IBM TotalStorage Enterprise Storage Server

# Command-Line Interfaces User's Guide

SC26-7494-04

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**Note**

Before using this information and the product it supports, read the information in “Notices” on page 129.

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# About this guide

This guide introduces the IBM® TotalStorage® Enterprise Storage Server® (ESS) command-line interfaces (CLIs). Specifically, it describes the ESS CLI, hereafter referred to as the Storage Management CLI and the Copy Services CLI. This guide begins with installation and removal instructions for the command line interface. It then covers the Storage Management and Copy Services commands and messages.

## Who should use this guide

This guide is intended for system administrators or others who install and use the Storage Management CLI and the Copy Services CLI.

## Conventions used in this guide

This section describes the notational conventions that are used in this guide.

## Syