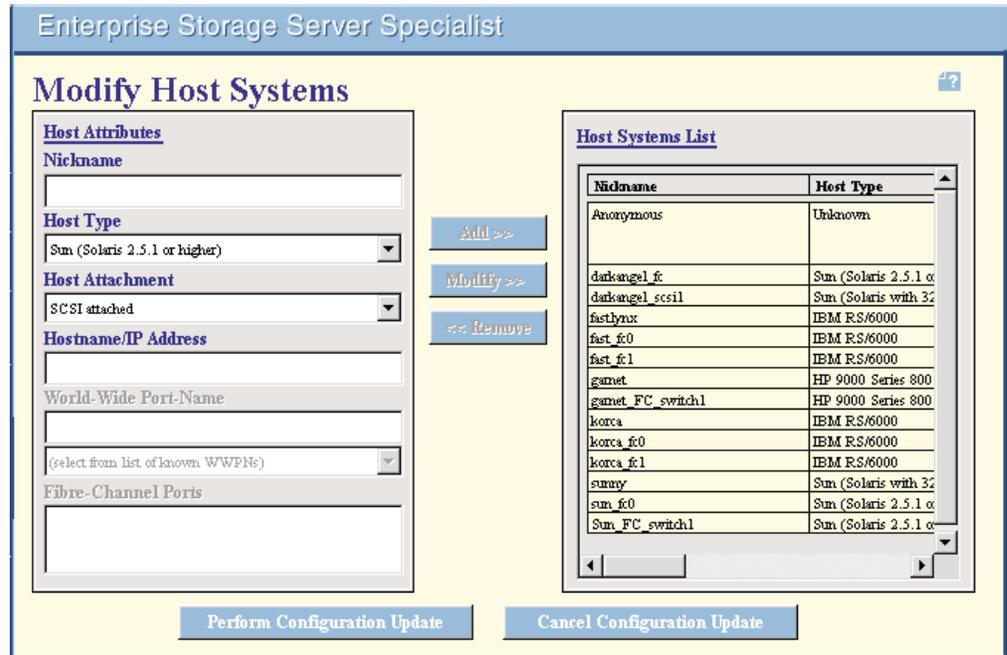
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Figure 20. Modify Host Systems panel

2. To add a host system enter the following information in the **Host Attributes** fields on the left side of the Modify Host Systems panel:

   a. Type the host name in the **Nickname** field.

      A host nickname must be unique and must not exceed 29 characters.

   b. Select a host type from the drop-down list in the **Host Type** field. See the list of supported host types in 35.

   c. From the **Host Attachment** drop-down list, select either **SCSI attached** or **Fibre Channel attached**. **SCSI attached** is the default selection.

      Note: If a host has multiple SCSI adapters installed, only one nickname needs to be entered in the host system list. ESS Specialist uses the same name for displaying the different SCSI connections. However, if a host has both SCSI and fibre-channel adapters, or multiple fibre-channel adapters installed, a separate nickname needs to be entered in the host system list for each fibre-channel adapter connected to the ESS. This is because a unique world-wide port-name (WWPN) is required for each fibre-channel connection.

   d. Optionally, type in the host name or the dotted decimal IP address in the **Hostname/IP Address** field, if the host is connected to the IP network. IBM recommends that you enter information in this field if you are using the IBM StorWatch Expert software package.

   e. If the host is fibre-channel attached, select the world-wide port name (WWPN) of the fibre-channel adapter that is installed in the host. Select the WWPN from the drop-down list in the **World Wide Port Name** field, or type in the WWPN manually.

      The WWPN field is mandatory for fibre-channel hosts; it is enabled only when you select **Fibre Channel** from the **Host Attachment** field drop-down list. If the host is SCSI attached, this field is disabled.

The WWPN drop-down list contains the WWPNs of all host fibre-channel adapters that are currently connected (logged in) but not yet defined to the ESS. The ESS "discovers" the WWPN from your host fibre-channel adapter when you connect your host system to the ESS. If the connection is made through a single ESS fibre-channel port, that port identifier is listed in parentheses following the WWPN. If the connection is made through multiple ESS fibre-channel ports, the ports are not indicated in the drop-down list.

If entering the WWPN manually, be aware that a valid WWPN consists of exactly 16 hexadecimal digits, which uniquely identify that particular host fibre-channel adapter. The hexadecimal characters are 0 - 9, a - f, and A - F.

Note: The Enterprise Storage Server supports only IEEE-compliant fibre-channel adapters. See "QLogic fibre-channel adapter" on page 41 if you are havings problems entering the WWPN for a QLOGIC adapter. See the *IBM Enterprise Storage Server Host System Attachment Guide* for instructions on locating the WWPN for the fibre-adapter on any of the supported operating systems.

f. If the host is fibre-channel attached, optionally select one or more entries from the list in the **Fibre-Channel Ports** field. If you do not make a selection from this field, the default will be used, which allows this host system to access the ESS through all fibre-channel ports installed in the ESS. To limit the ports through which this host can access the ESS, select one or more individual ports in the list.

3. Click **Add**. The host nickname and type are added to the Host System List on the right side of the Modify Host Systems panel.

4. Repeat the above steps for each host that you are adding.

5. Click **Perform Configuration Update** to apply the configuration changes to the ESS. A progress bar is displayed indicating the progress of the configuration action.

Note: Click **Cancel Configuration Update** at the bottom of the panel to cancel the information that you entered.

Removing a host system

Attention: When you select a host system that has assigned volumes, the ESS displays the following warning: `Host has assigned volumes. Removal of host xxxx will cause it to lose access to all nn volumes...Are you sure that you want to make this change? (Yes/No)`

Perform the following procedures to remove a host system from the Host System List:

1. Click on the system to be removed in the Host Systems List on the right side of the panel. Then click **Remove**.

   Notes:

   a. You should only remove a host system from the list after you disconnect it physically from the storage server.

2. Repeat the above steps for each host that you are removing.

3. Click **Perform Configuration Update** to apply the configuration changes to the ESS. A progress bar is displayed indicating the progress of the configuration action.

Note: Click **Cancel Configuration Update** at the bottom of the panel to cancel the information that you entered.

Modifying the characteristics of a host system

Perform the following procedures to modify the characteristics for an existing host system:

1. Select the host system to be modified in the Host Systems List by clicking on its row in the table. The characteristics of the selected host are displayed in the **Host Attributes** fields.

   Note: Attribute fields that you cannot change are disabled.

2. Modify the host's nickname, type, attachment, hostname/IP address, WWPN, and fibre-channel ports, as needed, in the **Host Attributes** fields. For detailed procedures about changing a host attachment attribute from SCSI to fibre channel, see "Modifying the attribute of a host from SCSI to fibre-channel attachment".

   Note: If the host that you selected already has one or more volumes assigned to it, modification of the host type and the host attachment may result in one or more of those volume assignments being lost. The ESS issues an appropriate warning message in this case.

3. Click **Modify**.

   If you modified the nickname, it is possible to click either **Add** or **Modify**, but the result will be different:

   Add   Adds the host as a new host to the list, keeping the original host unchanged. Volume assignments are **not** copied.

   Modify
               Modifies the existing entry in the list. This is especially important when the selected host already has one or more volumes assigned, as the volume assignments **are** copied for a modified host.

4. The ESS Specialist displays the selected host with the changed attributes in the Host System List.

5. Repeat the above steps for each host that you are modifying.

6. Click **Perform Configuration Update** to apply the configuration changes to the ESS. A progress bar is displayed indicating the progress of the configuration action.

   Note: Click **Cancel Configuration Update** at the bottom of the panel to cancel the information that you entered.

The ESS Specialist returns to the Open System Storage panel. Updates to the set of host system icons take effect after the ESS completes the internal configuration change.

Modifying the attribute of a host from SCSI to fibre-channel attachment

This section gives the procedures for using ESS Specialist to modify the attribute of a host from SCSI to fibre-channel attachment. This procedure ensures that volume assignments to a host are not lost when you change the host's attachment mode. These procedures include:

- Preparing your host system
- Installing fibre-channel adapters in the ESS (An IBM service support representative (SSR) performs these tasks)

- Installing a fibre-channel adapter in an available adapter slot
- Removing a SCSI adapter and replacing it with a fibre-channel adapter
- Using ESS Specialist to redefine a host system as fibre-channel attached:
  - Defining fibre-channel interfaces to the ESS, using the ESS Specialist Modify Host Systems panel
  - Changing a dummy configuration to a real configuration, using the Modify Host Systems panel
  - Assigning volumes to additional fibre-channel adapters on a host, using the Modify Host Systems panel and the Modify Volume Assignments panel

Preparing a host system for change from SCSI to fibre-channel attachment:
Before you can use ESS Specialist to change a host system attachment to the ESS from SCSI to fibre-channel attachment, you need to prepare your host system:

1. Upgrade the microcode to include fibre-channel capability and install the IBM Subsystem Device Driver (optional). For more information about the IBM Subsystem Device Driver, see the following Web site:

   www.ibm.com/storage/support/techsup/swtechsup.nsf/support/sddupdates/

   Note: If you have already installed the IBM Subsystem Device Driver and upgraded your microcode, you do not need to quiesce your host system. You can change adapters and cables while your host system is in operation.

2. Reset your host system or invoke device discovery with a command appropriate for your system, such as:
   - **cfgmgr** for IBM RS/6000
   - **DiskAdmin** for Windows NT
   - **drvconfg** for Sun
   - **devctl** for NUMA-Q
   - **iospan** for Hewlett Packard

   .

See the *IBM Enterprise Storage Server Host System Attachment Guide* and the white paper *ESS Fibre-channel Migration Scenarios* for more details on concurrent and non-concurrent migration from SCSI to fibre-channel attachment. Also see these publications for information about changing your host system from SAN Data Gateway to native fibre-channel attachment. These publications are available at the ESS Web site www.storage.ibm.com/hardsoft/products/ess/refinfo.htm

Installing fibre-channel adapters in the ESS: This section has two procedures. The first procedure is for installing a host fibre-channel adapter into an empty slot on the ESS. The second procedure is for removing a SCSI adapter and replacing it with a fibre-channel adapter.

Installing a fibre-channel adapter into an available adapter slot: Use this procedure when the ESS has a slot available for installing the fibre-channel adapter.

1. An IBM SSR installs the fibre-channel adapter and cable in the ESS. (Adapters should be installed into one bay at a time, to ensure data access through the other three bays during installation.)

2. In order for ESS Specialist to present the correct world-wide port names (WWPNs):
   a. Ensure that your host's fibre-channel adapter is configured correctly and connected to the ESS.

b. Define the fibre channel as an arbitrated loop or as point-to-point in the Configure Host Adapter Port panel.

c. Reset your host system or invoke device discovery (see step 2 on page 40) so that your host's fibre-channel adapter initiates the log into the fibre-channel adapter in the ESS.

3. Use ESS Specialist to define the first fibre-channel interface to the ESS (See "Defining fibre-channel interfaces to the ESS" on page 42.)

4. If you are connecting multiple fibre-channel adapters in your host system to the ESS, use ESS Specialist to assign volumes to the modified host system (See "Assigning volumes to additional fibre-channel adapters on a host" on page 43.)

Removing a SCSI adapter and replacing it with a fibre-channel adapter: Use this procedure when the ESS does not have a slot available for installing the fibre-channel adapter.

1. Before an IBM SSR removes one or more SCSI adapters from the ESS, use ESS Specialist to define a dummy fibre-channel configuration. This dummy configuration prevents the loss of volume assignments by moving them from the SCSI host list entries to the dummy fibre-channel host list entries.

    Note: The dummy configuration is not necessary if you know the WWPNs of the fibre-channel adapters that you have installed in your host.

    See steps 3 - 4 in "Defining fibre-channel interfaces to the ESS" on page 42 for this procedure.

2. An IBM SSR removes the SCSI adapters and cables from the ESS and replaces them with the fibre-channel adapters and cables. (Adapters should be installed into one bay at a time, to ensure data access through the other three bays during installation.)

3. In order for ESS Specialist to present the correct WWPN, you must have your host's fibre-channel adapter correctly configured and connected to the ESS. Reset your host system or invoke device discovery (see step 2 on page 40) so that your host's fibre-channel adapter initiates the log into the fibre-channel adapter in the ESS.

4. If you created a dummy configuration, use ESS Specialist to change the dummy WWPN values to actual WWPN values of the fibre-channel adapters that you installed. See "Changing a dummy configuration to an actual configuration" on page 42 for the procedure.

QLogic fibre-channel adapter: There is a bug in the firmware of certain QLogic fibre-channel adapters, which causes it to set the NAA field incorrectly. The adapter cards affected are:

* QLA2100F
* QLA2200F/33
* QLA2200F/66

If you are using one of these cards and are having trouble accessing the ESS, go to the QLogic Web site at www.qlogic.com/bbs-html/drivers.html

Under Tech Support, drivers for Fibre Channel Host Adapters, read the disclaimer and if you agree, click **Use QLogic Drivers** at the bottom of the panel. Select the QLA2xxx series of Fibre Channel Adapter Drivers and then select **BIOS and NVRAM**. Download and run the utility updating both the NVRAM and BIOS. (It is recommended that you update the NVRAM, because it is possible that it may have been corrupted.)

After the update is completed you will be able to use the QLogic adapter card to access your ESS.

Using ESS Specialist to redefine the host systems as fibre-channel attached:
Use ESS Specialist to add host systems with fibre-channel interfaces, to change a host system attachment attribute from SCSI to fibre channel, and to assign volumes to a host's additional fibre-channel adapters.

Defining fibre-channel interfaces to the ESS: Use this procedure to modify the host attachment attributes from SCSI to fibre channel:

Note: You can only use this procedure for the first adapter, since each adapter has its own WWPN value. For hosts with multiple fibre-channel adapters, see "Assigning volumes to additional fibre-channel adapters on a host" on page 43.

1. From the Modify Host Systems panel select the host list entry to be modified in the Host Systems List table. The characteristics of the selected host are displayed in the **Host Attributes** fields.
2. Change the host attachment type from SCSI to fibre channel in the **Host Attachment** field.
3. If IBM previously installed the fibre-channel adapters in your ESS, select the WWPN of your host's adapter from the drop-down list in the **World-Wide Port Name** field.

   If IBM has not installed the adapters in your ESS, but you know the WWPN of your host adapter, you can type it manually in the **World-Wide Port Name** field.
4. If IBM has not installed the adapters in your ESS, and you do not know the WWPN of your host adapter, you can enter a dummy WWPN manually in the **World-Wide Port Name** field:
   a. Enter a character string for the dummy WWPN, such as the letter F repeated 16 times (the WWPN consists of 16 hexadecimal digits).
   b. Because this is an invalid WWPN, the ESS displays a warning message. Click **OK** on the message panel.

      Note: You will modify this dummy value to the actual WWPN when you install the fibre-channel adapters in your ESS. See "Changing a dummy configuration to an actual configuration" for the procedures.
5. Click **Modify**.
6. The ESS Specialist displays the selected host with the changed Host Attachment attribute in the Host System List. All volume assignments are automatically copied from the old SCSI interface to the new fibre-channel interface.
7. When you complete the modify action, click **Perform Configuration Update** to apply the configuration changes to the ESS. ESS Specialist displays a progress bar that indicates the progress of the configuration action as it is being processed by the ESS.

Changing a dummy configuration to an actual configuration: Perform this procedure to change a dummy WWPN to the actual WWPN:

Note: The dummy configuration is not necessary if you know the WWPNs of the fibre-channel adapters that you installed in your host.

1. From the Modify Host Systems panel select the dummy fibre-channel host list entry to be modified in the **Host Systems List** box. ESS Specialist displays the characteristics of the selected host in the **Host Attributes** fields, including the dummy WWPN.

2. Change the WWPN from the dummy value to the actual WWPN by selecting the actual WWPN of your host's adapter from the **World-Wide Port Name** field drop-down list.

3. Click **Modify.**

4. Repeat steps 1, 2, and 3 for each additional dummy host in the list.

5. When you complete the modify actions, click **Perform Configuration Update** to apply the configuration changes to the ESS. ESS Specialist displays a progress bar that indicates the progress of the configuration action as it is being processed by the ESS.

Assigning volumes to additional fibre-channel adapters on a host: The ESS Specialist treats each fibre-channel adapter as a separate host list entry because each adapter has a unique WWPN. Consequently, if you install more than one fibre-channel adapter on a host system, you must repeat the following steps for each subsequent adapter:

1. Use the Modify Host Systems panel to add additional fibre-channel adapter attachments to the ESS as new host nicknames. The attributes should all be the same as those of the original host list entry (for the first adapter), except for the host nickname and the WWPN.

2. Select the WWPN from the drop-down list or manually enter the WWPN in the **World-Wide Port-Name** field.

3. Click **Add**.

4. ESS Specialist displays the new host list entry in the Host System List. However, no volumes are yet assigned to this interface.

5. Repeat steps 2 and 3 for each additional fibre-channel adapter in your host system.

6. When you complete the add actions, click **Perform Configuration Update** to apply the configuration changes to the ESS. ESS Specialist displays a progress bar that indicates the progress of the configuration action, as it is being processed by the ESS.

7. Use the Modify Volume Assignments panel to copy the volume assignments from the original host list entry (for the first fibre-channel adapter) to each of the other adapters in the host.

8. Select the **sort first** choice for the Host Nickname column of the table and click **Perform Sort.**

9. Select all volumes assigned to the original host list entry (for the first adapter of that host).

10. Click **Assign selected volumes to target hosts**.

11. Select the host nicknames of the subsequent adapters in that host from the Target Hosts list.

12. Click **Perform Configuration Update** to apply the configuration changes to the ESS. The volume assignments will be copied from the original host list entry to the additional entries for that host. ESS Specialist displays a progress bar that indicates the progress of the configuration action as it is being processed by the ESS.

Configuring host-adapter ports

The Configure Host Adapter Ports panel (See Figure 21) identifies the attachment of one or more host systems to a storage server host port. The icons in the first row represent the host adapters. The fibre-channel adapter icon has one port. This single port distinguishes the fibre-channel adapter from the SCSI and ESCON adapters, which have two ports.

The second row is the **Host Adapter Port** drop-down list. The port adaptor displays information about port identification, for example, Bay 2, Adapter 3, Port A (SCSI).

The middle of the panel displays options for the adapter type you select. See "Configuring a fibre-channel port" and "Configuring a SCSI port" on page 45. You do not need to perform configuration for ESCON adapter ports.

When you are accessing the ESS through several adapters from one host, spread the adapters evenly over the ESS adapter bays to achieve better workload balance. Volumes assigned to one adapter might be from a single array or from multiple arrays controlled by multiple device adapters and clusters. For best performance, the volumes assigned to an adapter should be from multiple arrays that are controlled by as many device adapters and clusters as possible.

Configuring a fibre-channel port
Figure 21 gives an example of the options for a fibre-channel adapter type.

CS000058

Figure 21. Configure Host Adapter Ports panel, example of a fibre-channel configuration

An explanation of the information in this panel and the actions you can perform follows:
1. A small red line is displayed on the panel under each of the fibre-channel ports that you have configured or modified.

2. The **Fibre Channel Access Mode** field in the Storage Server Attributes box shows the current fibre-channel access mode for the port that you selected. The ESS Specialist displays one of the following modes:
   - Access any
   - Access restricted
3. The FC Fabric Topology field in the FC Port Attributes box shows the current fibre-channel topology for the port you selected. If the topology is undefined you can use the drop-down menu to select either:
   - Point-to-point
   - Arbitrated loop

   If the topology is defined, you must first change the setting to **Undefined** before the ESS can make an alternate setting available for configuration.

   Note: If you want to change the port attributes, an IBM SSR can perform this change during a service action or during installation of a new host adapter. (See "Volume access" on page 48 for more information.)
4. At any time, you can click **Reset Selected Port** to cancel any pending configuration changes made to the currently selected port.
5. When all entries are complete for the fibre-channel port, click **Perform Configuration Update** to apply or **Cancel Configuration Update** to cancel the configuration step for all modified ports.

Configuring a SCSI port
An example of the SCSI-port configuration options is shown in Figure 22.
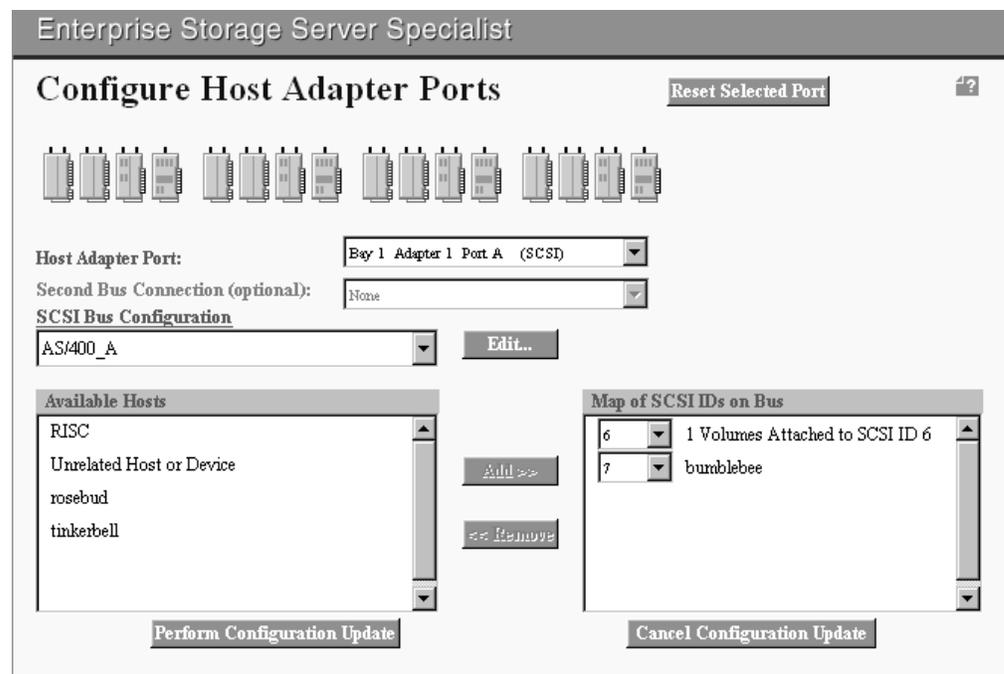
S008847O

Figure 22. Configure Host Adapter Ports panel, example of a SCSI configuration

The options for SCSI adapters includes:
- Reserve SCSI bus SCSI IDs for use by a second host port that may be attached to the SCSI cable

- Reserve an ID for another SCSI device

1. From the Configure SCSI Ports panel, select a port either by clicking on the port icon in the first row or selecting the port from the **Host Adaptor Port** drop-down list. The selected port is highlighted in yellow, and the port number is identified in the **Host Adapter Port** field.

   If a host system is attached to two ports through a common SCSI bus cable, refer to the **Second Bus Connection** field to identify the host port attached to the other end of the cable. The ESS Specialist configures both ports according to a common SCSI bus configuration and ensures that the map of SCSI IDs for each port is consistent.

   When you select a port, the remainder of the panel displays information about the selected port:
   - The **SCSI Bus Configuration** field identifies the set of configuration parameters in effect for the SCSI bus that is associated with the selected port. If you have not yet configured the selected port, then the bus configuration displays none.
   - The Available Hosts information box lists the available host systems that are compatible with the selected bus configuration setting.
   - The Map of SCSI IDs on Bus information box displays a list of SCSI IDs that are assigned to the attached host systems (maximum of 4) and the SCSI IDs on the bus that have been reserved for unrelated device attachments. The map of SCSI IDs also identifies any SCSI ID that currently has LUNs assigned. Any SCSI ID that is not listed in the map is available to be used for future LUN assignments.

2. Refer to the **SCSI Bus Configuration** field to identify the configuration parameters to be used for the selected SCSI port. Click **Edit** to customize the SCSI bus configuration parameters. For more information on custom SCSI bus configuration, see "Defining a custom SCSI bus configuration" on page 47.

   A warning message is displayed if you have already configured the port or if you select a conflicting host type.

3. The Available Hosts information box lists the host systems that are compatible with the selected bus configuration. Select a host system that you want to attach to the port you selected, and click **Add** to list the host system in the map of SCSI IDs. You can add up to four host systems to the map of SCSI IDs.

4. If there are SCSI IDs on the bus to which the host port should not answer, each of these IDs must be identified in the map of SCSI IDs. Click **Unrelated Host or Device** and click **Add** for each SCSI ID that you need to reserve. For example, you might reserve a SCSI ID for a printer.

5. A selection field for SCSI IDs is displayed for each entry in the Map of SCSI IDs on Bus list. Select a proper numeric value for each SCSI ID. This value is the SCSI ID numeric value for the host system or unrelated device SCSI adapter. All SCSI ID values in the list must be unique.

   The default values in the SCSI ID selection field are in accordance with SCSI protocol, which defines SCSI ID 7 as having the highest priority. The SCSI ID priority order is 7-0 then 15-8. The first host system that you add is assigned to SCSI ID 7, the second is assigned to SCSI ID 6. You must verify that these assignments match the SCSI ID setting in each host system SCSI adapter card, and make adjustments to the map of SCSI IDs as necessary.

   Note: Refer to "Performance guidelines for configuring SCSI ports" on page 47.

6. At any time, you can click **Reset Selected Port** to cancel any pending configuration changes made to the currently selected port.

7. When all entries are complete for each SCSI port, click **Perform Configuration Update** to apply or **Cancel Configuration Update** to cancel the configuration step for all modified ports.

Performance guidelines for configuring SCSI ports

For the best performance, IBM recommends the following configuration guidelines:

1. The SCSI ID priority is assigned in the order of 7-0 then 15-8, where ID 7 has the highest priority and ID 8 has the lowest.

   a. Assign host systems to the highest priority SCSI IDs, with the highest priority system being assigned to ID 7.

   b. After the host system assignments have been made, assign the highest priority volumes to the highest priority SCSI IDs . This is done automatically if you use the Add Fixed Block Volumes panel to create the highest priority volumes first. The highest priority volumes need to be at the top of the Volumes To Be Added list.

   c. If two host ports are connected to a common SCSI bus cable, arrange the SCSI IDs allocated to each port to give each port equivalent priority for volume access.

2. For best host-bay performance, spread volumes that are assigned to host ports across device adapters in both Cluster 1 and Cluster 2.

3. For best host-port performance, assign only volumes from a common cluster (cluster 1 or cluster 2) to each port.

When you establish several connections to the ESS, first use just one of the ports of all available adapters. When there is a need for more connections, start using the second port. Make sure that you spread all adapters evenly across the bays.

Defining a custom SCSI bus configuration

You can use the Configure Host adapter ports panel to define a custom SCSI bus configuration. Perform the following procedure to define a custom SCSI bus configuration:

1. Select the desired host system type.

2. Click **Edit**.

   The Customize SCSI Bus Configuration panel is displayed.

3. Edit the default settings as needed to meet the special requirements of a particular host system SCSI adapter card.

   The possible SCSI bus configuration settings are:

   Bus width:
   SCSI wide 16 bits or SCSI standard 8 bits

   Target initiated bus negotiation:
   Yes or no

   Respond before ready:
   Yes or No

   Synchronous period:
   0xC through 0x4B

   Synchronous offset:
   0x00 through 0x10

   Uninstalled LUN value:
   0x10 through 0x7F

Maximum number of LUNs:
> 7 through 63 (decimal notation)
>
> Every LUN corresponds to a volume that is assigned to a port. The larger this value, the more volumes the ESS can assign to a port. For most operating systems, set this parameter to 7 (LUN 0 through LUN 7, for 8 LUNs total). The ESS limit is 64 LUNs per SCSI ID.

Save As:
> Specify a file name that is descriptive and clearly identifies the file to the user.

4. Type a descriptive name for the custom bus configuration
5. Click **Perform Configuration Update** to apply the changes.

   The new bus configuration will be added to the SCSI bus configurations listed on the Configure Host Adapter Ports panel. Refer to Figure 22 on page 45.

Volume access

Fibre-channel architecture allows any fibre-channel initiator to access any open-system device, without access restrictions. You can restrict this access when IBM sets the access mode for your ESS during initial configuration. You can select from the following options for access:

Access-any mode
> This mode allows all fibre-channel attached host systems with no defined access profile to access all logical volumes on the ESS. This applies only if you have not defined a host profile on ESS Specialist. Once you define a profile for a host, that host only has access to those volumes that are assigned to the host's WWPN.

Access-restricted mode
> This mode allows access only to host systems for which you have defined a profile. The profile limits the access of the host system to only those volumes assigned to the profile. This is the default mode.
>
> An access profile requires that:
> * The host system is identified to the ESS with a world-wide port-name (WWPN) identity.
> * The logical volumes to which the host will have access are identified to the ESS by associating the logical volumes with the access profile. Each WWPN can access 256 or 4096 logical volumes, depending on the LUN addressing mode supported by the host operating system .
>
>   ESS Specialist updates the access profiles of a WWPN when you define the fibre-channel host and assign volumes to the host.

Note: Your IBM SSR can change the access mode on the ESS for you. When the SSR changes the access mode, you will need to restart your ESS..

Defining multiple paths when the IBM Subsystem Device Driver is installed

The IBM Subsystem Device Driver allows you to define multiple paths for data storage and retrieval. To define multiple paths with ESS Specialist:

1. Use the Add Volumes panel to define storage for the primary path. From this panel you assign volumes to a primary port. See "Adding fixed-block volumes" on page 50 for the procedures.

2. To define multiple paths (ports) to volumes, use the Modify Volume Assignment panel. See "Modifying volume assignments or assigning shared volumes" on page 55 for the procedures for two or more host ports to share access to a volume.

Configuring fixed-block disk groups

Perform the following procedure to configure a fixed-block disk group:

1. At the bottom of the Open Systems Storage panel click **Configure Disk Groups**. This selection links you to the Fixed Block Storage panel.
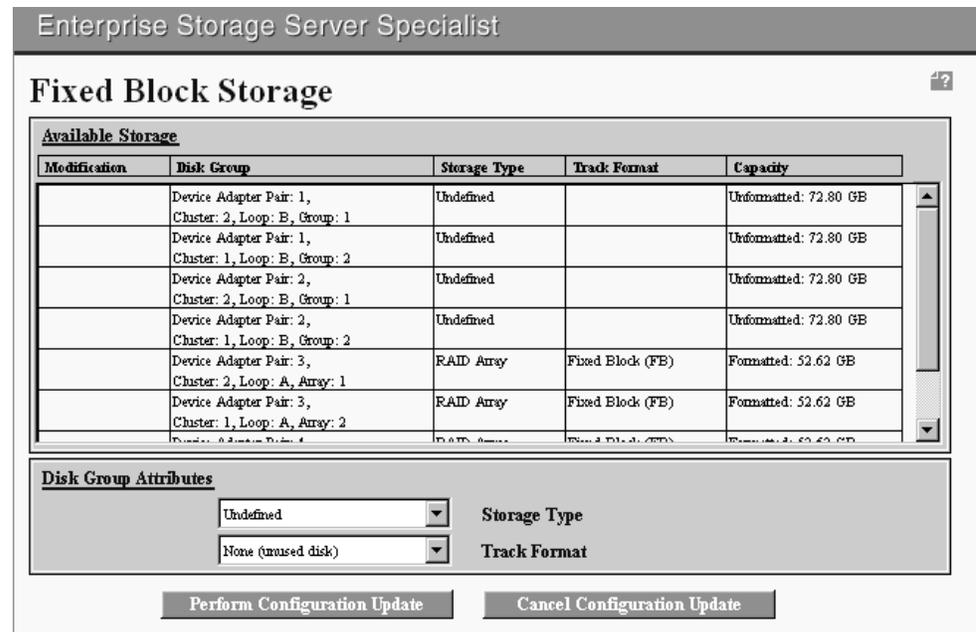
Figure 23. Fixed Block Storage panel

2. On the Fixed Block Storage panel, click a disk group in the list of disk groups to select it. See "Assignment of disk groups to logical subsystems" on page 50 for information and recommendations about configuring disk groups.

3. Select one of the following types from the **Storage Type** drop-down list:
   - RAID array
   - Non-RAID disk group
   - Undefined

   If you select non-RAID, the selected row expands to seven or eight rows, one for each disk in the group.

4. Click each disk row to define its track format as Fixed Block FB to define the disk, or select None (unused disk) to leave the disk undefined. Undefined disks can be defined at a later time to either fixed block FB track format (from this panel), or to count-key-data CKD track format (from the Configure CKD Disk Groups panel).

5. Repeat steps 2 thru 4 as needed to define, undefine, or redefine the wanted disk groups. The modification column in the table indicates which table entries will be affected when you click **Perform Configuration Update**.

6. When all entries are complete, click **Perform Configuration Update** to apply the changes; or click **Cancel Configuration Update** to cancel the configuration step for the FB groups.

Go to "Adding fixed-block volumes" for instructions about converting array capacity for FB storage to one or more volumes.

Assignment of disk groups to logical subsystems

The default ESS control switch setting for fixed block LSSs is 16. Four LSSs are allocated to each device adapter pair, two of which are allocated to Cluster 1 and two to Cluster 2.

ESS Specialist assigns a disk group to an LSS when the disk group is defined as a RAID array or as a set of non-RAID disks. Even numbered disk groups are assigned to an LSS belonging to Cluster 1 and odd numbered disk groups are assigned to an LSS belonging to Cluster 2.

ESS Specialist assigns disk groups to only one of the two LSSs belonging to a cluster. ESS Specialist assigns disk groups to the second LSS only if the disk groups already assigned to the first LSS contain a total of 192 or more volumes. Each LSS can contain a maximum of 256 volumes.

For large numbers of high-capacity disk groups with volume sizes of 8 GB or smaller, you may want to add volumes to half of the disk groups before defining the second half as RAID arrays or non-RAID disks. This will avoid the possibility of using up all 256 LSS volumes before the disk group capacity has been fully configured.

Adding fixed-block volumes

Use the two Add Volumes panels to create logical volumes from the capacity on your ESS.

Selecting resources

The first row of the Add Volumes (1 of 2) panel (see Figure 24 on page 51) contains icons for all attached host systems. The second row contains icons for the installed host adapters. Each SCSI adapter contains two selectable ports. A fibre-channel adapter has one selectable port. The third row contains icons for the installed device adapters for Cluster 1 and Cluster 2.

To select resources for the logical volumes, perform the following steps:

1. Click **Add Volumes** on the Open Systems Storage panel. ESS Specialist displays the Add Volumes (1 of 2) panel.
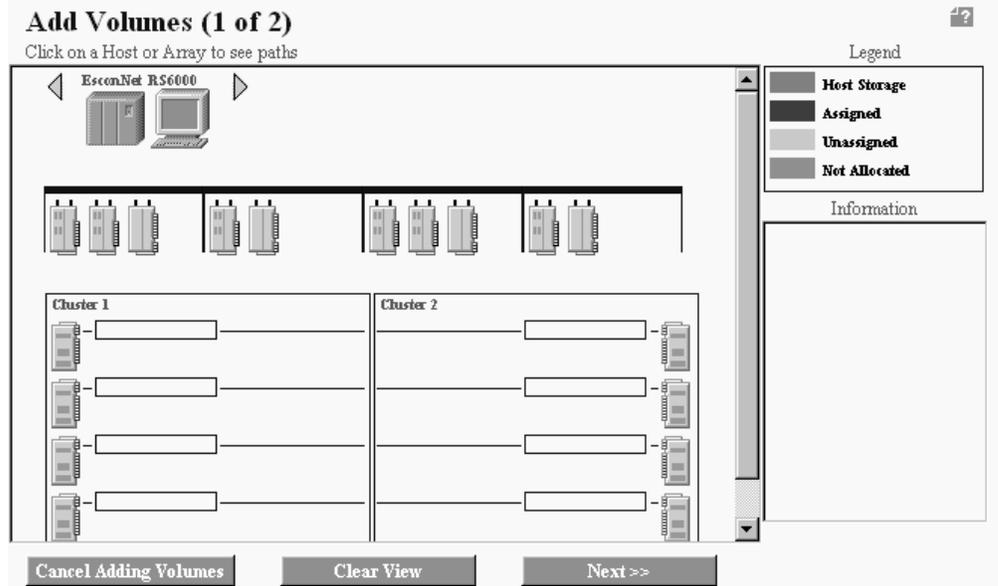
Figure 24. Add Volumes (1 of 2) panel

2. Click on a host system in the first row to select it.

   You may select only one host system for an add volumes sequence. Click **Clear View** at the bottom of the panel at any time to start a new sequence.

   IBM recommends that you do not add volumes to an anonymous host. Anonymous host icons represent all fibre-channel attached host systems that are explicitly defined to the ESS. If you add volumes to the anonymous host, the volumes are defined in specified storage, but no assignment to a particular host system is performed. If the ESS is configured to run in Access-Any mode, all fibre-channel attached hosts not explicitly defined to the ESS are able to access these volumes.

   The host system that you select is highlighted in yellow and is displayed with a black background to indicate selection. The name of the host system is displayed in the Information box at the bottom right of the panel. A thin black line is drawn from this host system to the one or more host ports in the second row that are attached to this system.

   Attention: Do not add a volume or modify a volume assignment on an active port. Some host systems react adversely to this action.

3. Click on a highlighted port to select it. The background of the port you selected changes to black to indicate that it has been selected.

   a. For SCSI-attached hosts, select only one port for the current sequence.

   b. For a fibre-channel attached host click any highlighted port. Volumes are assigned to the selected host and are visible on all the ESS fibre-channel ports that were defined for that host. You need to select the highlighted ports associated with the attached host to limit the host's access to those specific ports.

4. Click on one or more FB groups (optional) to select them. Only these groups will be used for the add-volume process that continues on the next panel. If no groups are specifically highlighted before continuing to the next panel, *all*

available disk groups will be used for the add-volume process. The Information box on the right side of the panel lists all RAID arrays and non-RAID disks that are currently selected.

5. Click **Next**. ESS Specialist displays the Add Volumes panel (2 of 2).

Defining volume sizes and numbers

Use the Add Volumes (2 of 2) panel (Figure 25 on page 53) to define volume sizes and numbers of volumes. See "Recommendations for volume size and placement" on page 54 for more information on setting sizes. The Add Volumes (2 of 2) panel contains the following components:

- The top of the panel displays the Available Free Space table. The information in the table is based on the capacities of the storage areas that were selected on page 1. Each row in the table shows the capacity values for a different storage type (RAID, non-RAID). The Available Capacity column indicates the total available space in the selected storage areas, and the Maximum Volume Size column displays the largest contiguous free space in the selected storage areas, per storage type.

- In the middle of the panel, on the left side, the **Volume Attribute** fields allow you to specify the number of volumes and the size of the volumes to be created. Size is specified in gigabytes (that is billion, or 10 to the ninth power bytes).

- In the middle of the panel, on the right side, the New Volumes table lists all of the volumes that have been defined by the user, and that are pending creation. The last row in the table indicates the total amount of space, in gigabytes, that has been defined.

- Near the bottom of the panel are the **Volume Placement** options. When creating multiple volumes, and multiple disk groups have been selected, you have the choice of how the volumes should be placed, as follows:

    Place volumes sequentially, starting in first selected storage area
    Indicates that the volumes are created starting in the first storage area, and continue to be allocated there until that storage area's capacity is depleted. At this point allocation continues in the second storage area, and so on.

    Spread volumes across all selected storage areas
    Allocates the first volume in the first storage area, the second volume in the second area, the third volume in the third area, and so on. Wrapping occurs if necessary, so that after allocating a volume in the last area, the next volume is allocated in the first area. If a particular volume is too large for a particular area, that area is skipped.

    Note: As you make volume selections and add them to the New Volumes column (right-hand column), the maximum size and capacity associated with the selection (RAID or Non-RAID) changes. You can add both RAID and Non-RAID devices by adding the RAID volumes then selecting the Non-RAID line to add the Non-RAID volumes.
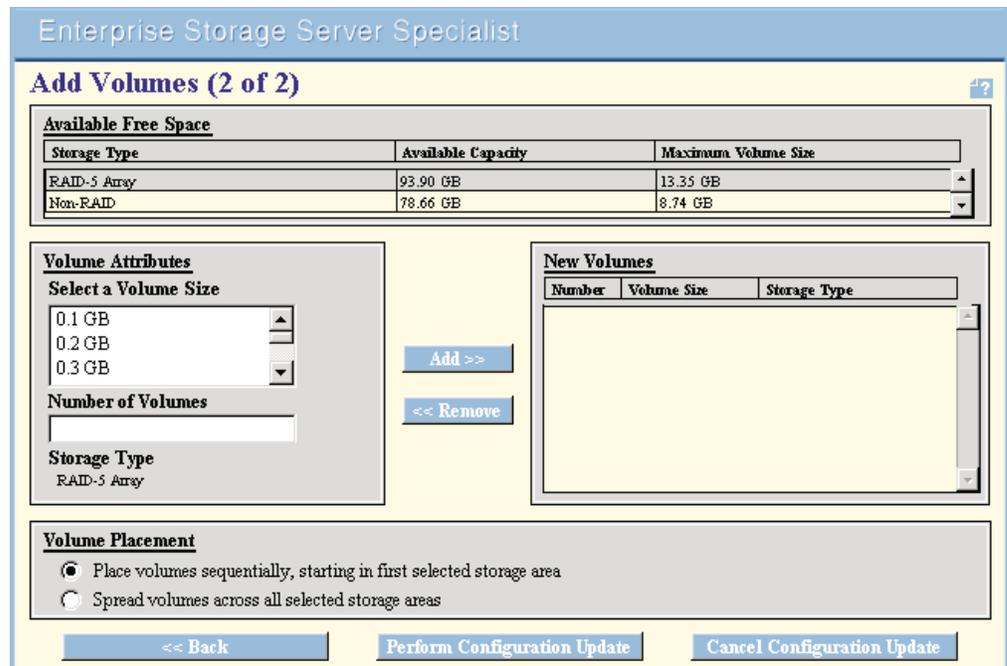
CS000060

Figure 25. Add Volumes (2 of 2) panel

To create new fixed-block volumes on the selected disk groups, and assign them to the selected host system or host-adapter port, or to remove or modify volumes, perform the following steps:

1. To add one or more volumes to the list to be created:

   a. In the Available Free Space table, select the table row that corresponds to the type of storage that you want to allocate (RAID, non-RAID). You must select a type for which the available capacity is greater than 0.

   b. In the Volume Attributes section, select a volume size from the list. The maximum volume size that can be allocated in the selected storage areas is displayed in the Available Free Space table at the top of the panel.

   c. In the Volume Attributes section, type the number of volumes that you want to add in the **Number of Volumes** field.

   d. For AS/400 volumes, select either **protected** or **unprotected** model type.

      Protected is the default, and indicates that the AS/400 host recognizes the volume as a protected device. Unprotected indicates that the AS/400 host recognizes the volume as an unprotected device, even though the storage resides on a RAID array and is therefore fault tolerant by definition. Deceiving the AS/400 host in this manner may be necessary if you intend to activate mirroring support for these volumes, on the AS/400 host.

   e. Click **Add** to add the volumes to the New Volumes table. The last row in the table, as well as the Available Capacity and Maximum Volume Size columns at the top of the panel, are updated appropriately.

2. To remove one or more volumes from the list to be created:

   a. Select one or more volumes from the New Volumes table. For detailed information about selecting entries in a table, see "Using ESS Specialist tables" on page 7.

   b. Click **Remove** to remove the volumes from the list. The last row in the table, as well as the Available Capacity and Maximum Volume Size columns at the top of the panel, are updated appropriately.

3. To add or remove additional volumes from the list of volumes to be created, repeat steps 1 on page 53 and 2 on page 53 as necessary.

   Note: When allocating many volumes of different sizes in many different disk groups, the order in which you define the volumes in the New Volumes list is important. Even if the total available storage capacity is sufficient for the defined volumes, the volume placement may be such that, due to space fragmentation, not all volumes can be created in the given disk groups. To reduce the risk of this happening, IBM recommends that you define the largest volumes first in the list.

4. When you are finished adding or deleting volumes, click **Perform Configuration Update** to apply the changes or **Cancel Configuration Update** to cancel the changes to the FB volumes. A progress bar is displayed indicating the progress of the configuration action, as it is being processed by the ESS.

   When volumes are created and assigned to a port, the ESS initiates a formatting process that can exceed one hour for one or more volumes. A volume is not available to the host system while the ESS is formatting it.

   Note: You can use the **Refresh** button on the Modify Volume Assignment panel to find out the progress of the formatting process. If the formatting process is complete no progress indication appears. The Refresh function takes time to run and should not be used to excess. It is a method to see if a format is active on a volume since a volume is not available to the host system while formatting is active. See "Modifying volume assignments or assigning shared volumes" on page 55.

Recommendations for volume size and placement

This section gives IBM recommendations for volume sizes and placement. Also see "Assignment of disk groups to logical subsystems" on page 50 for information and recommendations on configuring disk groups.

The volume size that you choose depends on the type of the application and the operating system. For operating systems with a built-in Logical Volume Manager (LVM), such as AIX, HP-UX, Windows NT, or Windows 2000, IBM recommends 16-GB volumes. This size satisfies most requirements. Since the data is accessed on logical rather than physical volumes, you can use the LVM to split up one larger volume into several smaller logical volumes or concatenate several volumes to a bigger logical volume.

IBM also recommends 16-GB volumes for operating systems with a logical volume manager add-on, such as Veritas Volume Manager for Sun Solaris. On operating systems without a logical volume manager, such as Sun Solaris and Windows NT (in an MSCS environment), you should adjust the volume size to the given requirements.

A larger volume can be a better choice for operating systems that have the ability to divide a physical volume into smaller parts (partitions or slices). However, if you decide to use several smaller volumes, place them on several arrays to achieve better performance.

If your operating system supports striping (for example, through a logical volume manager), you can also create striped logical volumes over the ESS volumes. The best results are achieved when the volumes are located on different arrays and also when they are assigned to different ports.

Modifying volume assignments or assigning shared volumes

Attention: Do not add a volume or modify a volume assignment on an active port. Some host systems react adversely to this action.

Use the Modify Volume Assignments panel (Figure 26 on page 57) to:

- Modify a volume assignment.
- Remove a volume from a target host. This does not affect the volume definitions nor does it affect any of the data on the volume.
- Assign a volume that is assigned to a host to another SCSI host or to another fibre-channel host. This allows shared access to a volume by two or more hosts.

A volume is not available to an attached host system while formatting is in process. Depending on volume size, formatting may take one hour or more.

Note: The **Refresh Status** button allows you to obtain the status of the format process. A Refresh can take a long time. Therefore, you should use it only if the host system does not see the LUN and sufficient time has elapsed for the format to complete.

The Modify Volume Assignments panel has the following elements:

- A Volume Assignments table of eight columns and multiple rows, with a minimum of one row for each defined volume. If a volume is assigned to a host, the row identifies the assigned host port and host system. If a volume is assigned to two or more hosts, the table contains an additional row for each additional host assignment.

The table columns display the following information:

Volume Contains the logical unit number (LUN) serial number associated with this volume. The LUN serial number of an ESS volume incorporates a portion of the ESS serial number. This allows the LUN serial numbers to uniquely identify not only volumes within a particular ESS but to uniquely identify volumes among all ESS machines installed in an enterprise.

In addition, this column lists any volume formatting status. When a volume is first created, it goes through a one-time formatting process that must complete before the volume becomes available to the assigned host systems. If the formatting is still in progress or has failed, the appropriate status is listed in this column. The format status for a volume can be one of the following.

Note: The ESS only updates this information when you click the**Refresh Status** on the Modify Volume Assignment panel.

Formatting (xx %)
Indicates that formatting is in progress. The percentage indicates approximately how much of the formatting is complete.

Formatting (busy)
Indicates that formatting is in progress. The completion percentage cannot be obtained at this time. Please wait a few minutes and then click **Refresh Status** to obtain the latest formatting status.

Format failed (xx%)
> Indicates that formatting did not complete successfully. Call your service representative to determine and correct the cause of the failure.

Format error
> Indicates that a hardware or microcode internal error caused the format to fail. Call your service representative to determine and correct the exact cause of the failure.

Location   Identifies the physical location of the volume. This includes the number of the device adapter pair, the number of the cluster, the ID of the device loop, and the number of the disk group associated with the RAID array that contains the data for this volume. In case of a non-RAID volume, it also includes the number of the non-RAID disk within the disk group that contains the volume. In addition, the volume number is included to differentiate between different volumes on the same array or disk.

LSS   Contains the number of the logical subsystem (LSS) that contains this volume. This value is important only for performing Copy Services operations on the volume. The ESS displays the LSS number as hexadecimal.

Volume Type   Displays the volume type for volumes allocated for AS/400 host systems; it can be either AS/400 for volumes allocated for AS/400 host systems, or it can be open system for volumes allocated to UNIX-based host systems or Intel-based personal computers (PCs).

Size   Displays the volume size in gigabytes. The value is rounded to two decimal places.

Storage Type   Displays the relative fault tolerance of the storage where the volume resides. The possible types are RAID array (fault tolerant) and non-RAID (non-fault tolerant).

Host Port   Provides the bay number and adapter information (SCSI or fibre-channel). The SCSI ID is also displayed for SCSI ports.

Host Nicknames
> Displays the host system or host system nicknames that are associated with the volume and port number combination.

- The Modify Volume Assignments panel has three buttons in the upper-right corner:
  - Click **Sort** after you use the drop-down list at the top of each column to set sort priorities. See "Sorting on table columns" on page 7 for more details about sorting.
  - Click **Refresh Status** to update the autoformat information in the Volume column. Refresh Status takes time to run and should not be used to excess. It is a method to see if a format is active on a volume since a volume is not available to the host system while formatting is active.
  - Click **Print Table** to capture and print the information about volume assignments.
- The lower section of the panel includes:
  - The Action Box, which has two actions that you can select after you select a volume:

- The **Unassign selected volume(s) from target host** option removes selected volume assignments.

  Removing a volume assignment does not affect the volume definition. The volume is *not* deleted; only its assignment to the target host is deleted.

- The **Assign selected volume(s) to target hosts** option lists all eligible hosts in the Target Host box. Selecting this action enables the optional action **Use same ID/LUN in source and target**.

- Selecting the **Use same ID/LUN in source and target** option keeps the same volume ID and LUN for source and target hosts. The display changes to show only the hosts in the Target Host box that are compatible for sharing the selected volume.

  – The Target Host box is populated when you select the **Assign selected volume(s) to target hosts** check box. The target host box displays the host nickname and the host port or location (bay, card, and port).

To modify volume assignments, perform the following steps:

1. Click **Modify Volume Assignments** from the Open System Storage panel. The ESS Specialist displays the Modify Volume Assignments panel (see Figure 26)

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Figure 26. Modify Volume Assignments panel

2. Click one or more rows in the table to select the volumes you want to modify. (See "Selecting multiple table rows" on page 7) A selected row is deselected when you click on it a second time.

   When you select a row, the two check boxes in the Action box below the table are enabled.

3. Select an action in the Action box:

   a. Select the **Assign selected volume(s) to target hosts** check box. When you select this action:

1) The Target Host box is populated with all the hosts that are connected by SCSI or fibre-channel adapters to the ESS. Use the scroll bar to see the complete list.

2) The optional **Use same ID/LUN in source and target** action is enabled. Select this action to keep the same volume ID and LUN for source and target hosts. The display changes to show only hosts in the Target Host box that are compatible for sharing the selected volume.

4. To remove a volume assignment:

   a. Select the volume in the Volume Assignment table.

   b. Select the **Unassign selected volume(s) from target host** check box to remove the selected volume-to-host assignment.

   c. Select one or more targets in the Target Host box.

   d. When you are finished modifying the volume assignments, click **Perform Configuration Update** to apply the modifications; or click **Cancel Configuration Update** to cancel the modifications to the volume assignments.

Configuring System/390 or zSeries storage

The S/390 storage panel displays information about:

- Configuring logical control units
- Configuring CKD disk groups
- Adding CKD volumes to a LCU
- Adding parallel access volumes (PAVs) to an LCU

To configure the System/390 or zSeries storage, click **S/390 Storage** on the Storage Allocation--Graphical View panel. The ESS Specialist displays the System/390 Storage panel (see Figure 27 on page 59).

```
Enterprise Storage Server Specialist

S/390 Storage                                                              ?

Logical Control Units (LCUs)                        Refresh Data | Print Table

LCU | Location          | Emulation | SSID | PAV Start | Device IDs  | Storage Summary           | Free Space
000 | Device Adapter Pair: 1 | 3990-6 | 1050 | 63 (3F) | 23 Base IDs | 1 RAID array(s) defined    | 676 Cylinders
    | Cluster: 1         |           |      |          | 30 Alias IDs | 1 disk group(s) available |
001 | Device Adapter Pair: 1 | 3990-6 | 1051 | 63 (3F) | 23 Base IDs | 1 RAID array(s) defined    | 676 Cylinders
    | Cluster: 2         |           |      |          | 8 Alias IDs  | 1 disk group(s) available |
002 | Device Adapter Pair: 2 | 3990-6 | 1052 | 63 (3F) | 23 Base IDs | 1 RAID array(s) defined    | 676 Cylinders
    | Cluster: 1         |           |      |          | 8 Alias IDs  | 1 disk group(s) available |
003 | Device Adapter Pair: 2 | 3990-6 | 1053 | 63 (3F) | 23 Base IDs | 1 RAID array(s) defined    | 676 Cylinders

LCU Devices                                                         Print Table

Device ID | Base/Alias | Storage Type | Device Type | Cylinders | Capacity | Location


       Configure LCU          |    Configure CKD Disk Groups    |    Add CKD Volumes
```

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Figure 27. System/390 Storage panel

Configuring logical control units

Use the Configure LCU panel to set the Logical Control Unit (LCU) emulation modes, subsystem identifiers (SSID) and PAV settings.

1. On the S/390 Storage panel, click an LCU number, for example 001, in the LCU list to select it.

   ESS Specialist displays information about LCU devices on the S/390 Storage panel for disk groups configured for that LCU.

2. Click **Configure LCU** at the bottom of the S/390 Storage panel.

   ESS Specialist displays the Configure LCU panel (Figure 28 on page 60) for the LCU number that you selected.

3. Select an emulation mode from the **Logical Control Unit Emulation Mode** drop-down list. The choices are 3990-3, -6, and 3990-3 TPF.

   Selecting a value in this field causes the other fields in this panel to be displayed.

4. Type an identifier for the subsystem in the **Subsystem Identifier (SSID)** field. This number should be unique; no other storage subsystem should use the same SSID.

   The SSID must not have FF as the first two digits. You could base the SSID on an ESS serial number, such as 2105-013FFA90. The SSIDs could be FA90 through FA9F for the 16 LCUs. The SSID number is hexadecimal.

5. The **Parallel Access Volumes (PAV)** field is enabled if you purchased this optional feature. If you did not purchase it, this field is disabled.

   PAV allows you to access volumes in parallel. With PAV, you create one or more alias device addresses for a selected base device address. Host systems can then access the device using its base device address or any of the assigned

PAV alias addresses. Base addresses are assigned in ascending order starting at 00, and PAVs are assigned in descending order from the PAV starting address (see step 6).

Notes:

a. If the PAV license is installed, the PAV field default is **enabled**.

b. If the PAV license is not installed, the PAV field default is **disabled** (unable to change field).

c. If you add the PAV feature after the LIC is installed, you can change the PAV field from disabled to enabled.

6. Select a PAV starting address from the drop-down list. The choices are 63 (3F), 127 (7F), and 255 (FF).

7. Add or delete PAV aliases.

   You can perform this task only after you have created the LCU, defined disk groups, and created base volumes. This task only applies for the Add PAV to LCU (see step 6).

8. When all entries are complete, click **Perform Configuration Update** to apply or **Cancel Configuration Update** to cancel the configuration step for the LCU.

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Figure 28. Configure LCU panel

Configuring CKD disk groups

Use the Configure CKD Disk Groups panel (see Figure 29 on page 61) to define volume capacity for a selected disk group.

Follow the instructions in the *IBM Enterprise Storage Server Configuration Planner* to plan a custom configuration. This information helps you determine how to specify disk groups as RAID or non-RAID arrays.

Enterprise Storage Server Specialist

Configure Disk Groups for LCU 7

Device Adapter Pair: 4, Cluster: 2

Available Storage

Modification	Disk Group	Storage Type	Track Format	Capacity
	Loop: A, Array: 1	RAID Array	3390 (3390 track mode)	Formatted: 59.85 GB
	Loop: A, Group: 3, Disk: 1	non-RAID	3390 (3380 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 2	non-RAID	3390 (3390 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 3	non-RAID	3390 (3390 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 4	non-RAID	3390 (3390 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 5	non-RAID	3390 (3380 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 6	non-RAID	3390 (3380 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 7	non-RAID	3390 (3390 track mode)	Formatted: 8.55 GB
	Loop: A, Group: 3, Disk: 8	non-RAID	3390 (3390 track mode)	Formatted: 8.55 GB

Disk Group Attributes

Undefined — **Storage Type**

None (unused disk) — **Track Format**

0 volumes — Standard volumes to auto-allocate

[Perform Configuration Update]   [Cancel Configuration Update]

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Figure 29. Configure CKD Disk Group panel

1. Click **Configure CKD Disk Groups** from the S/390 Storage panel.
2. Select a disk group that you want to modify by clicking on it in the **Available Storage** list.
3. Select a storage type from the **Storage Type** drop-down list. The choices are RAID, non-RAID, and Undefined.

   If you select non-RAID, then the selected disk row expands to seven or eight rows.

   For non-RAID, click a disk row to define its track format as 3380, 3390, or let it default to none. If you keep the default, you can define these disks at a later time to either CKD or FB.
4. Select the track format from the **Track Format** drop-down list. The choices are 3380 or 3390 track formats. The ESS supports 3380 track format for older device types or applications that do not recognize 3390 track format. IBM recommends 3390.
5. Select the number of volumes you want to modify from the **Standard volumes to auto-allocate** drop-down list. If zero volumes are selected, the array is created with the specified track format and zero volumes. Volumes can be created by using the Add CKD Volumes panel.

   A standard volume of a certain type is defined as a volume with the same number of cylinders as the type it emulates. Table 3 lists the amount of space allocated per standard volume.

   Note: Volumes may not be created in the order displayed in the New Volumes list. It takes about 30 minutes for the devices to be available for use.

Table 3. CKD Allocation table

Volume Type	Cylinders Allocated	Capacity (approximate)
3390-2	2226	1.91 GB

Table 3. CKD Allocation table (continued)

Volume Type	Cylinders Allocated	Capacity (approximate)
3390-3	3339	2.87 GB
3390-9	10017	8.62 GB
3390-2 (3380-track mode)	2226	1.78 GB
3390-3 (3380-track mode)	3339	2.67 GB

6. When all entries are complete, click **Perform Configuration Update** to apply or **Cancel Configuration Update** to cancel the configuration step for the groups.

Adding volumes to an LCU

Use the Add Volumes for LCU (X) panel to allocate available CKD storage as custom volumes (See Figure 30.) Allocations can be made in the selected LCU to RAID arrays, non-RAID disks, or both.

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Figure 30. Add Volumes for LCU (X) panel

Follow the instructions in the *IBM Enterprise Storage Server Configuration Planner* to plan a custom configuration. This information helps you determine how to add *custom* volumes to LCU storage space.

Select the cylinders and number of volumes you are adding based on the information in the Available Capacity per Volume Type table:

Storage Type
The group type, RAID or non-RAID

Track Format
The track format, 3380 or 3390.

Max Available Capacity
The maximum capacity available in cylinders. This is unassigned capacity.

Max Contiguous Capacity

> The maximum capacity available in contiguous or consecutive storage, which is governed by the largest amount of free storage space within a single RAID array or non-RAID disk. Since individual volumes are not allowed to span multiple arrays or disks (that is, they must be wholly contained in a single storage area), the Max Contiguous Capacity value represents a limitation on the maximum volume size that can be allocated.

Perform the following procedure to add a volume to an LCU:

1. Click **Add CKD Volumes** from the S/390 Storage panel. ESS Specialist displays the Add CKD Volumes panel.
2. In the Volume Attributes box, select a storage type from the **Storage Type** drop-down list. The choices are RAID and non-RAID.
3. Select the track format from the **Track Format** drop-down list. The type choices are 3380 or 3390 track formats.
4. Type the number of cylinders you want to configure in the **Cylinders** field, or click the up arrow to increase the number or the down arrow to decrease the number. The choices depend on the available capacity.

   The volumes you add with this panel are considered custom volumes. You can specify any number of cylinders from 1 to 10017. If you wish to emulate the standard capacity for 3390 or 3380 volumes, refer to Table 4.

Table 4. LCU Cylinder Allocation table

Volume Type and Model	Cylinders
3390 Model 1	1113
3390 Model 2	2226
3390 Model 3	3339
3390 Model 9	10017
3380 STD, 3380-D, 3380-J	885
3380-E	1770
3380-K	2655

   IBM recommends that you make the volume allocations as large as possible, minimizing the per-volume overhead. This in turn allows the maximum amount of user data to be placed in each volume.

5. In the Volume Attributes section, enter the number of volumes you want to add in the **Number of Volumes** field. You can also click the up arrow to increase the number or the down arrow to decrease the numbers. The maximum number is 256 per LCU.
6. Click **Add** to add the volumes to the New Volumes list. The following conditions relate to the Max Available Capacity column:

   • Not all space is available for user-volume space. Some per-volume overhead is required for all allocations.

   • The unavailable-space figure is a worst-case estimate.

   • After the configuration update, the actual overhead-space used in creating the volumes may be less than estimated.

   • If you create a large number of volumes of less than the maximum-possible size, the overhead-space lost from the total available space becomes larger.

- The numbers shown in the capacity summary reflect the minimum overhead-space that would be required if you create the smallest number of maximum-size volumes.
- Fragmentation within the total available space might limit some volume sizes to less than the maximum. Such fragmentation is not accounted for in the numbers shown in the Max Available Capacity column.

7. When all entries are complete, click **Perform Configuration Update** to apply the volume creation; or click **Cancel Configuration Update** to cancel the volume creation.

Removing a volume
Remove an unwanted volume prior to performing a configuration update in the following manner:

1. Select the desired volume from the New Volumes list.

2. Click **Remove**.

   Note: You may select multiple volumes to be removed by holding the Control (Ctrl) key while clicking on each desired volume name. Release the Ctrl key after the last volume is selected.

3. When all removals are made, click **Perform Configuration Update** to confirm the volume removal; or click **Cancel Configuration Update** to cancel the volume removal.

Adding PAV volumes to an LCU

The S/390 Storage panel lists LCUs and LCU devices. It also identifies each device ID as either a base device with 0-*n* alias devices assigned or as an alias device assigned to a base device ID.

To add PAV alias device IDs, click Configure LCU from the S/390 Storage panel. (See "Configuring logical control units" on page 59)

Perform the following on the **Configure LCU** panel (see Figure 30 on page 62):

1. To select multiple contiguous rows or multiple non-contiguous rows see "Selecting multiple table rows" on page 7

2. To add one or more PAV alias device IDs,

   select one or more base device IDs from the LCU Devices table The selected device IDs are highlighted in the table.

   a. Click **Add** in the center of the panel.

   b. Select the number of PAV alias devices that you want to create for each base device.

      The ESS assigns the aliases for the number of devices that you select.

   c. Click **Perform Configuration Update** to apply the PAV addition, or click **Cancel Configuration Update** to cancel the PAV addition.

3. To delete one or more PAV alias device IDs,

   select one or more alias device IDs from the LCU devices table (see Figure 30 on page 62). The selected device IDs are highlighted in the table.

   a. Click **Remove** at the center of the panel

   b. Click **Perform Configuration Update** to confirm the PAV removal, or click Cancel Configuration Update to cancel the PAV removal.
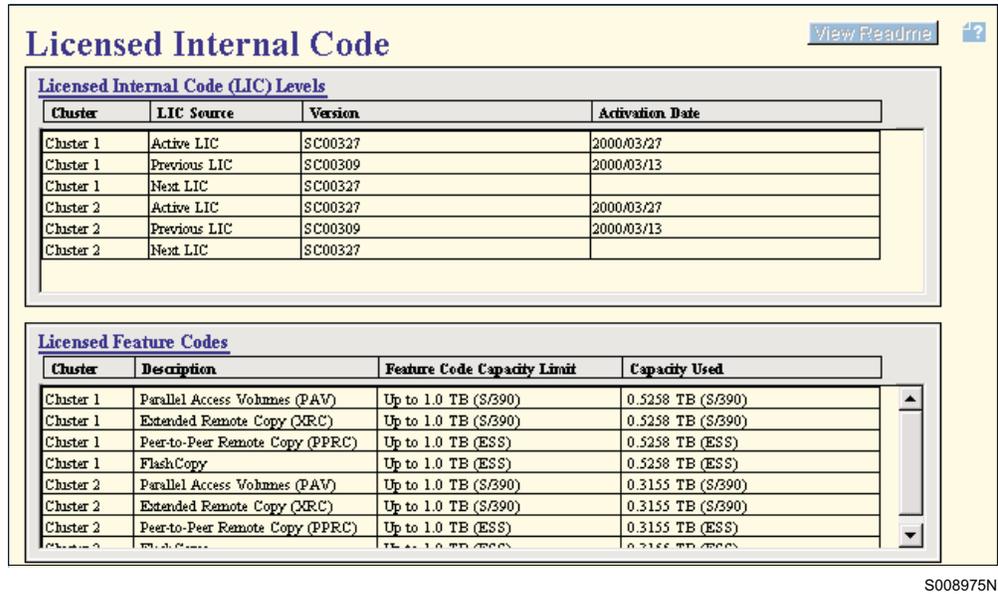
Checking Licensed Internal Code

The Licensed Internal Code (LIC) panel is divided into two tables (See Figure 31 on page 66.) The first table, Licensed Internal Code (LIC) Levels, provides information about the LIC levels. It includes information about the cluster on which the LIC is installed; the LIC source, such as active or down level; the LIC version; and the date that the LIC was activated.

The second table, displays the licensed feature codes that you have purchased for this ESS. Licensed feature codes are for optional software components that provide additional or enhanced functionality for the ESS. The table columns display the following information:

Cluster   Location (Cluster 1 or Cluster 2) where the feature code is installed.

Description   Description of the feature code.

Feature Code Capacity Limit   The maximum storage capacity in terabytes, that is supported by this particular feature code.

                                     Note: A terabyte is 1 000 000 000 000 bytes.

                                     Some feature codes apply only to storage configured for System/390 or zSeries hosts. Other feature codes apply to all configured storage in the ESS. This is indicated by the parenthetical text in the Capacity Used column, as S/390 or ESS, respectively.

Capacity Used   The total storage capacity, in terabytes, that is currently configured in the ESS for this particular feature code.

                                     If the definition of additional disk groups causes the total used capacity to exceed the capacity limit of any installed feature code, then the configuration of the added disk group will fail.

                                     Note: Feature code pricing is usually based on a capacity limit. You may be able to purchase additional capacity for a feature code.

To access the Licensed Internal Code (LIC) panel:

1. From the navigation frame on the initial Enterprise Storage Server Specialist Welcome panel, click **Licensed Internal Code**.
2. ESS Specialist displays the Licensed Internal Code panel (See Figure 31 on page 66.)
3. To see a list of any engineering changes to the LIC, click on a row in the LIC table; then click **View Readme** in the upper right corner of the ESS Specialist.

Licensed Internal Code

View Readme

Licensed Internal Code (LIC) Levels

Cluster	LIC Source	Version	Activation Date
Cluster 1	Active LIC	SC00327	2000/03/27
Cluster 1	Previous LIC	SC00309	2000/03/13
Cluster 1	Next LIC	SC00327	
Cluster 2	Active LIC	SC00327	2000/03/27
Cluster 2	Previous LIC	SC00309	2000/03/13
Cluster 2	Next LIC	SC00327	

Licensed Feature Codes

Cluster	Description	Feature Code Capacity Limit	Capacity Used
Cluster 1	Parallel Access Volumes (PAV)	Up to 1.0 TB (S/390)	0.5258 TB (S/390)
Cluster 1	Extended Remote Copy (XRC)	Up to 1.0 TB (S/390)	0.5258 TB (S/390)
Cluster 1	Peer-to-Peer Remote Copy (PPRC)	Up to 1.0 TB (ESS)	0.5258 TB (ESS)
Cluster 1	FlashCopy	Up to 1.0 TB (ESS)	0.5258 TB (ESS)
Cluster 2	Parallel Access Volumes (PAV)	Up to 1.0 TB (S/390)	0.3155 TB (S/390)
Cluster 2	Extended Remote Copy (XRC)	Up to 1.0 TB (S/390)	0.3155 TB (S/390)
Cluster 2	Peer-to-Peer Remote Copy (PPRC)	Up to 1.0 TB (ESS)	0.3155 TB (ESS)
Cluster 2	FlashCopy	Up to 1.0 TB (ESS)	0.3155 TB (ESS)

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Figure 31. Licensed Internal Code panel

Signing off ESS Specialist and closing the browser window

The browser retains previously entered passwords in memory. Therefore, you must close down the ESS Specialist and all browser windows completely to prevent unauthorized users from accessing the ESS Specialist. Access through an open browser window could give unauthorized users access to your IBM Enterprise Storage Server.

Restarting Copy Services

The Copy Services client program is responsible for notifying the primary Copy Services server when a status change occurs. In rare instances, the primary Copy Services server does not respond to newly initiated activity or does not have complete information from all Copy Services clients.

If you cannot access ESS Web Copy Services when you click **Copy Services** on the ESS Specialist Welcome panel (see Figure 32 on page 67), do the following:

1. Sign off from ESS Specialist and close the browser window. Open the browser and signon to ESS Specialist again.
2. If step 1 is unsuccessful, shut down and restart the workstation that is running your browser.
3. Open the browser and access the ESS Specialist again.
4. Click **Copy Services** from the ESS Specialist Welcome panel.

Figure 32. ESS Specialist Welcome panel

If you still cannot access Copy Services, it is possible that the Copy Services server functions are not operational. You might want to reset ESS Web Copy Services. Be aware that you need to have administrator authority to do this. To reset ESS Web Copy Services, do the following:

1. From the ESS Specialist, Click the **Help** icon (**?**) in the upper right corner of the panel. This links you to user assistance (Help).

2. Click the **Task Help** tab.

3. Scroll all the way to the end of the Task Help list to the last item in the Solve problems at the ESS Specialist Web site tasks.

4. Click **Unable to connect to Copy Services Server message** to link to the reset Help panel. The Copy Services Trouble Shooting Help panel is displayed (see Figure 33 on page 68. Be sure you understand the results of implementing a reset before proceeding:

   Resetting the ESS Web Copy Services. It is not recommended that you use this function, unless you are certain that there are no other recovery options. When you use this function, please be aware that:

   • You will lose any PPRC or FlashCopy tasks for which you have not received a successful completion message.

   • Established PPRC and FlashCopy relationships are maintained.

   • You cannot submit any additional command-line interface (CLI) tasks until ESS Web Copy Services has reinitialized.

Note: It is the responsibility of the user with administrator authority to ensure that no one is using Copy Services before doing a reset or disable action to Copy Services.

1. If you decide not to reset ESS Web Copy Services, click **Cancel**.

2. Click **Reset to Primary** to restart Copy Services with the primary server as the active server.

3. Click **Reset to Secondary** to restart Copy Services with the secondary server as the active server.

Note: This is the action you would take if the primary Copy Services server was unavailable because of a disaster or emergency situation.

4. Click **Disable** to disable Copy Services

Note:

Figure 33. ESS Specialist: Reset Copy Services panel

Notes:

1. To ensure proper processing of the above actions, your browser should be set to avoid caching these pages.

2. For Netscape, select *Edit*, *Preferences*, *Advanced*, *Cache*, and then select *Document in cache is compared to document on network every time*.

3. For Internet Explorer, select *Tools*, *Internet Options*, *General*, *Temporary Internet File Settings*, and then *Check for newer versions of stored pages on every visit to the page*.

If after resetting ESS Web Copy Services you experience the same problems as before, contact your IBM Service Support Representative (SSR).

The **Current Configuration** table in the Copy Services trouble shooting help panel (see Figure 33) gives the IP addresses for currently configured primary and backup servers, and the currently active Copy Services focal point (See Figure 33. To refresh the current configuration status, click your browser's **Reload** or **Refresh** button.

Chapter 3. Using ESS Web Copy Services

This chapter provides:
- A map to the ESS Web Copy Services tasks
- An overview of ESS Web Copy Services
- Information about the ESS Web Copy Services interface
- Information on accessing ESS Web Copy Services
- Guidance on creating and modifying Copy Services tasks using the following panels:
  – Welcome
  – Paths
  – Volumes
  – Storage Servers
  – Tasks
  – Configuration
- Guidance on disaster recovery
- Information about the ESS Web Copy Services messages

ESS Web Copy Services task map

If you have used ESS Web Copy Services before, see Table 5 to go directly to the desired task. This task map refers you to the sections that describe the tasks.

Table 5. ESS Web Copy Services task map

Copy Service Task	Related Section
Getting started	"Getting started" on page 74
Establishing paths	"Using the Paths panel" on page 78
Establishing a relationship between multiple source and target volumes for PPRC and FlashCopy	"Establishing multiple volume-pair relationships for FlashCopy and PPRC" on page 101
Grouping tasks	"Grouping tasks" on page 123
Performing a FlashCopy function	"Establishing a FlashCopy pair" on page 102
Establishing a PPRC relationship between source and target logical subsystems	"Using the Storage Servers panel" on page 115
Refreshing path and volume information	"Refreshing the path and volume information for an ESS unit" on page 126
Running a saved task	"Running a task" on page 123
Preparing for disaster recovery	"Planning for a disaster" on page 130
Testing your disaster recovery setup	"Creating tasks for PPRC and Flashcopy" on page 130
Viewing the server log from the Configuration panel	"Viewing the Copy Services server logs" on page 127

ESS Web Copy Services overview

ESS Web Copy Services provides a Web-based interface for setting up or managing the following types of data-copy functions:

Peer-to-peer remote copy (PPRC)

Once you establish a PPRC relationship between a source volume and a target volume, changes to the source volume continue to be made for the target volume until you either suspend or remove the PPRC relationship between the volumes.

FlashCopy

FlashCopy makes a single point-in-time copy. The source and target volumes must meet the following requirements:

1. The source and target volumes must be in the same logical subsystem (LSS).

2. It is possible to reference both source and target volume during a FlashCopy operation; however, at the time the FlashCopy relationship is actually created, the recommendation is that the target volume not be online.

Only one FlashCopy operation at a time can be active on a volume.

Note: ESS Copy Services functions can also be invoked from the command-line interface on your open-systems host. See *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the command-line interface.

Certain combinations of data-copy functions cannot be done on the same volume at the same time. For example, a volume that is defined as a secondary volume of a PPRC pair cannot concurrently be defined as an XRC source volume. The following table identifies the data-copy functions that can be successfully used at the same time on a logical volume.

Table 6. Valid data-copy functions that can be performed concurrently on an ESS volume

If volume is => Can it become ∨	Concurrent Copy source	FlashCopy source	FlashCopy target	PPRC primary	PPRC secondary	XRC source	XRC target
Concurrent Copy source	Yes	Yes	Yes	Yes	No	Yes	Yes
FlashCopy source	Yes	No	No	Yes	Yes	Yes	Yes
FlashCopy target	No	No	No	No	No	No	No
PPRC primary	Yes[2]	Yes	Yes	No	No	Yes[2]	Yes
PPRC secondary	No	Yes	Yes	No	No	No	No
XRC source	Yes	Yes	Yes	Yes[2]	No	No	Yes[1]
XRC target	Yes	Yes	Yes	Yes	No	Yes[1]	No

Notes:

1. A volume that is a secondary in an XRC session cannot be a primary in the same XRC session. It can, however, be a primary in another XRC session.

2. This operation is supported only with the ESS.

ESS Web Copy Services interface

In order to run data-copy functions, you will need to work with the following:

Volumes

Volumes are the basic components in a data-copy task. You must define the volumes before you establish a PPRC relationship or initiate a FlashCopy operation. The only way to define the volumes is through the ESS Specialist. Volumes in a PPRC relationship must be the same type (Fixed Block track format, 3390 CKD track format, or 3380 CKD track format).

From the Volumes panel, you can select any volumes associated with an LSS in an ESS. Simplex volumes (those not yet assigned to a PPRC or FlashCopy pair) are colored gray. PPRC source and target volumes are colored blue and red, respectively. While a FlashCopy operation is in progress, the icon for the source volume is a blue triangle and the icon for the target volume is a red triangle. When the FlashCopy operation completes, the source and target volumes return to simplex mode (unless they are in a PPRC relationship) and turn gray.

Storage servers

A storage server is a controller within an ESS. A storage server can have one or more Logical Subsystems (LSSs) Logical subsystems can be formatted as a System/390 or zSeries interface (CKD) or as an open-system (fixed block) interface.

From the Storage Servers panel, you can establish a PPRC relationship between all the volumes in one LSS and another LSS.

You can use this panel to view a list of all the storage servers. In addition, you can also get an overview of which logical subsystems on a storage server have simplex devices, PPRC source or target devices, or a mixture of devices.

The Storage Server Panel also allows you to modify the LSS time-out values for XRC, concurrent copy, and PPRC consistency groups.

Paths Copy services requires a logical path to be established over a physical path in order to transmit PPRC data between two ESSs.

The Paths panel allows you to establish paths between two different logical subsystems. You can use the Paths panel to view originating ESS (path origin) information, common storage server targets, and logical subsystem targets. You can also view the ESCON switches that are attached to a storage server. When you select the switch, the devices attached to the storage server through the switch are displayed.

IBM recommends that you perform the tasks in the following order:

1. Use the Paths panel to establish logical paths between a primary storage server and a secondary storage server for PPRC. You need to first identify the logical subsystems (LSS) containing the volumes you intend to define. (This step is not required for FlashCopy)

2. Use the Volumes panel to find and select the volumes that you want to pair as source and target volumes in a peer-to-peer relationship or for a FlashCopy operation. You can also use the Volumes panel to display a volume's logical subsystem number.

3. Use the Tasks panel to manage tasks you have defined. You can run, remove, modify, group, ungroup, or replace tasks.

4. Use the Storage Servers panel to find LSSs, define source and target LSSs for PPRC, and manage consistency groups. Use the Storage Servers panel when you want to perform PPRC on all volumes of a logical subsystem. You can also use this panel to monitor a large number of volumes for proper operation. For instance, if all the volumes in an LSS are in PPRC full duplex state, the LSS is all blue; later if a volume in the LSS is suspended, the LSS display changes.

Ensure that your host system is physically and logically configured for PPRC and FlashCopy. See the *IBM Enterprise Storage Server Introduction and Planning Guide* for the configuration requirements.

FlashCopy and PPRC conditions for open-systems host

When you copy a source volume to a target volume with FlashCopy, and you require concurrent read/write access to both volumes, the source and target volumes should be on different host systems. A copy operation creates a target volume with the same identification as the source volume. A single host system cannot access two volumes with the same identification.

Attention: There is an important performance consideration to be aware for PPRC target volumes that belong to a Windows NT or Windows 2000 host system. It is recommended that the LUNs for the target volumes not be mapped to the Windows NT or Windows 2000 host, until you need access to the data on the target volume. In other words, perform the LUN mapping after the PPRC copy operation, and immediately before, you need access to the data. Keep in mind, that the host system must be rebooted before you can access the data on the target volume. You greatly reduce the time it takes the host system to reboot, by performing the LUN mapping in this way. Otherwise, the time to reboot could be as much as 10 minutes per PPRC target volume. See "Configuring open-systems storage" on page 32 for information on LUN mapping.

Attention: When the copy operation creates the same identification for the target volume as for the source volume, you cannot distinguish one from the other; Therefore you may not be able to access the original data. The target volume and the source volume can be on the same host system for a PPRC or FlashCopy operation, only under the following conditions:

- For AIX: When the host system is using a logical volume manager (LVM) with the **recreatevg** command support (requires AIX 4.3.3.25 with APAR IY 10456)
- For AIX, Sun, and HP: When the host system is not using an LVM.
- For other host systems: When the host system can distinguish between a source volume and a target volume that has the same identification.

Attention: FlashCopy source and target volumes must be exactly the same size for Windows 2000 and most AIX systems.

Using the ESS Web Copy Services interface

The ESS Web Copy Services user interface consists of three major components:

1. The information frame

   The information frame is the long bar at the top of the interface. It identifies the interface. It also contains the global help button and the IBM logo on the right side of the bar.

   You can click the Help icon (**?**) at any time to bring up a new browser window that displays the Help system. See "Using the Help System" on page 73 for a description of the Help system.

2. The navigation frame is the column of buttons on the extreme left of the interface.

   These buttons indicate the components that can be operated by ESS Web Copy Services. You can click on any of these buttons at any time and the work frame will switch to display the panel associated with the particular button that you clicked.

3. The work frame is the main area in the center of the browser window.

   It contains the actual information being displayed by the interface, and it allows you to perform Web Copy Services tasks. The panels displayed in the work frame contain a page-help icon. The help icon is a question mark (**?**).

   When you click this icon, it links to the Help system and displays the help information specific to the current work frame panel. You open the Help system in a second browser window. Close the Help browser to return to the main browser window.

Using the Help System

The Help system consists of the following components:

Content Help

   Content Help includes a list of topics. Click on the topic of interest to see information about it.

Task Help

   Task Help includes a list of tasks you perform for copy services. Click the **Help** tab, then click the task of interest in the task list, to see instructions on how to perform the task.

Glossary

   Glossary Help includes a list of the terms that are used in this Web interface. Click the **Glossary** tab to see the contents, then click the first letter of the term for which you want a definition.

Messages

   Message Help includes a list of the messages that are displayed by ESS Copy Services. Click the **Messages** tab to display the message list, then click on the message number for which you want more information.

Accessing ESS Web Copy Services

You access ESS Web Copy Services from the ESS Specialist. You should use Netscape Navigator or Microsoft Internet Explorer (MSIE).

Note: If you have problems using a browser at a certain level, upgrade to the highest-available level.

Accessing Web Copy Services through MSIE:

To access the Web Copy Services from MSIE, perform the following steps to set up Java security options:

Note: The procedures may vary slightly among the different releases of MSIE.

1. Start MSIE.
2. Click **Tools->Internet Options** from the menu pull down.

   This brings up a new panel called Internet Options.
3. Click **Security**.

4. Click **Internet Zone**.

5. Click **Custom Level.**

   This brings up the Security Settings panel.

6. Scroll through to the Java section and click **Custom Permissions**.

7. Click **Java Custom Settings** at the bottom of the Security Settings panel.

   This brings up the Internet panel.

8. Click **Edit Permissions**.

9. Click **enable unsigned content**.

10. Click **OK** on the Internet panel

11. Click **OK** on the Security Settings panel

12. Click **OK** on the Internet Options panel

Getting started

Before you can use any Copy Services functions, the correct licensed internal code (LIC) features must be installed and activated. Before you can use any ESS Web Copy Services functions you must also ensure that your ESS has been configured with network connectivity to all ESSs in the Copy Services group. In turn, each ESS in the Copy Services group must be configured for network connectivity. See *IBM Enterprise Storage Server Introduction and Planning Guide* for more information about DNS and non-DNS addressing.

Understanding the Copy Services servers

The primary Copy Services server must be defined and the definition of a backup Copy Services server is strongly recommended. The IBM SSR or Maintenance Service Provider are the only ones that can perform these functions.

Primary Copy Services server
> Software that runs on one of the ESS clusters in the Copy Services server group and that performs the following functions:
> - Manages the Copy Services clients that are part of the Copy Services server group
> - Manages the Copy Services tasks
> - Copies tasks to the backup Copy Services server automatically
> - Manages the data that is in the Copy Services server group
> - Waits for data
> - Collects connectivity and configuration data from all clients that are part of the Copy Services server group
> - Communicates with the Web browser

Backup Copy Services server
> The ESS cluster in the Copy Services server group that runs the Copy Services server code when the primary Copy Services server has failed. The backup Copy Services server has the following characteristics:
> - It must be manually started in the event of a failure to the primary Copy Services server.
> - It runs on a different ESS cluster than the primary Copy Services server.
> - It can save tasks while running as the active server. but saved tasks are lost when the ESS cluser is reset to the primary server
> - Saved tasks are lost when the ESS cluster is reset to the primary server.

Active Copy Services server
> The ESS cluster that is currently running the Copy Services server code.

Copy Services clients

Software that runs on each ESS cluster in the Copy Services server group that performs the following functions:

- Communicates configuration, status and connectivity information to the Copy Services server.
- Performs data-copy functions on behalf of the Copy Services server.

Connecting to ESS Web Copy Services

You access Web Copy Services from the ESS Specialist. Perform the following steps to access ESS Web Copy Services:

1. Access the ESS Specialist. The ESS Specialist panel displays.

   Notes:

   a. The default support for Web Copy Services is for an open-systems host. If you want to use Web Copy Services for S/390 or zSeries volumes, that support must be enabled by the IBM SSR using the System Management Interface Tool (SMIT). The *IBM Enterprise Storage Server Introduction and Planning Guide* contains a configuration worksheet where you specify which option the SSR should enable.

   b. It is not necessary to use Web Copy Services for S/390 or zSeries volumes; all of the data-copy functions can be invoked from the S/390 or zSeries host system if it is running an operating system that supports copy services.

2. Click **Copy Services** from the ESS Specialist Welcome panel. The ESS Web Copy Services Welcome panel displays.

S009015

Figure 34. Copy Services Welcome panel

What to do if you cannot connect to ESS Web Copy Services: If you initially cannot connect to ESS Web Copy Services or cannot execute a Copy Services function from the ESS Web Copy Services interface, it is probably because of one of the following reasons:

1. The correct LIC features are not installed or activated.
2. The primary Copy Services server has not been defined.
3. The primary Copy Services server is down. See "Restarting Copy Services" on page 66 for information on recovering ESS Web Copy Services.

4. ESS clients have not completed registration with the Copy Services server.

You can verify that the correct LIC features are installed through the ESS Specialist by performing the following steps:

- From the ESS Specialist Welcome panel, click **Licensed Internal Code**. The list of installed feature codes is displayed.
- Verify that there is an installed feature code for the Copy Services function you want to perform.

You can verify that the primary Copy Services server is defined by following the instructions in "Restarting Copy Services" on page 66. If the primary Copy Services server is defined, click the **Restart to primary** button in the ESS Specialist Task Help system to attempt to correct the problem.

You can verify that the ESS clients have registered with the Copy Services server by determining if:

- You can see all the LSSs from the **Source** drop-down list in the Volumes panel or
- You can see all the LSSs from the **Select Source Subsystem** drop-down list in the Paths panel or
- You can see all the LSSs for each ESS within the Copy Service Server group, in the Storage Servers panel.

Using the Welcome panel

The ESS Web Copy Services Welcome panel your starting point for using the Web interface. The ESS Web Copy Services Welcome panel is similar in structure and organization to the ESS Specialist Welcome panel.

Note: Any ESS Specialist userid with administrator or configuration access authority (see "Assigning a user's access authority" on page 16) can be used to access Web Copy Services. It is not necessary to sign on to Web Copy Services if you are currently logged into the ESS Specialist on the ESS cluster running the active Copy Services server.

S009001

Figure 35. Copy Services sign on (may not be required)

Select the task you want to accomplish from the ESS Web Copy Services Welcome panel (Figure 34 on page 75):

- Click **Copy Services** from the ESS Specialist panel to connect to the Copy Services server. You will see this message while connecting to ESS Web Copy Services:

CS000011

Figure 36. Connecting to Copy Services message

- Click **Volumes** to bring up the Volumes panel.

  The Volumes panel allows you define source and target volumes for peer-to-peer copy or FlashCopy tasks. You can also view the peer status of a volume. The peer status (indicates whether the volume is a source or target volume and its copy mode.

- Click **Storage Servers** to bring up the Storage Server panel.

  The Storage Server panel allows you to work at the logical subsystems level for PPRC task definition. You can build tasks to place all of the volumes of a logical subsystem in a peer-to-peer relationship with all of the volumes of another logical subsystem.

  You can also use this panel to freeze a PPRC consistency group and to define and run a consistency-group-created operation.

- Click **Paths** to bring up the Paths panel.

  The Paths panel displays the current status of paths between a ESS unit and the devices that are connected to it.

  Also use this panel to add or remove Copy Services paths including the paths for a PPRC consistency group.

- Click **Tasks** to bring up the Tasks panel.

  Use the Tasks panel to manage tasks you have defined and saved. You can run, remove, modify, group, or ungroup tasks.

  Grouping tasks involves combining two or more separate tasks into a single task, so that multiple tasks can be run in parallel. It is important not to groups tasks that require the completion of one task before starting another.

- Click **Configuration** to bring up the Configuration panel.

  Use the Configuration panel to find the identity of the primary Copy Services server and to see the last time the configuration was changed. You also use this panel to display the error log and to send the log to the administrator.

  Use the Configuration panel to specify whether a password is required for hosts that use the command-line interface.

  Use the Configuration panel to perform a **Refresh** function on the ESS.

- Click **Exit** to return to the ESS Specialist Welcome panel or to exit from the ESS Web Copy Services browser.

> **Note:** When you perform a **Reset to Primary** or **Reset to Backup** function, you must exit the Web Copy Services panel and reenter it to receive valid updates from the Copy Service Server. See "Restarting Copy Services" on page 66 for more information on these functions.

Using the Paths panel

Use the Paths panel to establish paths between an ESS and another ESS or between logical subsystems (LSSs).

You can also use this panel to create a consistency group.

You can perform the following tasks from the Paths panel:
- Establish paths
- Add paths
- Remove a group of established paths
- Remove one or more paths from a group of established paths
- View information about paths
- Create a PPRC consistency group

Use the Paths panel (see Figure 37 on page 79) to display the ESCON interfaces of the selected ESS from which you can create paths to other ESS locations or to other logical subsystems. Click **Information Panel** on the Paths panel to determine the status of those interfaces and whether any established paths exist. Click **Display Direct Connect Paths** (optional).

> **Note:** You must activate the Display Direct Connect Paths function if there are direct connections between ESS storage facilities and:
> - If this is the first time you access ESS Web Copy Services
> - After a update of the ESS microcode
> - After a concurrent-service action

This ensures that all of the paths are displayed. See "Viewing information about paths" on page 92 for procedures about viewing path information.

Establishing paths

PPRC requires that you establish a path between a LSS in a source ESS and an LSS in the target ESS. You specify the path from the source by its unique port system adapter identification number (SAID), for example, SAID 0001. When you have established the paths, the Paths panel displays the current status of Copy Service paths between a ESS unit and another ESS or logical subsystem.
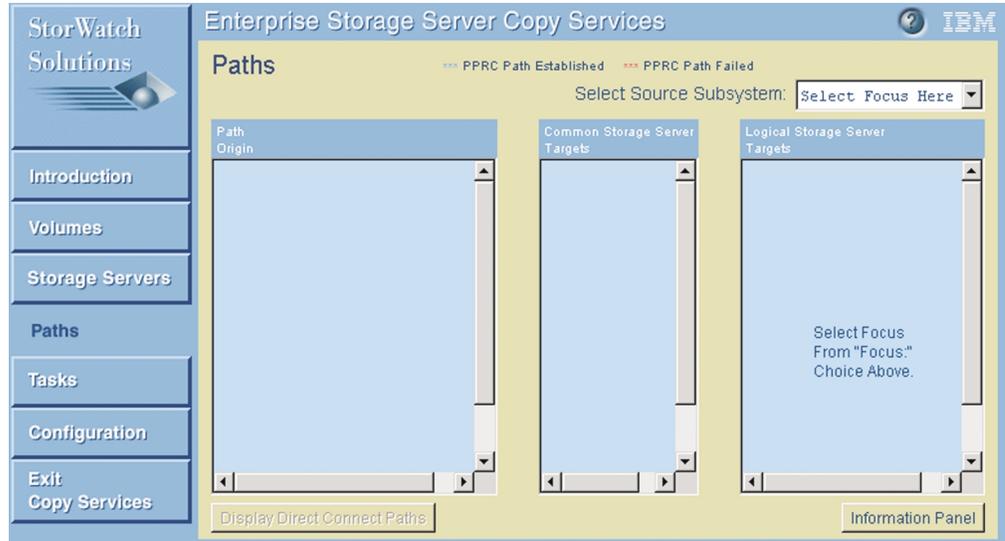
SWUG0001

Figure 37. The Initial Paths panel

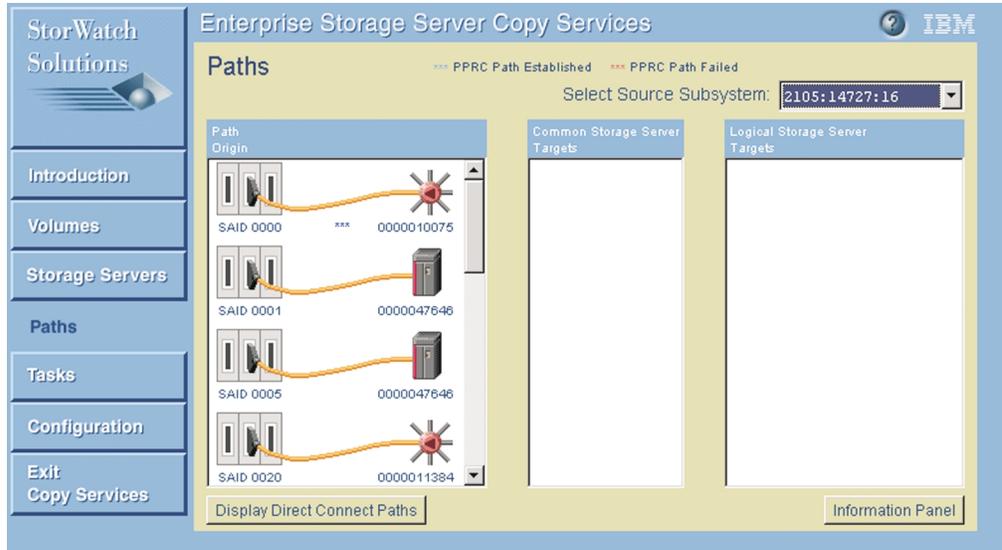Perform the following steps to establish a path:

1. Click **Paths** from the ESS Web Copy Services Welcome panel. (See Figure 34 on page 75.)

2. Click the **Select Source Subsystem** pull-down list. A list of logical subsystems is displayed.

   Notes:

   a. You are selecting an ESS and a subsystem. For example, if you select `2105:14727:16`; `2105` refers to the ESS type, `14727` is the ESS serial number, and `16` is the logical subsystem number. Colons (:) separate the identifiers.

   b. Blue asterisks mean a path is already established.

   c. Red asterisks mean the last attempt to establish the path has failed.

   d. The red or blue asterisks appear above the path-connection symbol in the Path Origin column.

3. Select the source logical subsystem.

4. Click **Display Direct Connect Paths** (optional).

   Note: You must perform this refresh function:

   - If this is the first time you access ESS Web Copy Services
   - After a update of the ESS microcode
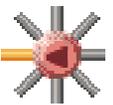   - After a concurrent-service action

StorWatch Solutions

Enterprise Storage Server Copy Services

Paths   ••• PPRC Path Established   ••• PPRC Path Failed

Select Source Subsystem: 2105:14727:16

Path Origin   Common Storage Server Targets   Logical Storage Server Targets

Introduction

Volumes

Storage Servers

Paths

Tasks

Configuration

Exit Copy Services

SAID 0000   •••   0000010075

SAID 0001   0000047646

SAID 0005   0000047646

SAID 0020   0000011384

Display Direct Connect Paths   Information Panel

SWUG0002

Figure 38. The Path Origin selection panel

5. Left-click on the desired path in the Path Origin column. This selects the first path. After the path is selected, the common storage servers and their designators are displayed.

   The following table shows the source-connection symbols and their meaning:

Table 7. Source-connection symbols and their meaning

Connection icon	Description
	host adapter
	Converter
	Channel extender
	ESCON director
	Host server
	Storage server

6. Left-click on the desired common storage server in the Common Storage Servers Targets column. A list of logical subsystems is displayed.
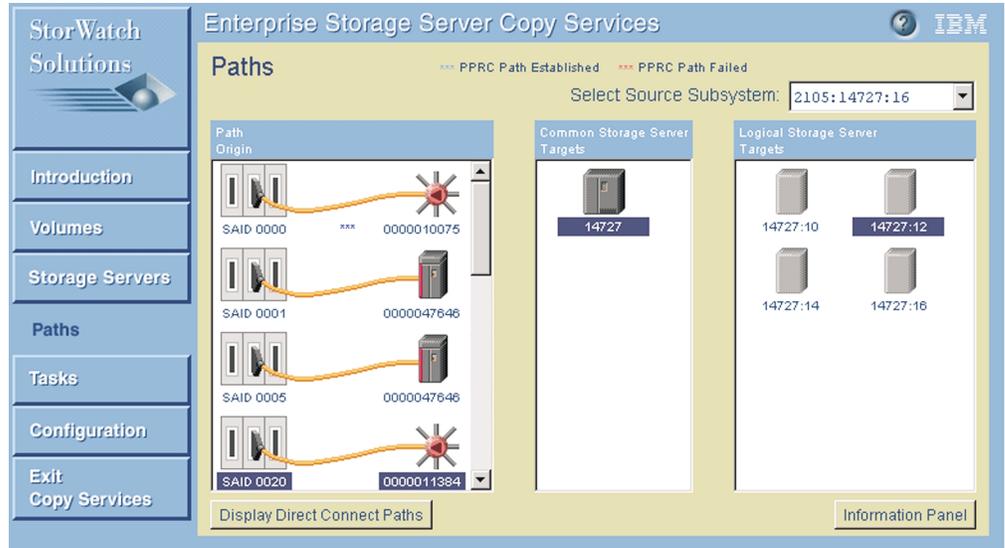
SWUG0003

Figure 39. Logical subsystem selection panel

7. Left-click on the desired logical subsystem. This is the destination of the path.

   Note: If the icons representing the logical subsystems disappear from the Logical Storage Server Targets column, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

8. Right-click on a path to select an additional path (optional). Repeat this step until all the desired paths to the target logical subsystem are selected.

9. Right-click on the target subsystem. The Task Wizard is displayed.

10. Use the Task Wizard to continue the task definition.

11. Select **Establish Paths** from the Select task type menu.

12. Click **Next** to bring up the Select Outgoing Ports screen (see Figure 40 on page 82).

   Notes:

   a. You will only see the Select outgoing ports menu if a switch is part of the path. If the paths are going through a switch, you must select **Force Removal of Paths** in the Task Wizard. This option causes any logical paths between a host system and the selected ESCON system adapter to be removed before establishing logical paths for copy services.

   b. Paths can only be removed if there are no PPRC devices using the paths for the associated source and target LSSs.
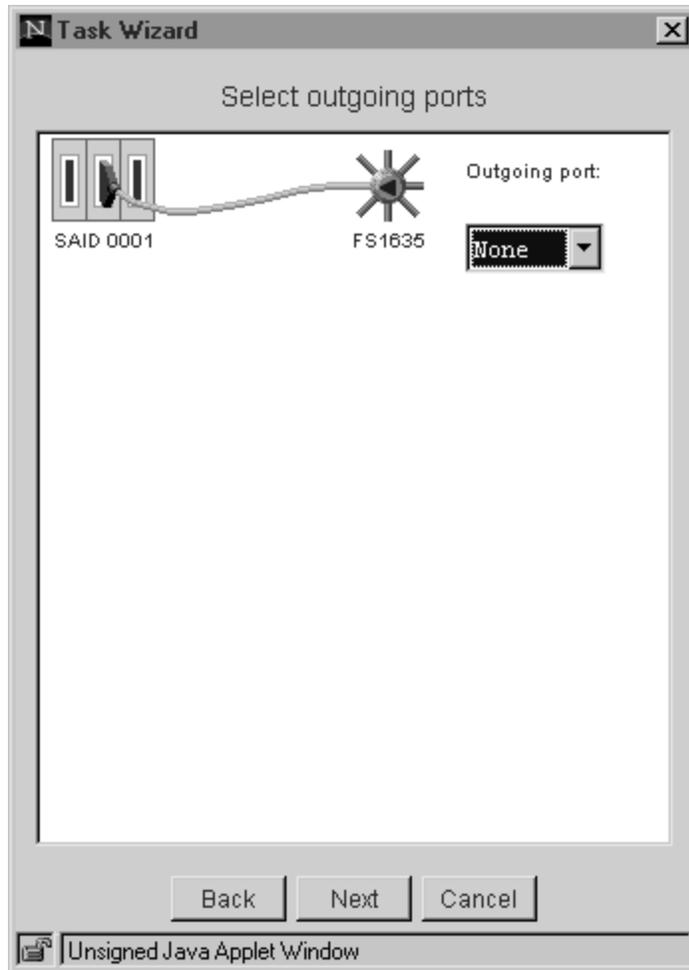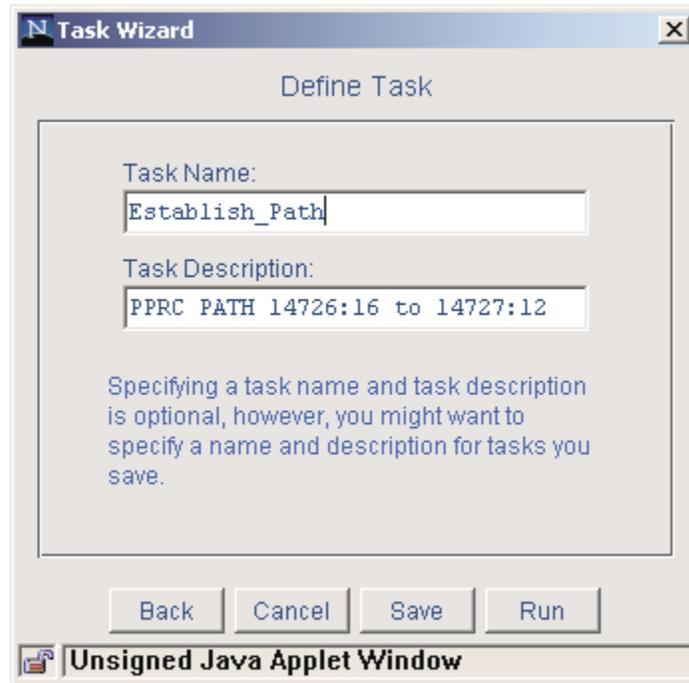
CS08871N

Figure 40. Second Task Wizard panel

13. Use the **Outgoing Port** pull-down menu to choose the desired port. Click **Next**. The following panel is displayed:
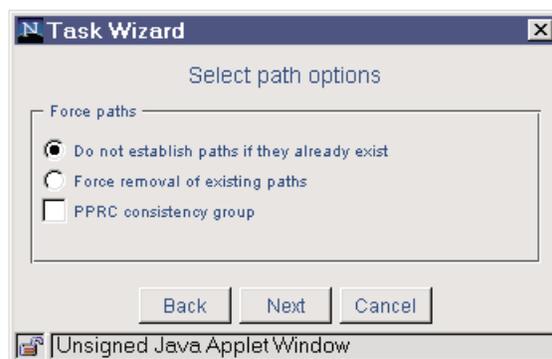
CS000004

Figure 41. Task Wizard: Select Path Options panel

14. Select the path options you want for this path and click **Next**. The ESS displays the Define Task Wizard.

CS000007

Figure 42. Task Wizard: Define Task panel

Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
- The name can only contain alphanumeric characters
- The name cannot contain blanks
- The name can contain the underscore (_) or hyphen (-) characters
- The name cannot exceed 16 characters

Note: You can establish paths to only a single target LSS at a time. If you want to establish paths to additional LSSs from the same source subsystem, it must be done with a separate task; repeat steps 5 - 8 for each additional logical subsystem.

Note: When the task runs, any paths that you have selected are established and established paths that you have not selected, are removed.

Attention: After creating and saving the task to establish paths, you need to create the corresponding task to remove the paths. IBM recommends that you modify the task that you just created so that it removes the path, then name and save the task. This not only saves time but it is also very useful for disaster recovery. See "Removing paths" for instructions on defining the task. See "Disaster recovery" on page 129 for more information about disaster recovery.

Removing paths

Perform the following steps to modify a saved task that establishes paths to a task that removes paths:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel. The Tasks panel is displayed. See Figure 43.
2. Click the saved task that you want to modify.
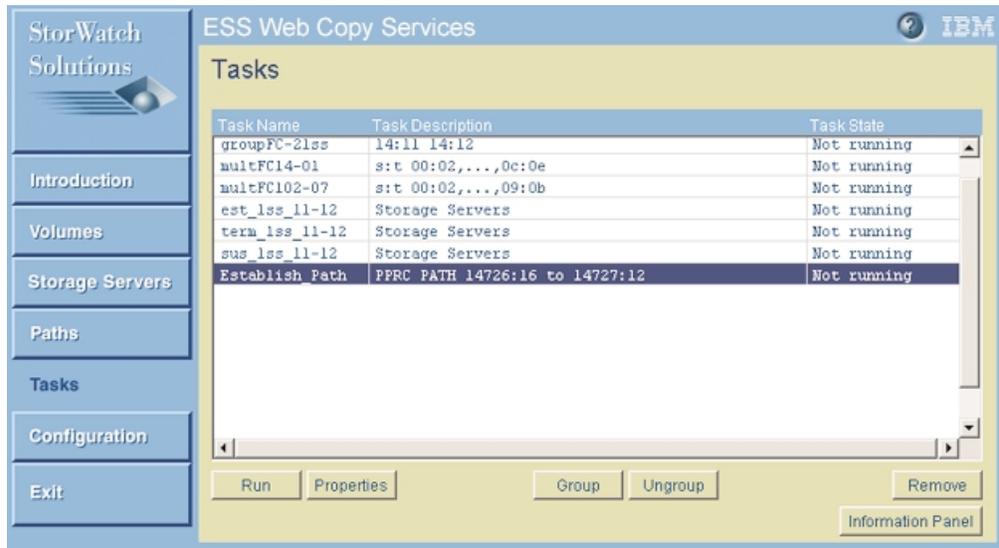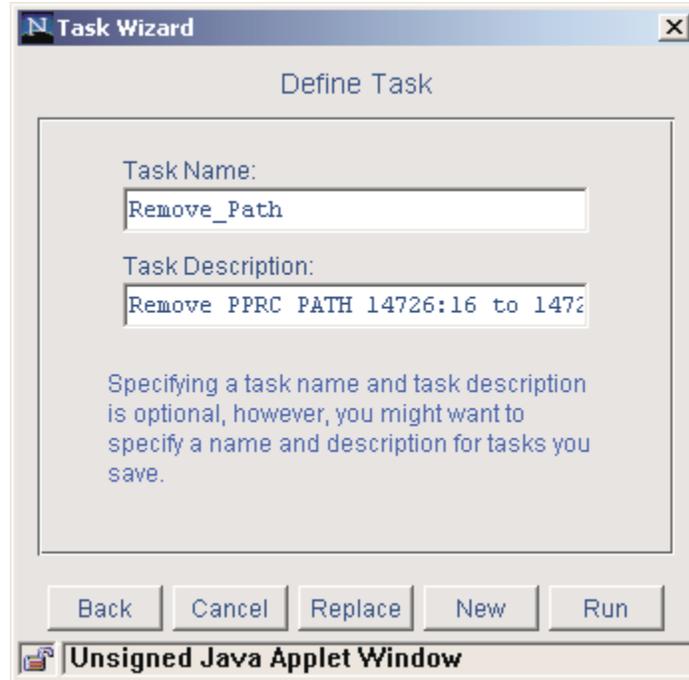

CS000019

Figure 43. Tasks panel

3. Click **Properties** at the bottom of the panel. The Task Wizard is displayed.
4. Select **Remove Paths** from the Select task type menu (see Figure 44). The following panel is displayed:

CS000010

Figure 44. Task Wizard: Select task type panel

5. Click **Next** to continue the task definition. The Define Task panel is displayed. See Figure 45 on page 85.

CS000012

Figure 45. Task Wizard: Define Task panel

6. Name the new task.

7. Click **Save** to save the new task.

   Note: The **Replace** option replaces the saved task with new parameters.

Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:

- The name can only contain alphanumeric characters
- The name cannot contain blanks
- The name can contain the underscore (_) or hyphen (-) characters
- The name cannot exceed 16 characters

Note: When you run a task that removes paths, *all* the paths between the source and target LSS are removed. This is true regardless of the paths you selected on the Paths panel or the paths specified in the remove paths task. To remove selected paths, create an establish paths task with just the paths desired. See "Removing a single path from a group of established paths" on page 88.

Adding paths

Perform the following steps to add paths:

1. Click **Paths** from the ESS Web Copy Services Welcome panel.

2. Click the **Select Source Subsystem** pull-down list. A list of logical subsystems is displayed. Select the source logical subsystem.

Notes:

  a. You are selecting an ESS and a logical subsystem. For example, if you select `2105:14727:16`; `2105` refers to the ESS type, `14727` is the ESS serial number, and `16` is the logical subsystem number. Colons (:) separate the identifiers.

  b. Blue asterisks mean a path is already established.

  c. Red asterisks mean the last attempt to establish the path has failed.

  d. The red or blue asterisks appear above the path-connection symbol in the Path Origin column.

3. Click **Display Direct Connect Paths** (optional).

  Note: You must perform this refresh function:
- If this is the first time you access ESS Web Copy Services and no paths have already been established.
- After a update of the ESS microcode
- After a concurrent service action

4. Left-click on one of the paths that is already established. (Blue asterisks mean a path is already established.)

5. Right-click on another path; this selects an additional path. Repeat this step until all the desired paths are selected.

6. Left-click on the desired common storage server in the Common Storage Servers Targets column. A list of logical subsystems is displayed.

7. Left-click on the desired logical subsystem. This is the destination of the path.

  Note: If the icons representing the logical subsystems disappear from the Logical Storage Server Targets column, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

8. Right-click on the target logical subsystem. The Task Wizard is displayed.

9. Use the Task Wizard to continue the task definition.

  Note: If the paths are going through a switch, you must select **Force Removal of Paths** in the Task Wizard.

  Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
- The name can only contain alphanumeric characters
- The name cannot contain blanks
- The name can contain the underscore (_) or hyphen (-) characters
- The name cannot exceed 16 characters

  Note: You can establish paths to only a single target LSS at a time. If you want to establish paths to additional LSSs from the same source logical subsystem, it must be done with a separate task; repeat steps 4 - 7 for each additional logical subsystem.

Attention: After creating and saving the task to add paths, you need to create the corresponding task to remove the paths. IBM recommends that you modify the task that you just created so that it removes the path, then name and save the task. This not only saves time but it is also very useful for disaster recovery. See "Removing paths" on page 83 for instructions on defining the task. See "Disaster recovery" on page 129 for more information about disaster recovery.

Removing a group of established paths

Perform the following steps to remove a group of established paths:

1. Click **Paths** from the ESS Web Copy Services Welcome panel.
2. Click on the **Select Source Subsystem** pull-down list. A list of logical subsystems is displayed. Select the source logical subsystem.

   Note:
   - You are selecting an ESS and a logical subsystem. For example, if you select 2105:14727:16; 2105 refers to the ESS type, 14727 is the ESS serial number, and 16 is the logical subsystem number. Colons (:) separate the identifiers.
   - Blue asterisks mean a path is already established.
   - Red asterisks mean the last attempt to establish the path has failed.
   - The red or blue asterisks appear above the path-connection symbol in the Path Origin column.

3. Click **Display Direct Connect Paths** (optional).

   Note: You must activate the Display Direct Connect Paths function if there are direct connections between ESS storage facilities and if this is the first time you display PPRC paths after an initial microcode load (IML).

4. Left-click on the desired path in the Path Origin column. (This selects the first path.) After the path has been selected, the common storage servers and their designators are displayed.
5. Right-click on a path to select an additional path (optional). Repeat this step until all the desired paths are selected.
6. Left-click on the desired common storage server in the Common Storage Servers Targets column. A list of logical subsystems is displayed.
7. Left-click the logical subsystem that is the destination of the path.

   Note: If the icons representing the logical subsystems disappear from the Logical Storage Server Targets column, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

8. Right-click on the desired logical subsystem. The Task Wizard is displayed.
9. Select **Remove Paths** and continue by using the Task Wizard.

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters
   - The name cannot exceed 16 characters

Removing a single path from a group of established paths

Perform the following steps to remove a single path from a group of established paths:

1. Click **Paths** from the ESS Web Copy Services Welcome panel.
2. Click on the **Select Source Subsystem** pull-down list. A list of logical subsystems is displayed. Select the source logical subsystem.

   Note:
   - You are selecting an ESS and a logical subsystem. For example, if you select 2105:14727:16; 2105 refers to the ESS type, 14727 is the ESS serial number, and 16 is the logical subsystem number. Colons (:) separate the identifiers.
   - Blue asterisks mean a path is already established.
   - Red asterisks mean the last attempt to establish the path has failed.
   - The red or blue asterisks appear above the path-connection symbol in the Path Origin column.

3. Left-click on the first path in the group. (This is one of the paths you want to keep.) After the path has been selected, the common storage servers and their designators are displayed.
4. Right-click on the next path in the group. (This is another one of the paths you want to keep.) Repeat this step until you have selected all the paths you want to keep.

   Note: You should have selected all the paths *except* the path you want to remove.
5. Left-click on the desired common storage server in the Common Storage Servers Targets column. A list of logical subsystems is displayed.
6. Left-click on the logical subsystem that is the destination of the path.

   Note: If the icons representing the logical subsystems disappear from the Logical Storage Server Targets column, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.
7. Right-click on the logical subsystem. The Task Wizard is displayed.
8. Select **Establish paths** and continue using the Task Wizard.

   Note: You will only see the Select outgoing ports menu if a switch is part of the path. If the paths are going through a switch, you must select **Force Removal of Paths** in the Task Wizard.

   Note: When the task is run, the unselected path is removed from the group. The other paths are re-established.

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters
   - The name cannot exceed 16 characters

Creating a PPRC consistency group

Note: Consistency groups are supported on open systems for planned outages only.

Use the Paths panel to create a PPRC consistency group. A consistency group is a set of volumes paired for PPRC. When an error occurs that affects any of these volumes, the ESS issues a long busy state to the primary host, so all the updates to the primary volumes are temporarily queued. The consistency group is created when you establish a path between the primary and secondary PPRC logical subsystems. Perform the following steps to create a consistency group:

1. Click **Paths** from the ESS Web Copy Services panel.

2. Click the **Select Source Subsystem** pull-down list to select the logical subsystem from which you want to create the paths.

3. Select the source logical subsystem.

4. Click on the path in the Path Origin column. The ESS automatically displays the physical targets that you can access through this connection in the Common Storage Server Targets column.

5. Click a physical target to select it. The ESS displays the logical subsystem targets that you can access from this physical target in the Logical Subsystem Targets column.

6. Left-click the target storage server that you want to select.

7. Right-click on the same target to display the first Task Wizard panel. This panel asks you to select the type of task you are creating.
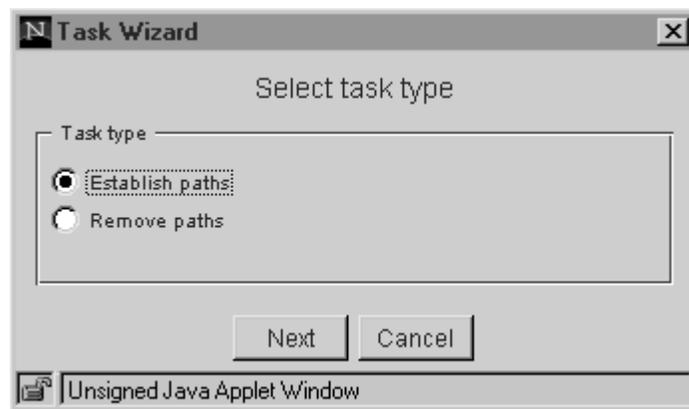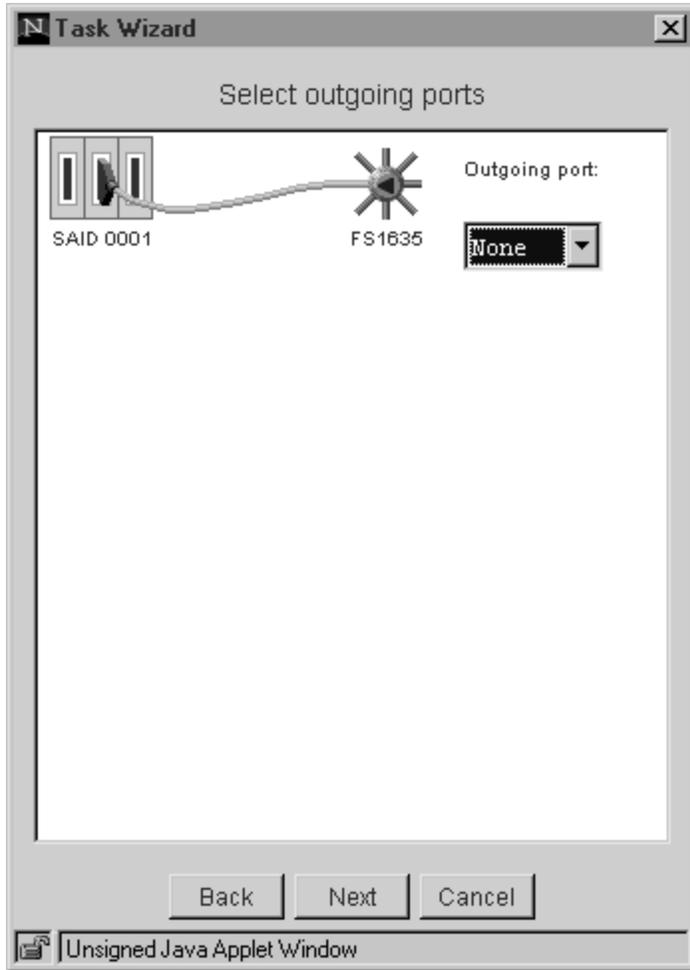

CS08870N

Figure 46. Initial Task Wizard panel

8. Select **Establish Paths** and click **Next** to bring up the Select Outgoing Ports panel (see Figure 47 on page 90).
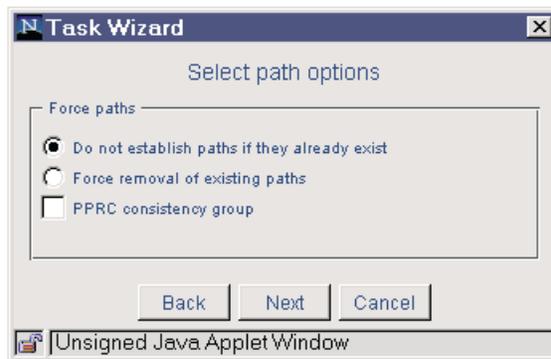
   Note: You will only see the Select outgoing ports menu if a switch is part of the path.

CS08871N

Figure 47. Second Task Wizard panel

9. Select the desired port on the **Outgoing Port** pull-down list.
10. Click **Next**. The following panel (Figure 48) is displayed.

CS000004

Figure 48. Task Wizard: Select Path Options panel

11. Select **PPRC consistency group** and click **Next**. The ESS displays the Define Task Wizard panel. (Figure 49).

CS009022

Figure 49. Task Wizard: Define Task panel

12. Type the Task Name and the Task Description in the appropriate fields (optional).

    Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
    - The name can only contain alphanumeric characters
    - The name cannot contain blanks
    - The name can contain the underscore (_) or hyphen (-) characters
    - The name cannot exceed 16 characters

    Attention: When creating paths for PPRC consistency groups it is important to save this task. After running the **Freeze** command, and the problem that caused the suspend to occur is corrected, you need to run the path task to re-establish the paths. This must be done before running the task to resynchronize the PPRC volumes. See "Freezing a PPRC consistency group" on page 118 for more information on the **Freeze** command. See "Re-synchronizing PPRC copy pairs" on page 111 for more information on resynchronizing PPRC volumes.

13. Click **Save** to save the task and run it later.
14. Click **Run** to run the task immediately.

Attention: After creating and saving the task to establish paths (with **PPRC consistency group** option), you need to create the corresponding task to remove the paths. IBM recommends that you modify the task that you just created so that it removes the path, then name and save the task. This not only saves time but it is also very useful for disaster recovery. See "Removing paths" on page 83 for instructions on defining the task. See "Disaster recovery" on page 129 for more information about disaster recovery.

Viewing information about paths

To view information about a selected path, perform the following steps:

1. Click **Paths** from the ESS Web Copy Services Welcome panel.
2. Click the **Select Source Subsystem** pull-down list to select the source logical subsystem that you want information for.

    Note: You must select the source LSS in order to see any established paths.
3. Click on the desired path in the Path Origin Column. (Figure 39 on page 81).
4. Click **Information Panel** to display information about the selected LSS and path. You only see information for the selected LSS.

```
Information Panel                                      ×

Adapters Information                                   ▲
  SAID: 0000
    Serial number:         00000FCA24
    Manufacturer:          IBM
    Type:                  2105
    Model number:          F20
    Connection type:       Storage Server
    Remote SAID:           0080
    Total PPRC Paths:      0
    PPRC Source Paths:
      0: destination:               00000FCA24
         SSID:                      0x2405
         status of path:           Established
         switch port destination:  0x0
         logical subsystem source: 0x00
         logical subsystem target: 0x04
      1: destination:               00000FCA24   ▼

  ◄                                          ►

                    Close

🖥 Unsigned Java Applet Window
```

Figure 50. Paths information panel

5. The following information is presented for an adapter interface:
    *   SAID designation
    *   Manufacturer
    *   Type
    *   Model number
    *   Connection type
    *   Remote SAID
    *   Total PPRC paths
    *   PPRC source paths, including:
        –   Destination
        –   SSID
        –   Status of the path
        –   Switch port destination
        –   Logical subsystem source
        –   Logical subsystem target

Notes:

  a. Once a path between an SAID on the source LSS and an SAID on the target LSS has been defined, it is not possible to define a path in the other direction with the same SAIDs.

  b. If you have defined paths for additional source and target logical subsystems, the PPRC source paths are included in the Information panel.

- The serial number is displayed for an ESS unit.
- When you are finished with the Information Panel, click **Close** to exit.

Using the Volumes panel

Use the Volumes panel to add volumes to or remove volumes from a pair relationship. You can also use the Volumes panel to display volumes that are accessible from open-systems hosts or LSSs.

The following list shows the tasks that you can perform from the Volumes panel:

- Establish a FlashCopy pair
- Establish a PPRC copy pair
- Establish multiple volume-pair relationships for FlashCopy and PPRC
- Re-synchronize a PPRC copy pair
- Suspend a PPRC copy pair
- Suspend a PPRC copy pair when only one volume is visible to the Web Copy Services client
- Terminate a PPRC copy pair
- Terminate a PPRC copy pair when only one volume is visible to the Web Copy Services client
- Withdraw a FlashCopy pair
- Withdraw a FlashCopy pair when only one volume is visible to the Web Copy Services client
- Find a volume
- Filter volumes
- View information about a volume

Establishing a PPRC copy pair

Attention: There is an important performance consideration to be aware for PPRC target volumes that belong to a Windows NT or Windows 2000 host system. It is recommended that the LUNs for the target volumes not be mapped to the Windows NT or Windows 2000 host, until you need access to the data on the target volume. In other words, perform the LUN mapping after the PPRC copy operation, and immediately before, you need access to the data. Keep in mind, that the host system must be rebooted before you can access the data on the target volume. You greatly reduce the time it takes the host system to reboot, by performing the LUN mapping in this way. Otherwise, the time to reboot could be as much as 10 minutes per PPRC target volume. See "Configuring open-systems storage" on page 32 for information on LUN mapping.

Perform the following steps to establish a PPRC copy pair.

1. Click **Volumes** from the ESS Web Copy Services Welcome panel. The Volumes panel is displayed.
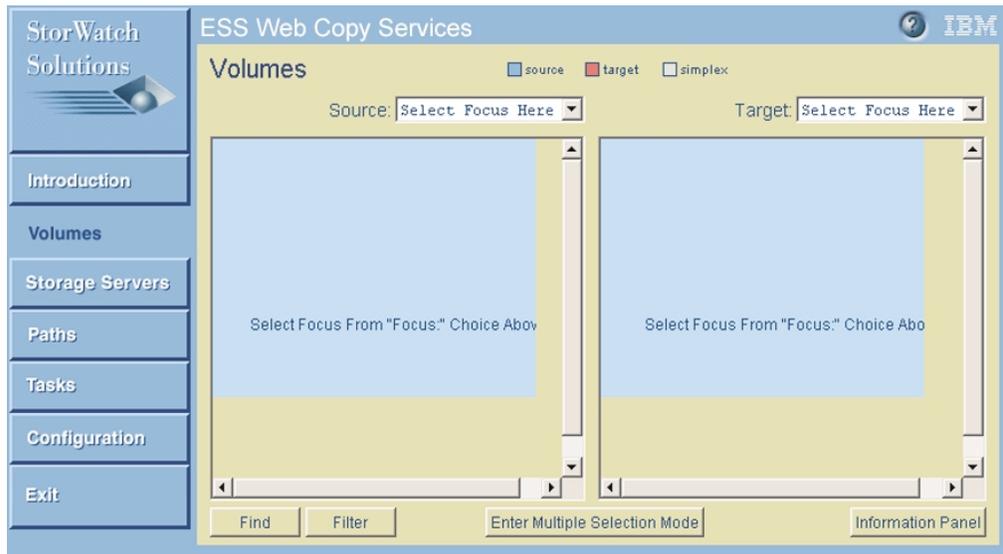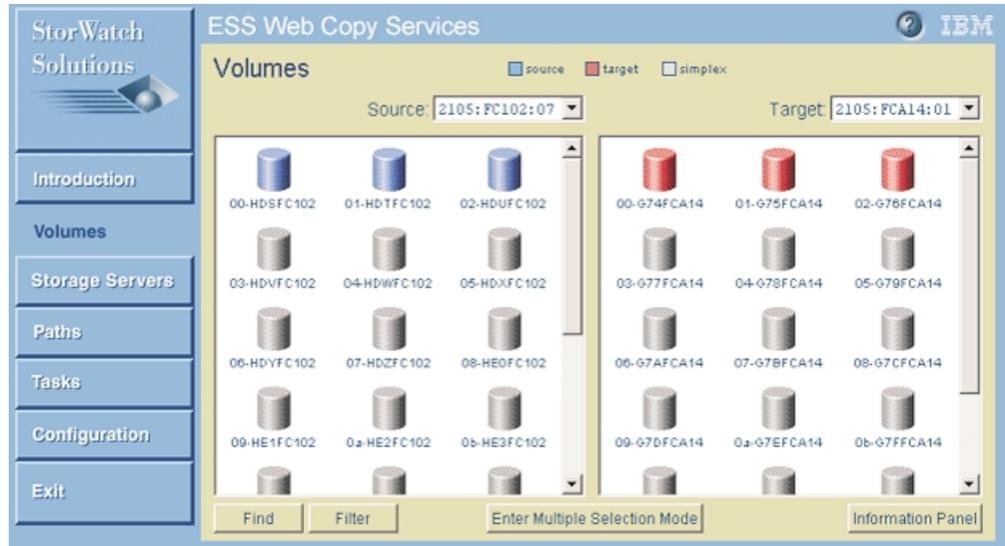

CS000024

Figure 51. Initial Volumes panel

2. Click the **Source** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.
3. Click the source LSS you want to select. The Volumes panel is updated to indicate all the volumes that are accessible from that LSS.
4. Click the **Target** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.

   Note:

   - The command-line interface can also display the volumes associated with a host system. The **rsList2105s** command lists the mapping between a host disk drive name (for example, hdisk) and an ESS LUN. See *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsList2105s** command.
   - The command-line interface also allows you to select host volumes from the **Source** or **Target** drop-down lists. The **rsPrimeServer** command loads the rsList2105s output into the Copy Services server, allowing you to use host names to identify those volumes. See the *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsPrimeServer** command.

5. Click the target LSS you want to select. The Volumes Panel is updated to indicate all the volumes that are accessible from that LSS.

CS000014

Figure 52. Volumes panel with source and target pairs selected

6. You can find a volume or get more information about a volume by clicking
   Find, **Filter**, and **Information Panel** on the bottom of the panel. Refer to
   "Finding volumes" on page 113, "Filtering volumes" on page 114, and "Viewing
   information about a volume" on page 114 for details.

7. Left-click the volume that you want to be the source volume. The volume ID
   turns blue.

8. Right-click the volume that you want to be the target volume. The volume ID
   turns red.

   Note: You can deselect a (PPRC) pair by left-clicking either the source or
   target volume.

   Note: Select a new source ESS and LSS or a new target ESS and LSS, if the
   volume is not in the current view.

   Note: If a volume is reserved by host application software it cannot be used
   as a secondary volume for PPRC.

9. Right-click the target volume again. The ESS displays the Select task type
   menu.
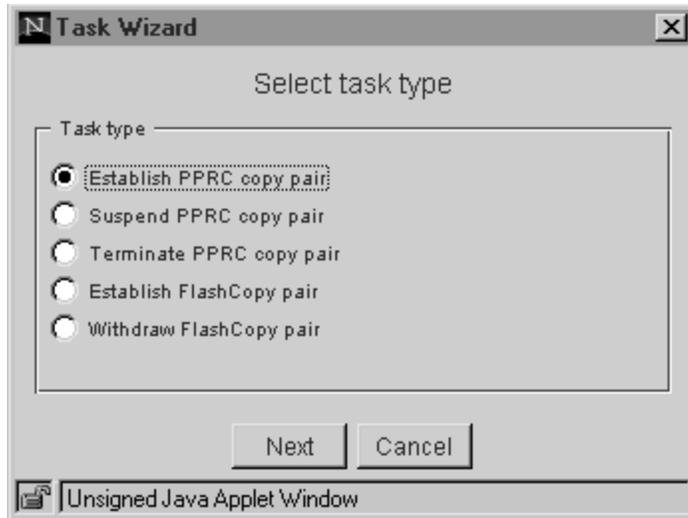
CS08895N

Figure 53. Task Wizard: Select task type

10. Click **Establish PPRC copy pair**.
11. Click **Next**.
12. The ESS displays the Select copy options menu.
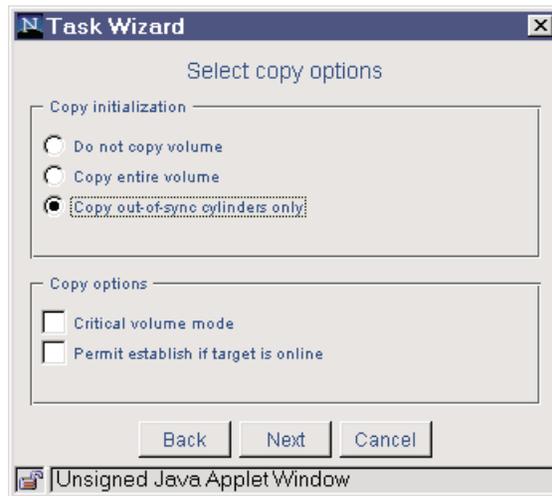
CS000046

Figure 54. Task Wizard: Select copy options

13. Select one of the following options:
    - Copy initialization:
        - Do not copy volume

          Select this option if you do not initially want to copy a source volume to a target volume. This option presumes that the volumes are already synchronized.
        - Copy entire volume

          Select this option to copy the entire source volume to the target volume.
        - Copy out-of-sync cylinders only

Select this option to copy only the data that is not synchronized between the source volume and the target volume. Use this option to re-establish a source/target pair that has been suspended.

- Copy options
  - Critical volume mode

    If the last path fails between the pairs, resulting in the inability to send information to the secondary, the primary becomes write protected; current updates and subsequent attempts to update the primary will fail, with a unit check on S/390, or a check condition on SCSI.

  - Permit establish if target is on line

    Select this option to establish a PPRC pair even if the target volume is online.

    Note: This option only applies for S/390 or zSeries volumes; it does not apply for open-systems volumes

14. Click **Next**. The ESS displays the Define task panel.
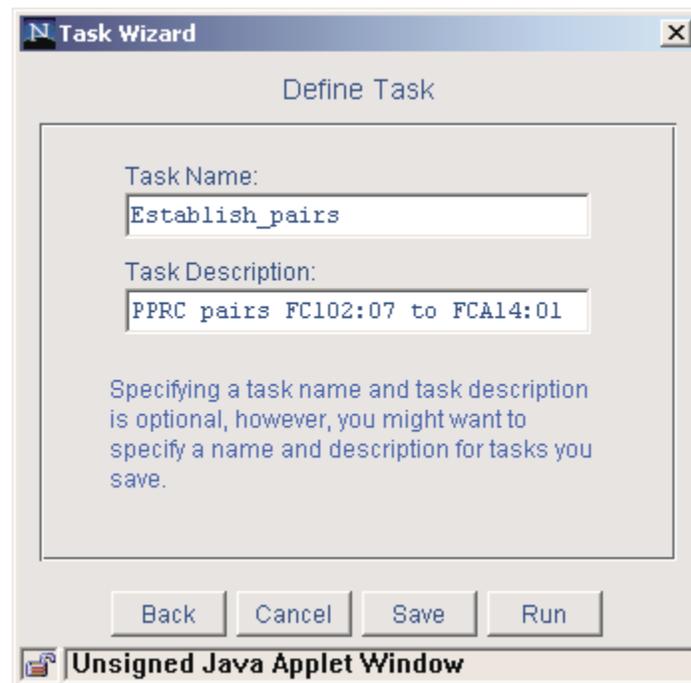
CS000008

Figure 55. Task Wizard: Define task panel

15. Type the Task Name and the Task Description in the appropriate fields (optional).

    Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:

    - The name can only contain alphanumeric characters
    - The name cannot contain blanks
    - The name can contain the underscore (_) or hyphen (-) characters
    - The name cannot exceed 16 characters

16. Click **Save** to save the task and run it later.

17. Click **Run** to run the task immediately.

Attention: After creating and saving the task to establish a PPRC pair, you need to create corresponding tasks to resynchronize the pairs and terminate the pairs. IBM recommends that you modify the task that you just created so that it suspends, resynchronizes or terminates the pair, then name and save the task. This not only saves time but is also very useful for disaster recovery. See "Terminating a PPRC copy pair" for instructions on creating the task. See "Creating tasks for PPRC and Flashcopy" on page 130 for more information about disaster recovery.

Terminating a PPRC copy pair

Perform the following steps to modify a saved task from one that establishes a PPRC copy pair to one that terminates a PPRC pair from the Volumes panel.

Note: You can also modify a task used to suspend a PPRC copy pair to a task that terminates a PPRC copy pair.

1. Click **Tasks** from the ESS Web Copy Services Welcome panel. The Tasks panel is displayed.

2. Click the saved task that you want to modify.

3. Click **Properties** at the bottom of the panel. The Select task type menu is displayed.

CS000047

Figure 56. Task Wizard: Select task type menu

4. Select **Terminate PPRC copy pair** from the Select task type menu.

5. Click **Next**. The ESS displays the Specify storage server to execute task menu.

CS000021

Figure 57. Task Wizard: Specify storage server to execute task menu

6. Select the storage server that you want to execute the task. You have two choices. You can:
   - Schedule the task at the source logical subsystem (See Figure 58)
   - Schedule the task at the target logical subsystem (See Figure 59 on page 100)
7. Click **Next**. The ESS displays the Define task menu.
8. Type the Task Name and the Task Description in the appropriate fields (optional).
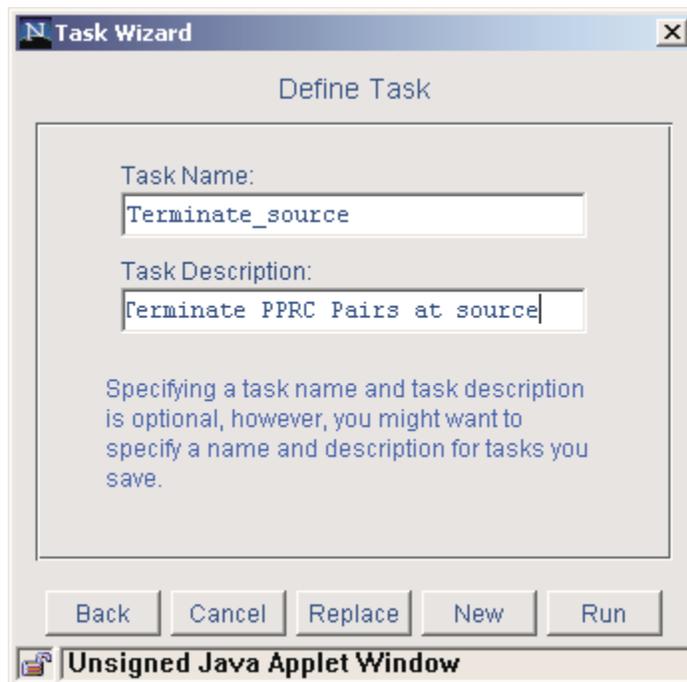
CS000022

Figure 58. Task Wizard: Define task menu
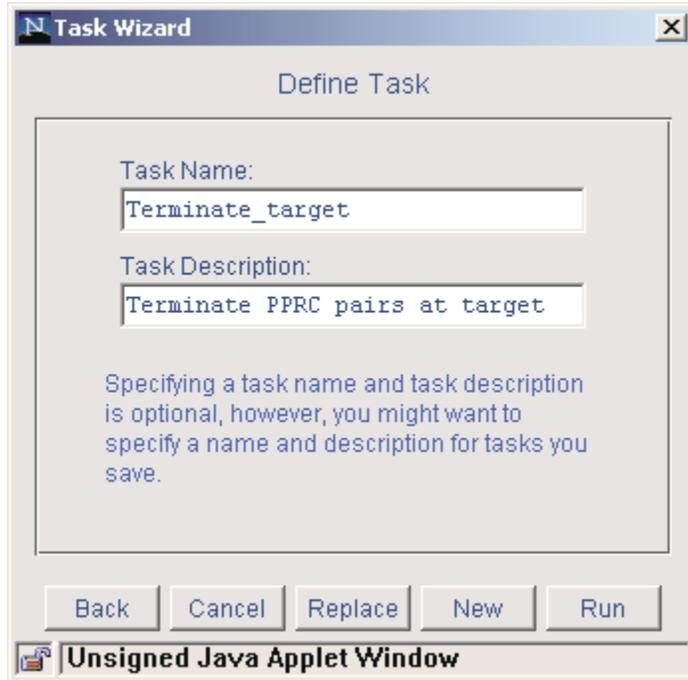
CS000023

Figure 59. Task Wizard: Define task panel

> **Note:** IBM recommends that you name and save your tasks. The tasks can be
> run and rerun at later times. The task name should be chosen using the
> following guidelines:
> - The name can only contain alphanumeric characters
> - The name cannot contain blanks
> - The name can contain the underscore (_) or hyphen (-) characters
> - The name cannot exceed 16 characters

9. Click **Save** to save the task and run it later.
10. Click **Run** to run the task immediately.

Terminating a PPRC copy pair when only one volume is visible to the Web Copy Services client

There might be circumstances that require you to terminate a PPRC copy pair, even
though only one volume of the pair is visible to the Web Copy Services client.

Perform the following steps to terminate a PPRC pair:

1. Left-click on the volume. The volume ID turns blue if it is a source volume or
   red if it is a target volume.
2. Right-click the volume. The volume turns gray.
3. Right-click the volume again. The Select task type menu is displayed. This is
   the first menu of the Task Wizard.
4. Select **Terminate PPRC copy pair**.
5. Click **Next**. The ESS displays the Select storage server to execute task menu.
   (See Figure 57 on page 99.)
6. Select the storage server that you want to execute the task. Click **Next**.

Note: A task that is run using this procedure cannot be saved and run at a later time.

Establishing multiple volume-pair relationships for FlashCopy and PPRC

You can establish multiple volume-pair relationships for both FlashCopy and PPRC. Perform the following steps to establish multiple volume-pair relationships from the Volumes panel:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel. (See Figure 51 on page 94.)
2. Click on the **Source** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.
3. Click the source LSS that you want to select. The Volumes Panel is updated to indicate all the volumes that are accessible from that LSS.
4. Click on the **Target** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.
5. Click the target LSS you want to select. The Volumes panel is updated to indicate all the volumes that are accessible from that LSS.
6. Click **Enter Multiple Selection Mode** at the bottom of the panel. This allows multiple volume pairs to be defined.

   The **Enter Multiple Selection Mode** button changes to **Exit Multiple Selection Mode**. The ESS disables the **Source** field, the **Target** field, and the **Find** button.

   Attention: If you click **Exit Multiple Selection Mode** before selecting the target volumes, you lose all, of your previous selections.

   Note:
   - The command-line interface can also display the volumes associated with a host system. The **rsList2105s** command lists the mapping between a host disk drive name (for example, hdisk) and an ESS LUN. See *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsList2105s** command.
   - The command-line interface also allows you to select host volumes from the **Source** or **Target** drop-down lists. The **rsPrimeServer** command loads the rsList2105s output into the Copy Services server, allowing you to use host names to identify those volumes. See the *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsPrimeServer** command.
7. Left-click the desired source volume. The volume ID turns blue.
8. Right-click the desired target volume. The volume ID turns red. This establishes a target relationship with the source that you just selected. Repeat the selection of source and target volumes until you define all volume pairs.
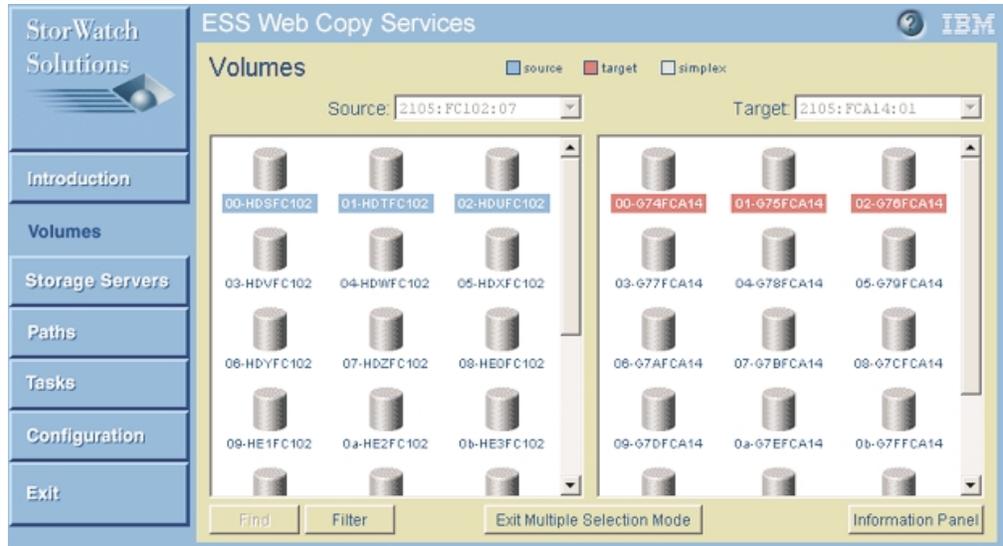
CS000006

Figure 60. Volumes panel: Multiple-selection mode

> **Note:** Keep in mind that if you made a mistake in selecting a volume, you can deselect the volume according to the following guidelines:
>
> - Source volumes are selected with a left-click and target volumes are selected with a right-click.
> - If you make a mistake in selecting either the source or target volume, a left-click on either volume deselects it.

9. Right-click the last target volume you selected. ESS Web Copy Services displays the Select task type menu. This is the first panel of the Task Wizard. Complete the task definition using the Task Wizard. Select the appropriate FlashCopy or PPRC options.

Attention:

- If you click another panel besides the Volumes panel before completing the task definition, you will lose all previous selections.
- If you cancel the Task Wizard, you will lose all previous selections.

Attention: After creating and saving the task to establish PPRC copy pairs, you need to create the corresponding task to terminate the PPRC copy pairs. IBM recommends that you modify the task that you just created so that it terminates the pairs, then name and save the task. This not only saves time but is also very useful for disaster recovery. See "Terminating a PPRC copy pair" on page 98. for instructions on creating the task. See "Creating tasks for PPRC and Flashcopy" on page 130 for more information about disaster recovery.

Establishing a FlashCopy pair

Attention: For FlashCopy and PPRC, the source volume and target volume can be on the same host only under certain conditions. These conditions apply only to open-system host. See "FlashCopy and PPRC conditions for open-systems host" on page 72 for a list of the conditions.

Conditions for doing a FlashCopy operation on an open-system host

When you copy a source volume to a target volume with FlashCopy, and you require concurrent read/write access to both volumes, the source and target volumes should be on different host systems. A copy operation with the source and target volume on the same host system creates a target volume with the same identification as the source volume. The host system sees two identical volumes.

Attention: When the copy operation creates the same identification for the target volume as for the source volume the user cannot distinguish one from the other, so you might not be able to access the original data. The target volume and the source volume can be on the same host system for a FlashCopy operation only under the following conditions:

- For AIX: When the host system is using a logical volume manager (LVM) with the **recreatevg** command support (requires AIX 4.3.3.25 with APAR IY 10456).
- For AIX, Sun, and HP: When the host system is not using an LVM.
- For other host systems: When the host system can distinguish between a source volume and a target volume that has the same identification.

Attention: FlashCopy source and target volumes must be exactly the same size for Windows 2000 and most AIX systems.

Perform the following steps to establish a pair of FlashCopy volumes:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel.
2. Click the **Source** drop-down list. The ESS units and logical subsystems known to the Copy Services server are displayed. See Figure 61.
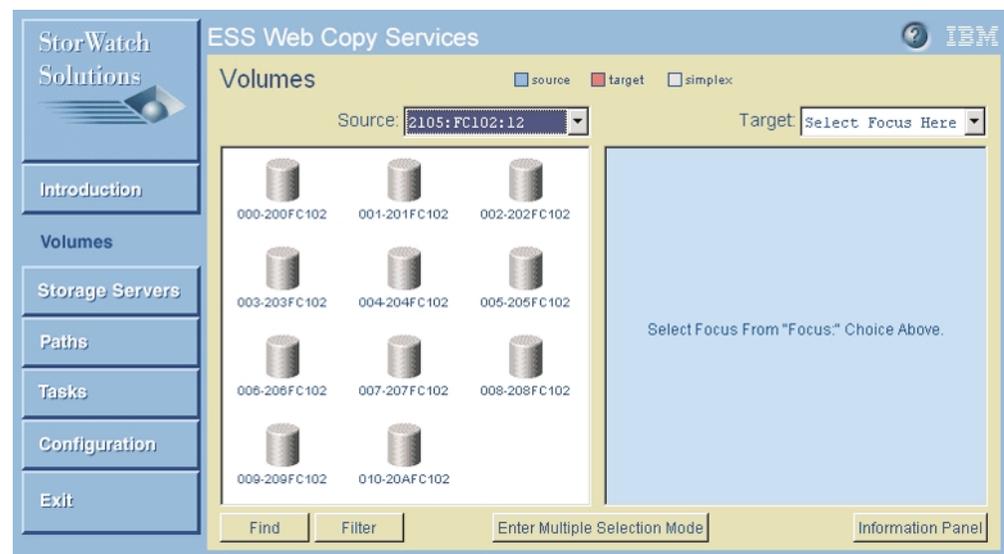
CS000030

Figure 61. Volumes panel: source pull-down list displayed

Note:

- The command-line interface can also display the volumes associated with a host system. The **rsList2105s** command lists the mapping between a host disk drive name (for example, hdisk) and an ESS LUN. See *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsList2105s** command.

- The command-line interface also allows you to select host volumes from the **Source** or **Target** drop-down lists. The **rsPrimeServer** command loads the rsList2105s output into the Copy Services server, allowing you to use host names to identify those volumes. See the *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsPrimeServer** command.

3. Click the ESS and LSS that you want to select. The Volumes Panel is updated to indicate all the volumes that are accessible from that LSS.

4. Left-click the volume that you want to be the source volume. The volume ID turns blue.

5. Right-click the volume that you want to be the target volume. The volume ID turns red.
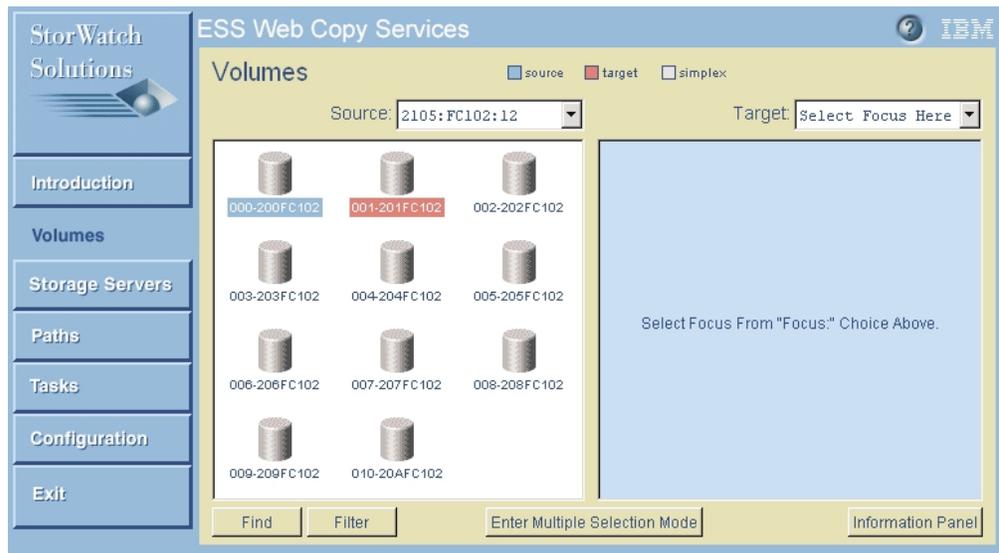
CS000031

Figure 62. Volumes panel: FlashCopy source and target volumes selected

Notes:

a. You must select the target from the Source (left) panel not from the right panel.

b. If a volume is reserved by host application software it cannot be used as a target volume for FlashCopy.

c. Source and target volumes must be in the same logical subsystem.

d. You can deselect a source-target pair by left-clicking on either the source or target volume.

Note: If the icons representing the volumes disappear from the panel, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

6. Right-click the target volume again. The Select task type menu is displayed. This is the first menu of the Task Wizard.
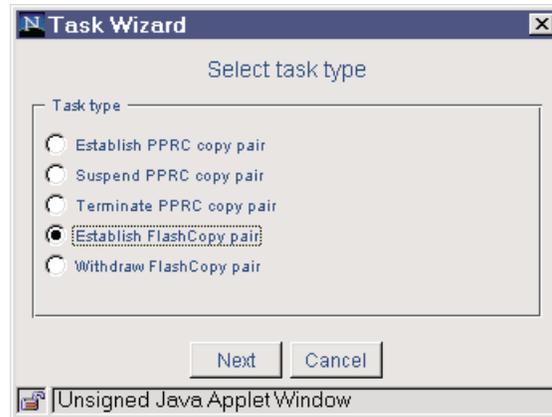
CS000032

Figure 63. Task Wizard: Select task type panel

7. Select **Establish FlashCopy pair** from the Select task type menu. Click **Next**. The Select copy options menu is displayed.
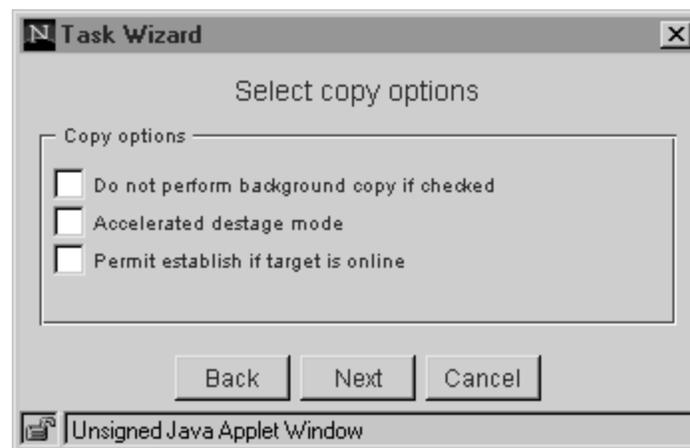
CS08907N

Figure 64. Task Wizard: Select copy options for FlashCopy

8. Select one of the following options:

   • Do not perform background copy if checked

     Select this option if you want data copied only when I/O activity is sensed on either the source or target volume.

   • Accelerated destage mode

     Select this option if the target is going to be accessed only once. Data staged to cache when the target is read will be destaged under the assumption that it will not be accessed again.

     Note: This option is useful when you use Flashcopy to create a point-in-time copy of the source volume that is used for backup purposes only.

   • Permit establish if target is online

     Select this option if you want to establish a FlashCopy relationship even if the target is online.

9. Click **Next** to continue with the Task Wizard.

10. Complete the task definition using the Task Wizard.

    Notes:

    a. Click **Run** to start the FlashCopy operation immediately.

    b. Click the source volume to select it.

    c. Click **Information Panel** to display the progress of the FlashCopy operation. See Figure 65 for an example of the Information panel.
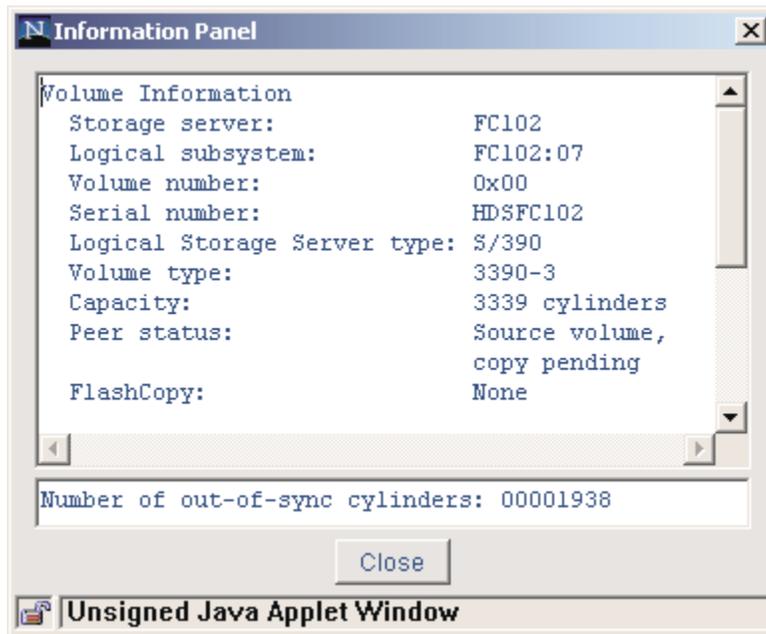
CS000013

Figure 65. Information panel: progress of FlashCopy operation

Note: A double pyramid symbol is displayed on each of the FlashCopy volume icons. The blue pyramid symbol indicates a FlashCopy source volume and a red pyramid symbol indicates a FlashCopy target volume.
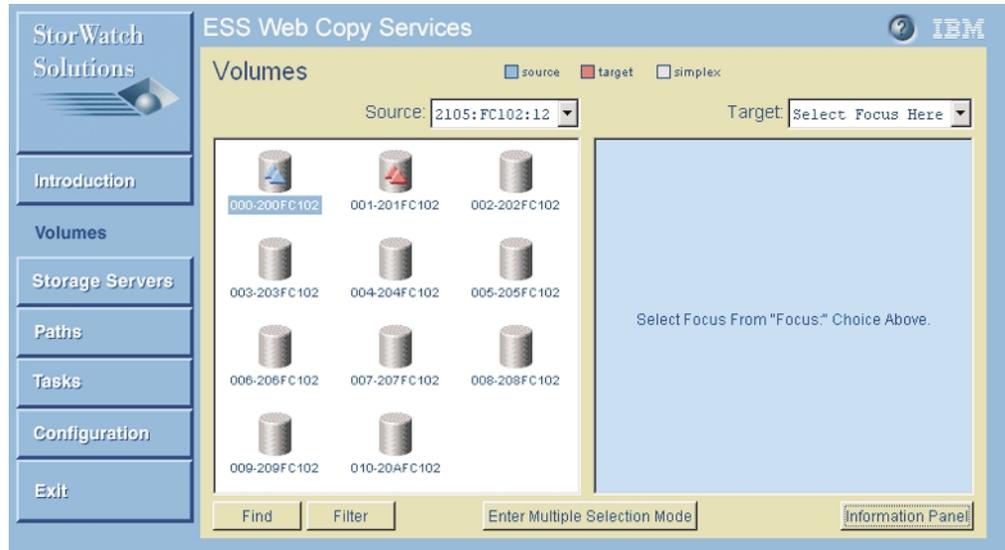
CS000037

Figure 66. Volumes panel: FlashCopy source and target volumes

> **Note:** If the FlashCopy pair was established with a background copy, the information panel will show the progress of the copy, and the triangles disappear when the copy operation completes. If the pair was established without a background copy, the triangles will remain until the withdraw operation is performed, or the entire volume is rewritten.

Attention: After creating and saving the task to establish a FlashCopy pair, you need to create the corresponding task to withdraw the FlashCopy pair. IBM recommends that you modify the task that you just created so that it withdraws the pair, then name and save the task. This not only saves time but is very useful for disaster recovery. (see "Withdrawing a FlashCopy pair" for instructions on creating the task. See "Disaster recovery" on page 129 for more information about disaster recovery.

Withdrawing a FlashCopy pair

Attention: The command to **Withdraw FlashCopy pair** results in a termination of a FlashCopy operation. All the data on the target volume can be corrupted and unusable. Use this command only when the data on the target is no longer required.

Perform the following steps to withdraw a FlashCopy pair from the configuration:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Click the saved task that you want to modify.
3. Click **Properties** at the bottom of the panel. The Select task type menu is displayed. This is the first panel of the Task Wizard.
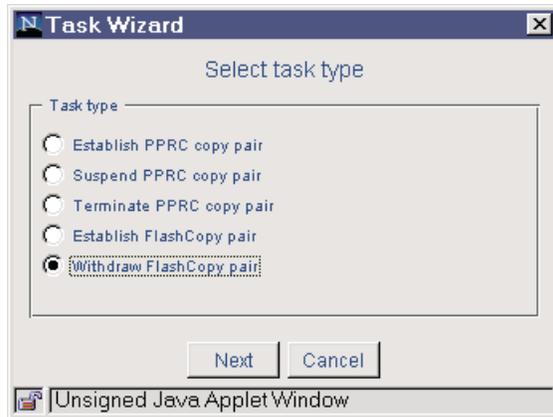
CS000034

Figure 67. Task Wizard: Select task type

4. Select **Withdraw FlashCopy pair**.
5. Complete the task definition using the Task Wizard.

Withdraw a FlashCopy pair when only one volume is visible to the Web Copy Services client

There might be circumstances that require you to withdraw a FlashCopy pair when only one volume is visible to the Web Copy Services client.

Perform the following steps to withdraw a FlashCopy pair:

1. Left-click on the volume. The volume turns blue if it is a source volume or red if it is a target volume.
2. Right-click the volume. The volume turns gray.

   Note: If the icons representing the volumes disappear from the panel, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

3. Right-click the volume again. The Task Wizard panel is displayed.
4. Select **Withdraw FlashCopy pair**.
5. Click **Next**l. The ESS displays the Select storage server to execute task menu. (See Figure 57 on page 99.)
6. Select the storage server that you want to execute the task.
7. Click **Next**.

Note: A task that is run using this procedure cannot be saved and run at a later time.

Suspending a PPRC copy pair

Perform the following steps to suspend a PPRC pair from the Volumes panel:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel.
2. Click the **Source** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.
3. Click the source LSS that you want to select. The Volumes panel is updated to indicate all the volumes that are accessible from that component.

4. Click the **Target** drop-down list. The ESS units and logical subsystems that are known to the Copy Services server are displayed.

5. Click the target LSS you want to select. The Volumes panel is updated to indicate all the volumes that are accessible from that component.

   Note: If the icons representing the volumes disappear from the panel, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions about doing a Refresh.

   Note:
   - The command-line interface can also display the volumes associated with a host system. The **rsList2105s** command lists the mapping between a host disk drive name (for example, hdisk) and an ESS LUN. See *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsList2105s** command.
   - The command-line interface also allows you to select host volumes from the **Source** or **Target** drop-down lists. The **rsPrimeServer** command loads the rsList2105s output into the Copy Services server, allowing you to use host names to identify those volumes. See the *IBM Enterprise Storage Server Host System Attachment Guide* for information about using the **rsPrimeServer** command.

6. You can find a volume or get more information about a volume by clicking **Find**, **Filter**, and **Information Panel** on the bottom of the panel. Refer to "Finding volumes" on page 113, "Filtering volumes" on page 114, and "Viewing information about a volume" on page 114 for details.

7. Left-click the source volume. The volume ID turns blue.

8. Right-click the target volume. The volume ID turns red. (See Figure 60 on page 102.)

   **Note:** You can deselect a source-target pair by left-clicking on either the source or target volume.

9. Right-click the target volume again. The Select task type panel is displayed.

CS000049

Figure 68. Task Wizard: Select task type

10. Select **Suspend PPRC copy pair**.

11. Click **Next**. The ESS displays the Select storage server to execute task menu. (See Figure 57 on page 99.)

12. Select the storage server that you want to execute the task. You have two choices. You can:

    • Schedule the task at the source logical subsystem

    • Schedule the task at the target logical subsystem

13. Click **Next**. The ESS displays the Define task menu.

14. Type the Task Name and the Task Description in the appropriate fields (optional).

    Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:

    • The name can only contain alphanumeric characters

    • The name cannot contain blanks

    • The name can contain the underscore (_) or hyphen (-) characters

    • The name cannot exceed 16 characters

15. Click **Save** to save the task and run it later.

16. Click **Run** to run the task immediately. A display similar to the following appears:
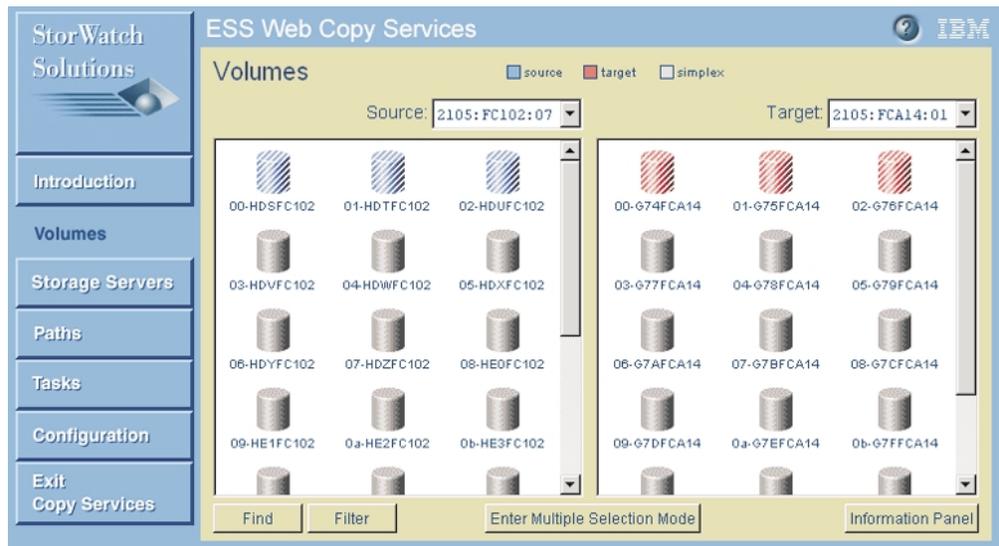
CS000045

Figure 69. Volumes: suspended PPRC pairs

Attention: After creating and saving the task to suspend a PPRC copy pairs, you need to create the corresponding task to re-synchronize the pair. IBM recommends that you modify the task used to establish the pairs, then name and save the new task. This not only saves time but is also very useful for disaster recovery. See "Re-synchronizing PPRC copy pairs" on page 111 for instructions about creating the task. See "Creating tasks for PPRC and Flashcopy" on page 130 for disaster recovery considerations.

Suspending a PPRC copy pair when only one volume is visible to the Web Copy Services client

There might be circumstances that require you to suspend a PPRC copy pair, even though only one volume of the pair is visible to the Web Copy Services client.

Perform the following steps to suspend a PPRC pair:

1. Left-click on the volume. The volume ID turns blue if it is a source volume or red if it is a target volume.
2. Right-click the volume. The volume turns gray.
3. Right-click on the volume again. The Select task type panel is displayed.
4. Select **Suspend PPRC copy pair**. Click **Next**. The ESS displays the Select storage server to execute task menu.
5. Select the storage server that you want to execute the task.
6. Click **Next**.

Note: A task that is run using this procedure cannot be saved and run at a later time.

Re-synchronizing PPRC copy pairs

Perform the following steps to re-synchronize a PPRC pair:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Click the saved task (the task that establishes the PPRC pair) that you want to modify.
3. Click **Properties** at the bottom of the panel. The Select task type menu is displayed. This is the first panel of the Task Wizard.

CS08895N

Figure 70. Task Wizard: Select task type

4. Click **Establish PPRC copy pair**.
5. Click **Next**. The ESS displays the Select copy options menu .
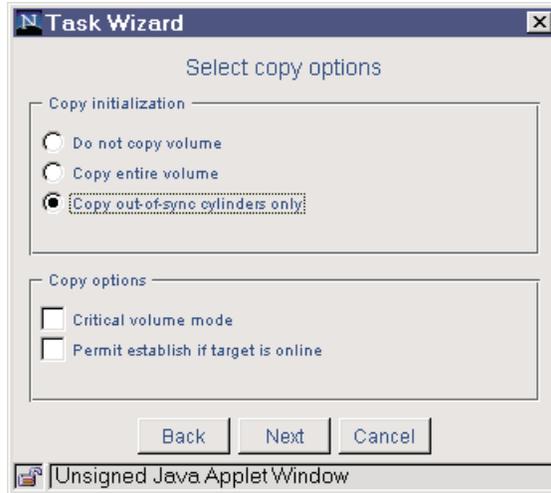
CS000046

Figure 71. Task Wizard: Select task type

6. Select **Copy out-of-sync cylinders only**.

7. Click **Next**. The ESS displays the Define task panel.

8. Type the Task Name and the Task Description in the appropriate fields (optional).

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:

   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters
   - The name cannot exceed 16 characters

9. Click **Save** to save the task and run it later.

10. Click **Run** to run the task immediately. See Figure 72 on page 113 for an example of the Information panel for the resychronized volumes.
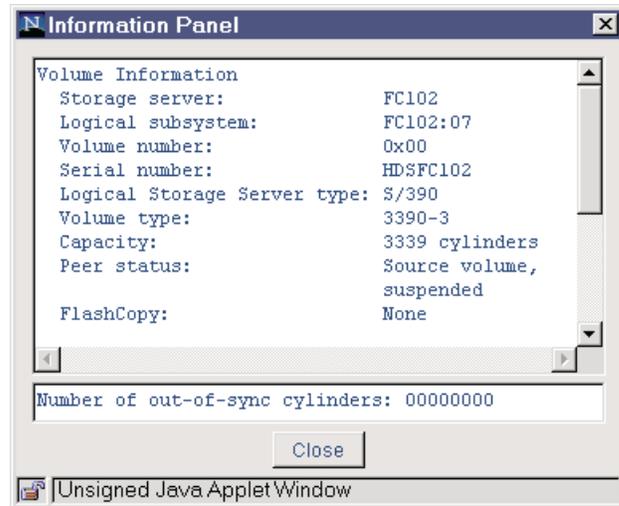
CS000027

Figure 72. Information panel: Re-synchronized volumes

Finding volumes

Perform the following steps to find a volume:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel.
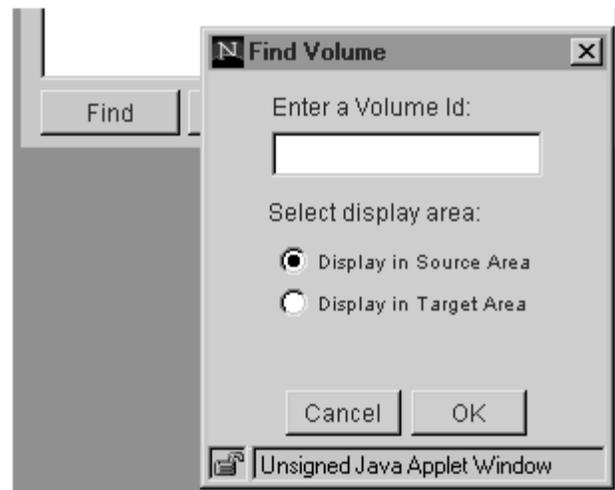
CS08879N

Figure 73. Copy Services Find panel

2. Click **Find** at the lower left of the Volumes panel to display the Find Volume window. See Figure 73.
3. Type a volume ID.

   Note: The Find function is case-sensitive.

   If the desired volume is found, its designator is displayed in the upper-left corner. All other volumes in the same logical subsystem are also displayed.
4. Select whether you want to display the volume in the source or target area.
5. Click **OK**.

Filtering volumes

Perform the following steps to filter the volumes:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel.
2. Click **Filter** at the lower left of the main Volumes panel. The Filter pop-up window is displayed (see Figure 74.)
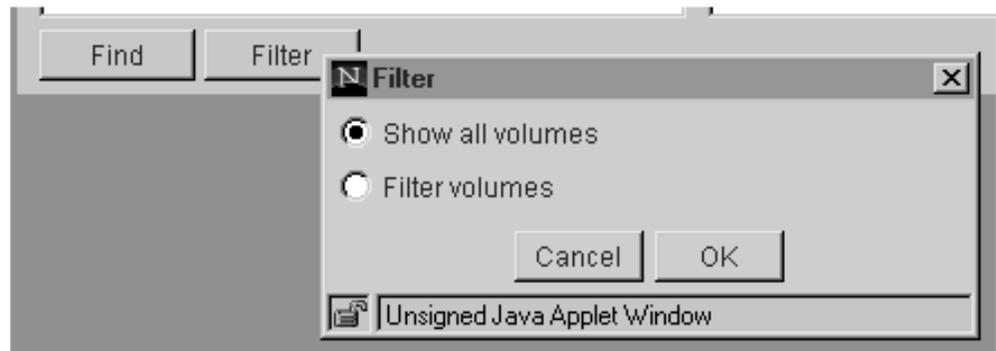
CS08878R

Figure 74. Copy Services Filter panel

3. Click **Filter volumes**.
4. Select the attributes by which you wish to filter the volumes:
   * Type attributes
     – Show System/390 or zSeries storage volumes (count-key-data)
     – Show open-system volumes (fixed-block)
   * Copy Services attributes
     – Show simplex-state volumes
     – Show source-state volumes
     – Show target-state volumes
     – Show suspended volumes
     – Show non-suspended volumes
5. Click **OK** when you have set the filter for the volumes displayed on the Volumes panel.

   Note: The filter stays in effect until you disable it.
6. To disable filtering, click **Filter** again. The **Filter** pop-up window is displayed. Click **Show all volumes**, and then click **OK** (Figure 74). The filter is now disabled.

Viewing information about a volume

Perform the following steps to view information about a volume:

1. Click **Volumes** from the ESS Web Copy Services Welcome panel.
2. Click any volume of interest in the Volumes panel.
3. Click **Information Panel** at the lower right corner of the Volumes panel. The **Information Panel** pop-up window is displayed. (Figure 75 on page 115).

   Note: The Information Panel is displayed until you click **Close** at the bottom of the Information Panel.

```
Information Panel                                              [X]

Volume Information
  Storage server:                    FA222222
  Logical subsystem:                 FA222222:07
  Volume number:                     0x04
  Serial number:                     G0700004
  Logical Storage Server type:       S/390
  Volume type:                       3390-2
  Capacity:                          595.0 cylinders
  Peer status:                       Target volume,
                                     full copy mode
  FlashCopy:                         None
  XRC:                               None
  Concurrent copy:                   Not active

                          Close

  Unsigned Java Applet Window
```
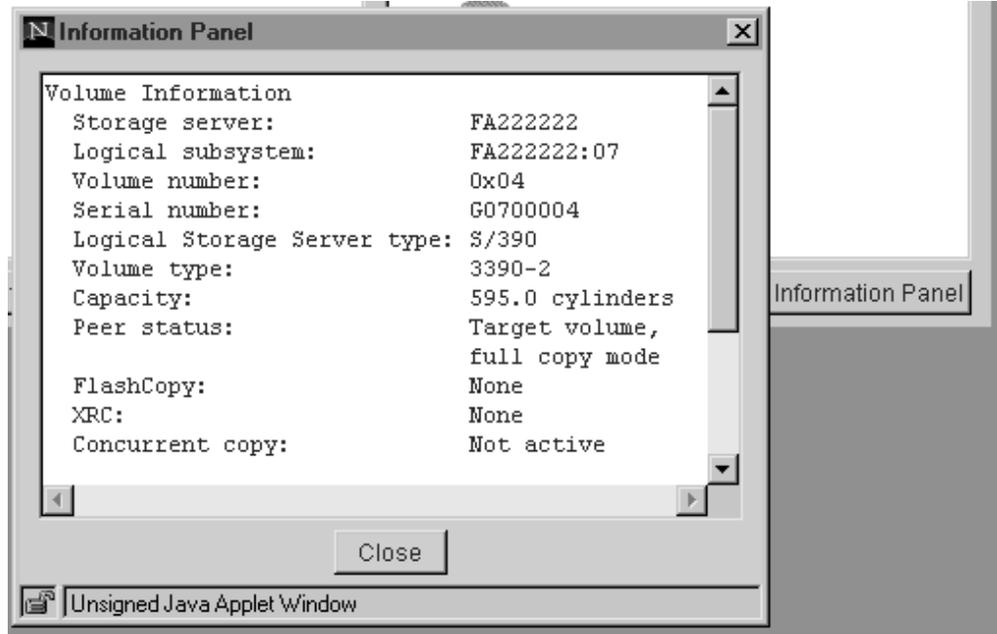
CS08880O

Figure 75. Information panel

The following information is displayed for a volume:

* The storage server and logical subsystem (LSS) designations.
* The volume number
* The volume serial number
* The logical subsystem type
* The volume type (Fixed block, 9337, 3390 or the like)
* The volume capacity
* Peer Status (indicates whether the volume is a source or target volume and the copy mode.
* Any active FlashCopy operations?
* Any active extended remote copy (XRC) operations?
* Whether the Concurrent Copy function is active?

Note: Use the scroll bar on the right side of the panel to see all of the information for a volume.

4. Click **Close** to close the pop-up window.

Using the Storage Servers panel

Use the Storage Servers panels to add, suspend, or remove all volumes of a selected storage server.

The Storage Servers panel can also display the ESS units, the logical subsystems, and the switches that reside in the storage network.

You can also use the Storage Server panel to perform other PPRC-related tasks such as:

* Selecting source and target servers

- Freezing a PPRC consistency group
- Running a consistency-group-created operation
- Filtering a list of storage servers

Note: The Storage Server Panel also allows you to modify the LSS time-out values for XRC, concurrent copy, and PPRC consistency groups.

Selecting source and target logical subsystems for PPRC

Source and target logical subsystems are selected from the same window. There is more than one way to make this selection. A PPRC example follows:

1. Click **Storage Servers** from the ESS Web Copy Services Welcome panel. The Storage Servers panel is displayed.
2. Click the **Select** pull-down list. A list of all the ESSs is displayed.

   Note: The first four digits in the server designator indicate the type of equipment, while the remaining digits are the machine serial number. An ESS example is 2105:14380, where 2105 is the device type and 14380 is the ESS serial number. An ESCON Director example is 9032:00000010016, where 9032 is the device type and 00000010016 is the path indicator for the first path the ESCON Director sees.

3. Select the source ESS. A panel showing all of the logical subsystems is displayed, with the appropriate names and serial numbers indicated below each logical subsystem icon.

   Note: At this point the color of the logical subsystem icons becomes important.
      - Blue logical subsystems are source only.
      - Yellow represents the fact that not all volumes in the LSS are simplex, some volumes are either PPRC pairs or FlashCopy pairs. Yellow logical subsystems cannot be used for multiple-selection operations.
      - Red logical subsystems are target only.
      - Gray simplex logical subsystems are isolated.

        The color changes from gray to blue, red, or yellow only after the task is run, not before.

4. Left-click on the desired source logical subsystem.
5. Click the **Select** pull-down list again. A list of all the ESSs is displayed.
6. Select the target ESS.
7. Right-click the target logical subsystem.

   Note: If the icons representing the logical subsystems disappear from the panel, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

8. Right-click the target logical subsystem again. The Task Wizard is displayed.
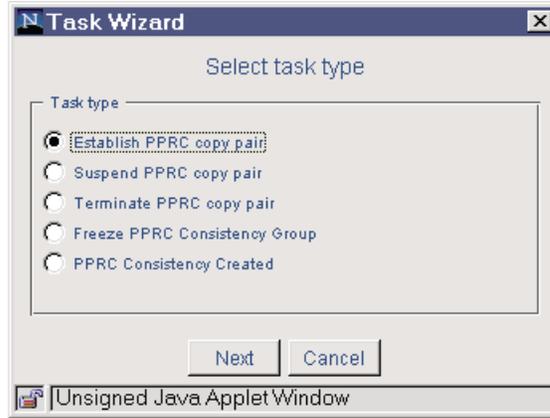
CS009021

Figure 76. Task Wizard: Select task type

9. Use the Task Wizard to guide you through the remaining steps needed to establish PPRC pairs for all volumes of the logical subsystems.

10. From the Select task type menu, click **Establish PPRC copy pair**. See Figure 53 on page 96.

11. Click **Next**. The Select copy options menu is displayed.

12. Select one of the following options:
   - Copy initialization:
     - Do not copy volume

       Select this option if you do not initially want to copy a source volume to a target volume. This option presumes that the volumes are already synchronized.
     - Copy entire volume

       Select this option to copy the entire source volume to the target volume.
     - Copy out-of-sync cylinders only

       Select this option to copy only the data that is not synchronized between the source volume and the target volume. Use this option to re-establish a source/target pair that has been suspended.
   - Copy options
     - Critical volume mode

       If the last path fails between the pairs which results in the inability to send information to the secondary, the update operation results in a unit check and subsequent attempts to update will be write inhibited.
     - Permit establish if target is on line

       Select this option to establish a PPRC pair even if the target volume is online.

13. Click **Next**. The Define task panel is displayed.

14. Type the Task Name and the Task Description in the appropriate fields (optional). See Figure 58 on page 99.

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks

- The name can contain the underscore (_) or hyphen (-) characters
- The name cannot exceed 16 characters

15. Click **Save** to save the task and run it later.
16. Click **Run** to run the task immediately.

    Attention: After creating and saving the task to establish PPRC pairs, you need to create the corresponding task to terminate the pairs. IBM recommends that you modify the task that you just created so that it terminates the pairs, then name and save the task. This not only saves time but is also very useful for disaster recovery. See "Terminating a PPRC copy pair" on page 98 for instructions on creating the task. See "Creating tasks for PPRC and Flashcopy" on page 130 for more information about disaster recovery.

Freezing a PPRC consistency group

Freezing a PPRC consistency group stops all operations from being propagated to the secondary volumes. The freeze operation is best implemented by creating and saving tasks for all of the associated LSS pairs and then grouping the tasks. The group can then be run from the Task panel when you need to perform a freeze operation. See "Using the Tasks panel" on page 122 for information on grouping tasks.

The task is invoked when a freeze trigger event (for example, an e-mail notification, an SNMP alert, or a host detected failure condition) is detected.

Note: A task that freezes a PPRC consistency group can also be invoked through open-system host automation or shell scripts using the command-line interface.

Note: Following the freeze operation, a consistency-group-created operation should be run to stop any long busy states that the volumes are in.

Perform the following steps to create a task that freezes a consistency group:

1. Click **Storage Servers** from the ESS Web Copy Services Welcome panel.
2. Click the **Select** pull-down list.
3. Select the source ESS. A panel showing all of the logical subsystems is displayed, with the appropriate names and serial numbers indicated below each logical subsystem icon.
4. Left-click the source logical subsystem.
5. Click the **Select** pull-down list again. A list of all the ESSs is displayed.
6. Select the target ESS. The target logical subsystem icons are displayed.
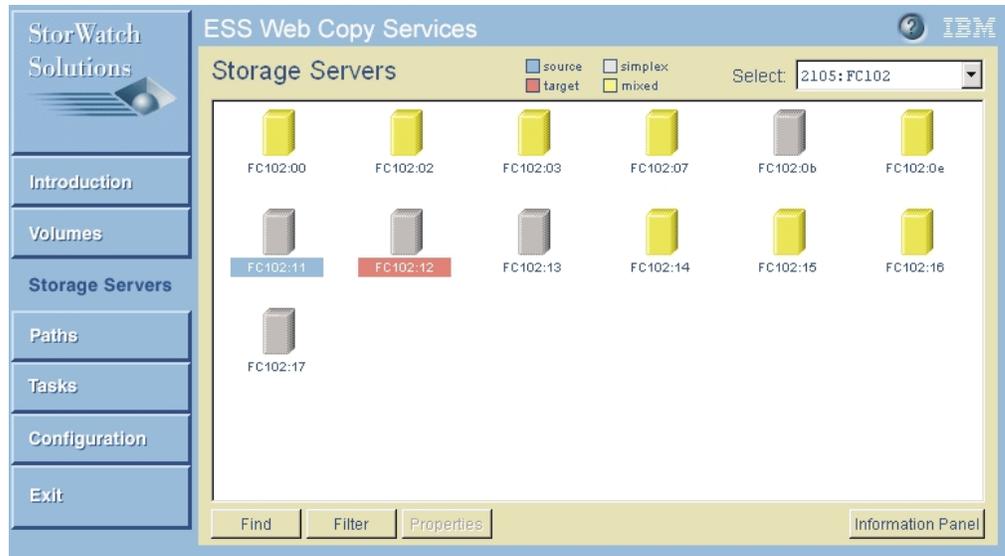
CS000044

Figure 77. Storage Servers panel: Logical subsystems displayed

7. Right-click the target logical subsystem.

   Note: If the icons representing the logical subsystems disappear from the panel, you should perform a Refresh from the Configuration panel. See "Refreshing the path and volume information for an ESS unit" on page 126 for instructions on doing a Refresh.

8. Right-click the target logical subsystem again. The Task Wizard is displayed.

9. Select **Freeze PPRC consistency group**. Click **Next**.

10. Type the Task Name and the Task Description in the appropriate fields (optional).

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   * The name can only contain alphanumeric characters
   * The name cannot contain blanks
   * The name can contain the underscore (_) or hyphen (-) characters
   * The name cannot exceed 16 characters

11. Click **Save** to save the task and run it later.

12. Click **Run** to run the task immediately.

In order to use the volume-pairs for PPRC again, the paths must be restored.

Attention: After creating and saving the task to freeze a PPRC consistency group, you need to create the corresponding task to run a consistency-group-created operation. IBM recommends that you modify the task that you just created so that it runs a consistency-group-created operation, then name and save the task.

Running a consistency-group-created operation

Note:

Consistency groups are supported on open systems for planned outages only.

A consistency-group-created operation causes the control unit to stop protecting the data on all the logical subsystems because a freeze operation has already been executed on all LSSs. A consistency-group-created operation is best implemented by creating and saving tasks for all of the associated LSS pairs and then grouping the tasks. The group can then be run from the Tasks panel when you need to run the consistency-group-created operation.

Note: Run the consistency-group-created operation following a successful freeze operation.

Perform the following steps to create a task that runs the consistency-group-created operation:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Click the saved task that you want to modify.
3. Click **Properties** at the bottom of the panel. The Select task type menu is displayed. This is the first panel of the Task Wizard.
4. Select **PPRC consistency created**. Click **Next**.
5. Type the Task Name and the Task Description in the appropriate fields (optional).

   Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters

6. Click **Save** to save the task and run it later.
7. Click **Run** to run the task immediately.

See *Implementing ESS Copy Services on System 390*, SG24-5680, for more information about PPRC consistency groups.

Filtering a list of storage servers

Perform the following steps to filter a list of storage servers:

1. Click **Storage Servers** from the ESS Web Copy Services Welcome panel.
2. Click **Filter** to display the Filter panel. (See Figure 78 on page 121.)
   All devices of a selected component are displayed.

CS08886M

Figure 78. Storage servers filter

3. Filter this list by clicking on **Filter**.
4. Select the attributes by which you want to filter storage servers. The following attributes are selectable:
   - Filter attributes
     - Show ESCON switches
     - Show physical switches
     - Show logical switches
   - Logical device attributes
     - Type attributes
       - Show System/390 or zSeries devices
       - Show open-systems devices
     - Device attributes
       - Show ESS units
       - Show logical subsystems
       - Show ESCON switches
5. Set the filter to the devices displayed on the Storage Servers Panel, and click **OK**.

   Note: The filter stays active until you disable it.
6. To disable the Filter Storage Servers function, click **Filter** again. The Filter panel is displayed (Figure 78). Click **Show all devices**, and then click **OK**. The filter is now disabled.

Viewing information about a storage server

1. Click **Storage Servers** from the ESS Web Copy Services Welcome panel.
2. Click the **Select** pull-down list. A list of all the ESSs and LSSs is displayed.
3. Select the storage server.
4. Click **Information Panel** in the lower right corner of the Storage Servers panel to display the Information panel (Figure 79 on page 122).

   Depending on the device selected, the following information is displayed:
   - For a ESS unit:
     - Serial number
     - SSID
   - For a logical subsystem:
     - Type: System/390 or open systems
     - Logical subsystem number

• For a switch, the serial number
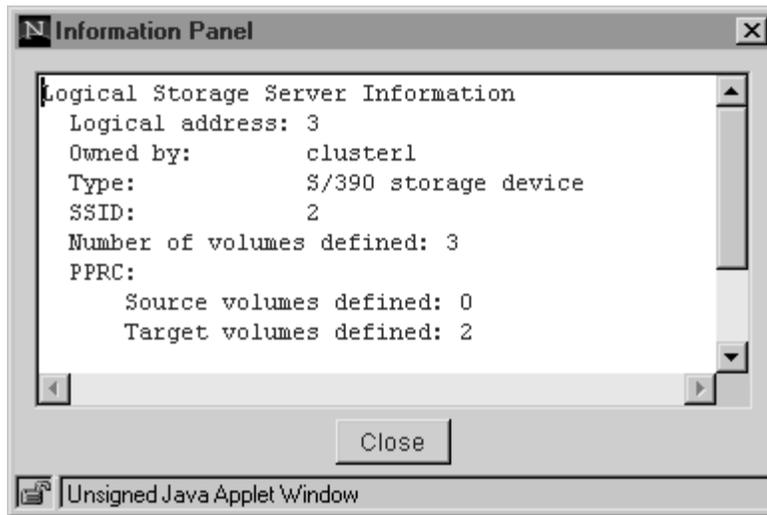
CS08893P

Figure 79. Storage Server Information panel

Using the Tasks panel

The Volumes, Storage Servers, and Paths panels allow you to create tasks using a Task Wizard. The ESS displays the Task Wizard whenever you define a source and target relationship between volumes in the Volumes panel, and between LSSs in the Storage Server or Paths Panels.
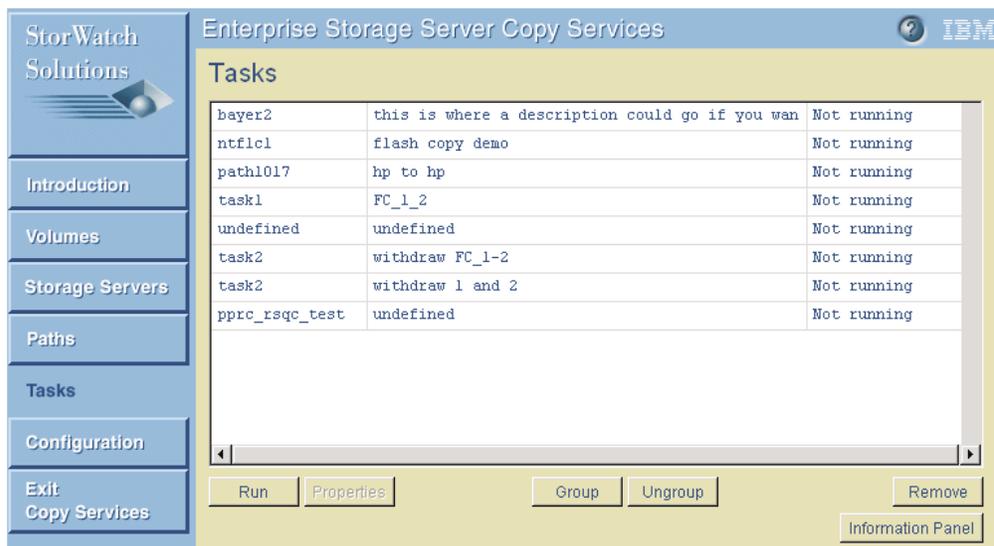
CS08894R

Figure 80. Copy Services Tasks panel

The Tasks panel allows you to run previously saved tasks, remove a saved task, modify a task (properties button), group and ungroup tasks, or view information about a task. When you run a task, the Copy Services server determines if there are existing conflicts. If conflicts exist the task fails.

You can perform the following tasks from the Tasks panel:

- Running a saved task
- Grouping tasks
- Ungrouping tasks
- Removing a saved task
- Viewing information about a saved task
- Modifying a task

Running a task

Perform the following steps to run a previously saved task:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Locate the desired task in the tasks list.
3. Click the desired task.
4. Click **Run** to submit the task. The task status display changes from `Running` to `Successful` after the task completes, or from `Running` to `Failed` if the task did not complete.
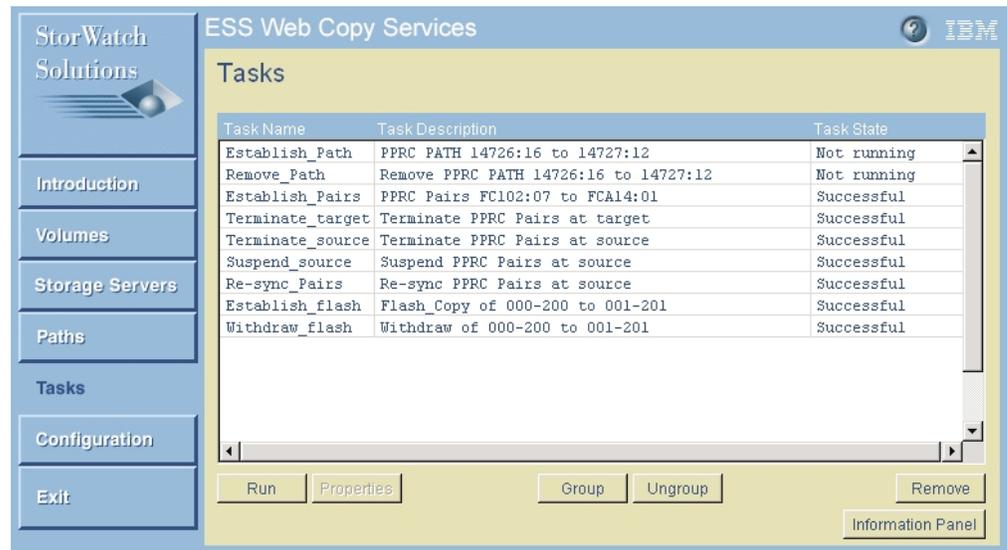
CS000039

Figure 81. Tasks panel

> **Note:** You can view error message in the Configuration Panel by viewing the logs and locating the task name. The last executed task is located at the bottom of the log.

Grouping tasks

Use the Tasks panel to organize a series of related tasks into a group; you should name the group, just as you would any other task. Because the group has a name, you can run the entire series of tasks (group), by selecting the group and running it. When a group task is run from the Tasks panel (or the command-line interface) all tasks with the group are submitted to Copy Services server in parallel.

> **Note:** Do not combine into a group tasks that must be run serially. For example, do not combine into a group a task that establishes paths, with a task that

establishes a volume pair. The task that establishes a volume pair will fail unless the paths have already been established.

Perform the following steps to group previously saved tasks

1. Click **Tasks** from the ESS Web Copy Services Welcome panel. A list of all the saved tasks is displayed.
2. Click the first task of the group you want to create.
3. While pressing the Ctrl key on the keyboard, click the other tasks for the group you want to create.
4. Click **Group** at the bottom of the panel.
5. The **Define Group** Task Wizard menu is displayed.
6. Type a name in the **Task name** field.

   Note: IBM recommends that you name and save your tasks. Then the tasks can be rerun at a later time. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters
   - The name cannot exceed 16 characters
7. Type a task description in the **Task description** field.
8. Click **OK** to create the task group.

Ungrouping tasks

Use the Tasks panel to ungroup (separate) tasks that were previously organized into a group.

Perform the following steps to ungroup a task:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel. A list of all groups and tasks is displayed.
2. Click the group you want to ungroup.
3. Click **Ungroup** at the bottom of the panel.

   Note: You must regroup tasks if you want to run the tasks as a group again.

Removing a saved task

Use the Tasks panel to remove (delete) a previously saved task.

Perform the following steps to remove a task:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel. A list of all the saved tasks is displayed.
2. Click the task you want to remove.
3. Click **Remove**. A confirmation window is displayed asking if you want to remove the task.
4. Click **Yes** to remove the task.

Viewing information about tasks

Use the Tasks panel to view information about a task.

Perform the following steps to view information about a task:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Click on any task.
3. Click **Information Panel**. The Information panel window is displayed.

   The following information is displayed as applicable:
   - Type of task
   - Source ESS: Serial number
   - Source logical subsystem: Logical address
   - Source volume list: Volume serial number
   - Target storage server: Serial number
   - Target logical subsystem: Logical address
   - Target volume list: Volume serial number

   If the task failed, the error message logged by the failure is available through the Information Panel.

Modifying a task

Use the Tasks panel to modify a previously saved task. For example, use the **Properties** button to modify a task that establishes paths, to a task that removes those paths. You can modify a task that establishes volume pairs, to a task that suspends, resynchronizes or terminates those volume pairs.

Perform the following steps to modify a saved task:

1. Click **Tasks** from the ESS Web Copy Services Welcome panel.
2. Click the task that you want to modify.
3. Click **Properties** at the bottom of the screen. The Task Wizard window is displayed.
4. Change the task by clicking the appropriate option.
5. Save the task or rename the task.

Note: IBM recommends that you name and save your tasks. The tasks can be run and rerun at later times. The task name should be chosen using the following guidelines:
   - The name can only contain alphanumeric characters
   - The name cannot contain blanks
   - The name can contain the underscore (_) or hyphen (-) characters
   - The name cannot exceed 16 characters

Note: Grouped tasks cannot be modified. The tasks must be ungrouped and then the tasks can be modified. See "Ungrouping tasks" on page 124.

Using the Configuration panel

Use the Configuration panel to:

- Identify the name of the primary or backup Copy Services server in the **Server** field.

   Note: The backup Copy Services server acts as a standby for the primary Copy Services server. However, the backup Copy Services server must be manually started as the active Copy Services server in the event of a

failure; there is no automatic failover. See the *IBM Enterprise Storage Server Introduction and Planning Guide* and "Restarting Copy Services" on page 66

- Display the time stamp of the last server configuration in the **Last configuration update** field.
- Type an e-mail address in the **Send summary to** field.

CS000029

Figure 82. Copy Services Configuration Panel

You can perform the following additional tasks from the Configuration panel:

- Refresh the path and volume information for a ESS unit
- View the logs:

    copyservices.log
    Contains messages associated with user actions issued through ESS Web Copy Services. Includes messages associated with such actions as saving tasks and executing tasks, including information on the success or failure of the tasks.

    rsCStiming.log
    Contains information on the time to complete data-copy functions (PPRC or FlashCopy) on a specific volume

- Defining the userid and enabling password-protection for an open-systems host with the command-line interface.

Refreshing the path and volume information for an ESS unit

Use the refresh function to get the most up-to-date information about paths and volumes from an ESS unit.

Perform the following steps to do a refresh:

1. Click **Configuration** from the ESS Web Copy Services Welcome panel.
2. Click the **Refresh ESS** drop-down list. The serial numbers of the ESSs in the Copy Services group are displayed.
3. Select the ESS unit.

4. Click **Refresh**. A status window is displayed.

Viewing the Copy Services server logs

The Copy Services server maintains logs of errors and tasks performed by the server or its clients. Do the following to view or clear the logs from the Configuration panel:

1. Click **Configuration** from the ESS Web Copy Services Welcome panel.
2. Click the **Log** pull-down list to the right of the **Log entry** field. Select the log you want to view or clear.
3. Click **View**. The selected log is displayed.

   Attention: The logs are used for problem determination and should only be cleared when no problems exist or data collection on failure has been completed.
4. Click **Clear** at the bottom of the View Log panel to clear the log.

```
N View Log                                                          [X]
Tue Jan 11 09:37:00 EST 2000 Task "flashcopy" (679556761) scheduled successful. ▲
Tue Jan 11 09:37:12 EST 2000 Task "flashcopy" (679556761) completed successful.
Tue Jan 11 09:46:50 EST 2000 IBM Copy Services Server starting...
Tue Jan 11 09:47:39 EST 2000 IBM Copy Services Server starting...
Tue Jan 11 09:49:11 EST 2000 Task "undefined" (528571053) scheduled successful.
Tue Jan 11 09:49:23 EST 2000 Task "undefined" (528571053) completed successful.
Tue Jan 11 10:09:20 EST 2000 Task "pathtask" (528571054) scheduled successfull
Tue Jan 11 10:09:32 EST 2000 Task "pathtask" (528571054) completed successfull
Tue Jan 11 10:23:13 EST 2000 Task "pprctask" (528571055) scheduled successfull
Tue Jan 11 10:23:25 EST 2000 Task "pprctask" (528571055) completed successfull
Tue Jan 11 10:29:34 EST 2000 Task "lsstask" (528571056) scheduled successfully
Tue Jan 11 10:29:46 EST 2000 Task "lsstask" (528571056) completed successfully
Tue Jan 11 10:35:35 EST 2000 Task "savedtask" (528571057) committed
Tue Jan 11 10:36:10 EST 2000 Task "savedtask" (528571057) scheduled successful.
Tue Jan 11 10:36:22 EST 2000 Task "savedtask" (528571057) completed successful.
Tue Jan 11 10:37:09 EST 2000 Task "savedtask" (528571058) scheduled successful.
Tue Jan 11 10:37:21 EST 2000 Task "savedtask" (528571058) completed successful.
Tue Jan 11 10:39:02 EST 2000 Task "savedtask" (528571059) scheduled successful.
Tue Jan 11 10:39:14 EST 2000 Task "savedtask" (528571059) completed successful.
Tue Jan 11 10:39:20 EST 2000 Task "savedtask" (528571057) scheduled successful.
Tue Jan 11 10:39:32 EST 2000 Task "savedtask" (528571057) completed successful.
Tue Jan 11 10:40:03 EST 2000 Task "savedtask" (528571060) scheduled successful.
Tue Jan 11 10:40:15 EST 2000 Task "savedtask" (528571060) completed successful. ▼
                              [ Close ]   [ Clear ]
[ Unsigned Java Applet Window
```

CS08899R

Figure 83. Copy Services Log

Defining the userid and enabling password-protection for an open-systems host with the command-line interface

Use the Configuration panel to enable password-protection for an open-systems host with the command-line interface. If password-protection is enabled, all hosts that issue CLI commands must provide a userid and password as part of the command string, or else the command fails. See "User authentication" on page 12 for information about security.

Attention: When you define the userid and password, they are defined at the primary Copy Services server; they are not automatically sent to the backup Copy Services server, as are Copy Services tasks. Therefore, you must define the userid and password at the backup Copy Services server in a separate step. You must manually restart the backup Copy Services server before you can define the userid and password there. (See "Restarting Copy Services" on page 66.)

Defining the userid and password

Perform the following steps to define the userid and password:

1. Click **Configuration** from the ESS Web Copy Services Welcome panel.
2. Select the **password-protection** option in the **Host Command** field. Click **Authorize**. The Authorized Users panel is displayed.
3. Click **Add**. The Add Users panel is displayed.
4. Type the userid in the **User** field and type the password in the **Password** field. Click **Add**. The userid is displayed in the Authorized Users panel.
5. Click **Done** to confirm the action.

Removing the userid and password

Perform the following steps to define the userid and password:

1. Click **Configuration** from the ESS Web Copy Services Welcome panel.
2. Select the **password-protection** option in the **Host Command** field. Click **Authorize**. The Authorized Users panel is displayed with the names of the authorized userids
3. Select the userid you want to remove. Click **Remove**. A confirmation window is displayed asking for permission to remove the userid.
4. Click **Yes** to remove the userid.

Exiting ESS Web Copy Services

Click **Exit** from any of the main panels (see Figure 34 on page 75 as an example) to return to the main ESS Specialist panel. If you accessed ESS Web Copy Services from Netscape Communicator or Microsoft Internet Explorer (MSIE), you exit the browser.

Problem analysis

Occasionally, you may have problems connecting to or using the Copy Services server. Some of the common problems are described here, as well as steps you can take to analyze the problem.

Problem Number 1: Some ESS clients that are part of the Copy Services server group are not shown in the pull-down list for the Volumes, Storage Servers, or Paths panels.

Possible causes: Start with step 1 in the table for possible causes and recommended actions.

Problem Number 2: You click **Copy Services** from the ESS Specialist Welcome panel and there is no response.

Possible causes: Start with step 1 in the table for possible causes and recommended actions.

Problem Number 3: You receive a `server disconnected, reconnect` message while running Copy Services.

Possible causes: Start with step 2 in the table for possible causes and recommended actions.

Problem Number 4: Tasks for volumes on an ESS cluster keep failing with a return code, RC=8.

Possible causes: Start with step 5 in the table for possible causes and recommended actions.

Table 8. ESS Web Copy Services problems: possible causes and recommended actions

Possible Cause	Recommended Action
1. The Copy Services server or clients are not configured.	If this is the first time Copy Services is being used on the clients (those clients that are not in the pull-down list) have your system support representative (SSR) verify that the IP addresses for the primary and backup Copy Services server are correctly defined. Otherwise, continue with the next entry in the table.
2. The ESS is powered off.	Ensure that the ESSs that are part of the Copy Services group are powered on. If the ESSs are powered on, continue with the next step.
3. There is a problem with the network connections to the ESS.	Verify that the ESS clusters for the Copy Services group are accessible from the network. Test to see if ESS Specialist can be invoked on each cluster of the ESS. (See "Accessing the ESS Specialist user interface" on page 9.) If the ESS Specialist panels cannot be accessed it is likely that there is a network problem. Proceed to isolate the network problem or contact IBM service.
4. The Copy Services clients are in the process of establishing contact with the Copy Services server.	The ESS Copy Services code takes several minutes to initialize. Retry the operation after waiting 10 minutes. If the operation still fails, continue with the next entry in the table.
5. ESS Copy Services server code is not running	Restart ESS Copy Services. See "Restarting Copy Services" on page 66.
6. ESS Web Copy Services failed to restart	Contact IBM service.

Disaster recovery

If a disaster or emergency situation at your primary production site causes you to lose connections to the Copy Services primary server, you can switch control to your recovery site. ESS Web Copy Services copies tasks synchronously between the primary and backup servers, but there are some steps you should consider in planning for disaster recovery, and for implementing procedures following a disaster.

Attention: Tasks are only copied from the primary server to the backup server, not vice versa. You can save tasks when the active server is the backup server but these tasks will be lost when the **Reset to Primary** function is performed. This reset function makes the active server the primary server. (See "Restarting Copy Services" on page 66 for more information)

Planning for a disaster

The primary decision you must make in planning for a disaster is deciding where to place your primary and backup Copy Services servers. There are two options. You can place your

- You can place your primary Copy Services server at your recovery site
- You can place your primary Copy Services server at your production site

There are trade-offs associated with both options. See *IBM Enterprise Storage Server Introduction and Planning Guide* for more information about factors you should consider in making this decision.

Creating tasks for PPRC and Flashcopy

The tasks that you create establish source-target relationships for paths, volumes, ESS units, and LSSs. For each task that you create that establishes a source-target relationship, you should create a corresponding task that terminates the source-target relationship. Why is this a good idea? Because after a disaster you need to terminate the existing relationships in order to get your production systems up and running at your recovery site. For example, say you have established a PPRC copy pair with volume A as your source and volume B as your target. If a disaster occurs at your production site, you must terminate the PPRC copy pair at your recovery site before you can bring up your production systems.

Note: When you create tasks on the primary Copy Services server, they are automatically copied to the backup Copy Services server. Therefore, it is not necessary to recreate tasks that you have already created on your backup Copy Services server. However, any tasks that you create on the backup Copy Services server cannot be saved.

The following tables show what generally needs to be done when creating tasks. The best way to create a corresponding task for disaster recovery is to first create, name, and save the task; then modify, name, and save the associated task.

Table 9. Establish paths tasks

Step 1a	1. Create tasks for establish paths.
	     • with consistency group
	     • without consistency group
	 2. Name and save each task. (See "Establishing paths" on page 78, and "Creating a PPRC consistency group" on page 89.)

Step 1b	Edit each task for establish paths. 1. Create an associated remove paths task. 2. Name and save each task. (See "Removing paths" on page 83.)

Table 10. Establish pairs tasks

Step 2a	1. Create tasks for establish pairs. 2. Name and save each task. (See "Establishing a PPRC copy pair" on page 93.)

Table 10. Establish pairs tasks (continued)

Step 2b	Edit each task for establish pairs that you created in Step 2a to:
	
	• Create an associated suspend pair task. (See
	  "Suspending a PPRC copy pair" on page 108.)
	• Create an associated resynchronize pair task (See
	  "Re-synchronizing PPRC copy pairs" on page 111.)
	• Create an associated terminate pair running on the source server.
	  (See
	  "Terminating a PPRC copy pair" on page 98.)
	• Create an associated terminate pair running on the target server.
	  (See
	  "Terminating a PPRC copy pair" on page 98.)
	• Name, and save each task as you create it.

Table 11. Freeze and consistency-group-created tasks

Step 3a	1. Create tasks for freeze operation. 2. Name and save each task. (See "Freezing a PPRC consistency group" on page 118.)
Step 3b	Edit each Freeze task created in step 3a: 1. To create an associated consistency-group-created task. (See "Running a consistency-group-created operation" on page 119.) 2. Name and save each task as you create it.

Note: The disaster recovery considerations noted for PPRC do not apply to FlashCopy. FlashCopy operates only in the same LSS, hence, the same ESS. Therefore, at the recovery site there are no existing source-volume relationships to terminate. Nevertheless, in your normal production environment it is still a good idea to create a corresponding Withdraw FlashCopy pair task for every Establish FlashCopy pair task that you create. These tasks are shown here for planning purposes only.

Table 12. FlashCopy tasks

Step 4a	1. Create tasks for establish pairs. (See "Running a consistency-group-created operation" on page 119.) 2. Select background copy or no background copy. 3. Name and save each task.
Step 4b	Edit each establish pairs task created in step 3a: 1. To create an associated withdraw task. (See "Withdrawing a FlashCopy pair" on page 107.) 2. Name and save each task as you create it.

Testing your disaster recovery setup

In order to test your disaster recovery setup or even to recover from a disaster you need to be able to answer this question: Do you know which ESS Web Copy Services server is active? The active Copy Services server is the ESS cluster that is currently running the Copy Services server code. The active server is either the primary Copy Services server or the backup Copy Services server. The procedure for determining which server is active is documented in the ESS Specialist Task Help system. See "Restarting Copy Services" on page 66.

Note: You need to have administrator authority to perform these actions.

To test disaster recovery scenarios, do the following:

1. Use the ESS Specialist button to **Disable ESS Web Copy Services** at the primary or production site.

Current Configuration:

IP Address	Description
9.113.24.152	Currently configured Primary Server.
9.113.24.151	Currently configured Backup Server.
.	Currently active Copy Services focal point.

NOTE: to refresh the above display, use your browser's *Reload* or *Refresh* button.

Available Actions:

Action	Description
Reset to Primary	Restart Copy Services with the primary server as focal point.
Reset to Backup	Restart Copy Services with the backup server as focal point.
Disable	Disable Copy Services.
Cancel	Return to main task-help, without performing any action.

CS000048

Figure 84. Restarting ESS Web Copy Services

2. If the primary server is at the recovery site, proceed to step 3. Otherwise establish a connection to the ESS Specialist at the recovery site and use the **Reset to backup** function to enable the backup server as the active server.
3. Invoke ESS Web Copy Services at the recovery site, thereby simulating a disaster. (See "Accessing the ESS Specialist user interface" on page 9 for instructions on accessing the ESS Specialist.)

   Note: You will only see the volumes that are attached to the ESS at the recovery site.
4. The tasks designed for site switch-over should be tested.

   Note:
   - If your primary Copy Services server is at your recovery site, you should test the Terminate pair on secondary volumes task.
   - If your primary Copy Services server is at your production site, you should test the Terminate pair on primary volumes task.

   See "Terminating a PPRC copy pair" on page 98 for the instructions for creating these tasks.

What to do when a disaster occurs

The steps you take following a disaster depend on the steps you took when you set up ESS Web Copy Services. There are two basic scenarios:

1. Primary server at the recovery site
2. Primary server at the production site

When the primary Copy Services server is at recovery site

If your primary Copy Services Server is at the recovery site and you created the proper recovery tasks, follow these steps:

1. Use the button **Reset to primary** from the ESS Specialist. This starts the Copy Services server at the recovery site.

   Note: You need to have administrator authority to perform this action.

2. Establish a browser connection to ESS Web Copy Services.

   Attention: Use the left-column (Source) of the Volumes panel for all selections of LSSs during the disaster recovery procedures.

3. Run the tasks necessary for disaster recovery.

4. Perform the necessary tasks required by your operating systems to bring up the applications.

When the primary Copy Services server is at the production site

If your primary Copy Services Server is not at the recovery site and you created the proper recovery tasks, follow these steps:

1. Establish a connection to the ESS Specialist at the recovery site. You might have to restart ESS Web Copy Services before you proceed further (See "Restarting Copy Services" on page 66.)

   Note: You need to have administrator authority to perform this action.

2. Establish a connection to the ESS Specialist at the recovery site and use the button **Reset to backup** to enable the backup server as the active server.

   Note: You need to have administrator authority to perform this action.

3. Establish a browser connection to ESS Web Copy Services

   Attention: Use the left-column (Source) of the Volumes panel for all selections of LSSs during the disaster recovery procedures.

4. Run the tasks necessary for recovery.

5. Perform the necessary tasks required by your operating system (OS) to bring up the applications.

When you did not create tasks ahead of time for disaster recovery

In this case, no matter where the primary server resides, you will have to perform several steps to manually terminate PPRC pairs.

1. At the recovery site, terminate each of the PPRC pairs manually. See "Terminating a PPRC copy pair when only one volume is visible to the Web Copy Services client" on page 100 for the procedure.

2. Use the procedures that apply to the location of your backup server. See "When the primary Copy Services server is at recovery site" or "When the primary Copy Services server is at the production site".

Appendix A. ESS Copy Services messages

The following messages may be displayed by ESS Copy Services when a task fails.

ANTP0101I   ESTAB. PAIR FAILED- NVS SPACE NOT AVAIL. FOR BITMAP

Explanation: Insufficient nonvolatile storage space is available for the application site storage control to create the changed track bitmap for the volume pair.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Refer to the appropriate reference publication for pinned data procedures. Correct the condition and retry the command.

ANTP0102I   ESTAB. PAIR FAILED- DEVICES NOT IN SUSPEND MODE

Explanation: The devices are not in the suspend mode. The re-sync option is only valid if devices are in suspended mode.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Verify the status of the pair, and submit a task with the COPY or NOCOPY option.

ANTP0103I   ESTAB. PAIR FAILED- DEVICES NOT IN SIMPLEX MODE

Explanation: The specified devices are not in simplex mode.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Go to the Volumes panel to verify the status of the devices (pending, duplex, or suspended). If status is suspended, create an established pair task with the RESYNC option.

ANTP0104I   ESTAB. PAIR FAILED- SECONDARY NOT IN CORRECT STATE

Explanation: The secondary volume is actively being used by a host.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Quiesce activity on the target secondary device (vary it offline to all attached hosts). The target secondary device may not be actively used or be a member of a duplex pair.

ANTP0105I   ESTAB. PAIR FAILED- PINNED DATA ON SUSPENDED VOLUME

Explanation: The storage control detects pinned data for a volume and halts the command. An established pair task was issued against a suspended volume that contains pinned data.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Refer to *IBM Advanced Copy Services* for information on IBM remote copy services, including Concurrent Copy, Peer-to-Peer Remote Copy (PPRC), FlashCopy, and Snapshot.

ANTP0106I   ESTAB. PAIR FAILED- SECONDARY ADDRESS INCORRECT

Explanation: The storage control cannot resolve the secondary (target) volume's channel connection address (CCA) from the operand given in the command. The CCA secondary address provided on the command is not a valid CCA address for this PPRC pair.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Verify the target storage control is operational.

ANTP0107I   SUSPEND OPERATION REJECTED- SUSPEND STATE EXISTED

Explanation: An attempt to suspend a PPRC copy has been made to a pair that is already suspended.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Use the Volumes panel to verify the PPRC volume status or the paths panel to verify path status.

ANTP0108I   ATTEMPTED A DUPLEX OPERATION ON A SIMPLEX VOLUME

Explanation: A PPRC operation has been directed to a volume that is not a member of a PPRC pair.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Use the Volumes panel to verify the PPRC volume status or the paths panel to verify path status.

ANTP0109I   SUSPEND PRIMARY FAILED- DUPLEX OR PPRC PENDING

Explanation: A suspend operation is attempted to a volume that has a pending duplex or PPRC operation.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Use the Volumes panel to verify the PPRC volume status or the Paths panel to verify path status.

ANTP0110I   ESTAB. DUPLEX PAIR FAILED- CE MODE OR UNDETERMINED

Explanation: While attempting to establish a PPRC pair, the storage control is in CE mode or the FC state (Sense Format F, Message C).

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Take the storage control out of CE mode or correct the FC condition, and then reissue the command.

ANTP0111I   TERMINATE PAIR FAILED- DASD FAST WRITE PENDING

Explanation: The storage control is unable to end a pair while DASD fast write (DFW) is pending.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Resubmit the failing task when the DFW pending condition clears.

ANTP0112I   ESTAB. PAIR FAILED- SUBSYSTEM INSTALLING MICROCODE

Explanation: Because a microcode install operation is in progress, the storage control is unable to initiate the operation.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Permit the microcode install operation to complete, and then resubmit the failing task.

ANTP0113I   ESTAB. PATHS FAILED- WOULD EXCEED UNITS/PATHS LIMITS

Explanation: The submitted task has failed because the maximum number of storage control connections or the number of paths to a specific storage control has been reached.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Use the Paths panel to determine the established storage controls and paths for the secondary volume.

ANTP0114I   COPY OPERATION UNABLE TO COMPLETE- ABNORMAL CONDITION

Explanation: An abnormal condition in either storage subsystem prohibits the completion of the submitted establish path or establish pair task.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Verify the path status by using the Paths panel. Also look for any SIM messages that indicate a problem with the storage control or device. Correct the problem and resubmit the failing task.

ANTP0115I   NO MATCH IN CU FOR SSID OR SERIAL# OF PRIM. OR SCNDRY

Explanation: The storage control cannot resolve the operands in the command input to match a subsystem ID or serial number.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: The subsystem ID or serial number may have recently been modified by the ESS specialist. Resubmit the failing command later.

ANTP0116I   CONDITIONS AT SECONDARY CU PROHIBIT PROPER OPERATION

Explanation: A condition that prohibits initiation of the operation at the secondary volume's storage control has been detected. One of the following conditions exists on the storage control:
* Cache is not available for the subsystem
* Cache is not active for the device
* Nonvolatile storage space not available for the subsystem
* DASD fast write is not active for the device
* Primary and secondary device geometry are incompatible

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Resubmit the failling task after conditions have been corrected.

ANTP0117I FAILED TO ESTAB. ONE OR MORE PATHS TO SECONDARY

Explanation: The storage control cannot establish all the paths specified. However, one or more paths have been established.

Module: Peer-to-peer remote copy (PPRC).

System Action: The command is partially successful.

System Programmer Response: Uses the Paths panel to determine the pathing status. Use the information there to determine the action required for status other than "established".

ANTP0118I ESTABLISH PAIR FAILED- A VOLUME HAS PINNED DATA

Explanation: Either the primary or secondary volume has pinned data, preventing establishment of the pair.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Refer to *IBM Advanced Copy Services* for information on IBM Remote Copy Services, including Concurrent Copy, Peer-to-Peer Remote Copy (PPRC), FlashCopy, and Snapshot.

ANTP0119I WRITE REJECTED- VOLUME IS IN SUSPENDED STATE

Explanation: The PPRC pair has been suspended. Since the volume is established with the CRIT(YES) option, no writes are permitted to the suspended volume.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Determine the reason why the volume is suspended. Use the **Information panel** option from the Volumes panel. Correct the condition and reestablish or delete the PPRC pair.

ANTP0120I COMMAND CONFLICTS WITH ESTABLISHED PPRC DEVICE STATE

Explanation: The state (simplex, duplex, pending, or suspend) of the pair is in conflict with the attempted PPRC action.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: To determine the specific PPRC state, issue the CQUERY command to the primary or secondary device.

ANTP0121I DELETE PATHS FAILED- PPRC VOLUMES ARE STILL ACTIVE

Explanation: A remove paths task was submitted while PPRC volumes are still active.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Verify status (using the Volumes panel), and ensure that you are specifying the correct PPRC device. Then submit a terminate task to end the PPRC pair, and retry the command.

ANTP0203I UNIT DOES NOT SUPPORT PPRC OPERATIONS

Explanation: A PPRC task has been submitted to a storage control that does not support the PPRC feature.

Module: Peer-to-peer remote copy (PPRC).

System Action: None.

System Programmer Response: Submit the task to a storage control with the PPRC Licensed Internal Code installed.

CSWB0101I INVALID LOGICAL SUBSYSTEM

Explanation: The logical subsystem involved in the operation is owned by another cluster. This problem can occur during a failover of one cluster to another and is temporary.

Module:

System Action: The task fails.

System Programmer Response: Wait several minutes and rerun the task.

CSWB0102I VOLUME NOT CONFIGURED

Explanation: A volume or volumes specified in a task are unassigned to any SCSI port or interface. You cannot execute a Peer-to-Peer Establish task on a volume that is not known to at least one host.

Module: The task fails.

System Action: None.

System Programmer Response: Specify other volumes.

CSWB0103I NO RESOURCES AVAILABLE

Explanation: No resources are available to create FlashCopy relationships or the maximum number of FlashCopy relationships has exceeded the maximum.

Module:

System Action: The task fails.

System Programmer Response: None.

CSWB0104I NO BATTERY

Explanation: Battery feature not available or not installed. FlashCopy requires the battery for proper operation.

Module:

System Action: The task fails.

System Programmer Response: None.

CSWB0105I INVALID VOLUME

Explanation: The target FlashCopy volume is a Peer-to-Peer Remote Copy source or target or is an XRC primary volume.

Module:

System Action: The task fails.

System Programmer Response: Select another pair of volumes to FlashCopy.

CSWB0106II MISSING FEATURE

Explanation: The Peer-to-Peer Remote Copy or FlashCopy features are not installed or enabled for the subsystem.

Module:

System Action: The task fails.

System Programmer Response: Install the Peer-to-Peer Remote Copy or FlashCopy features.

CSWB01071I
                     INVALID FLASHCOPY

Explanation: The specified FlashCopy source and target volumes are not in the same logical subsystem, or the volumes specified in the FlashCopy task are not of the same format or size.

Module:

System Action: The task fails.

System Programmer Response: Select source and target volumes within the same logical subsystem. Be sure that the volumes have the same format and size.

Appendix B. Using Extended Remote Copy (XRC) for planned outages

Perform the following steps to change the XRC session timeout value:

* From the ESS Copy Services panel, click the **Storage Servers** button. This displays the Storage Servers panel.
* Select the ESS storage server from the drop-down menu in the **Select** field. The storage server displays all the logical subsystems contained within that physical storage server.
* Select the storage server you want to work with.
* Click **Properties** on the bottom of the screen. The ESS displays the **Logical subsystem** panel.
* Enter a new value in the **XRC session timeout** field.
* Click **OK**.

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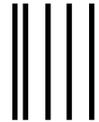
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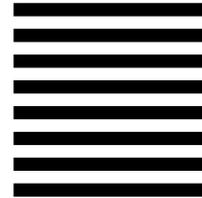Fold and Tape   **Please do not staple**   Fold and Tape

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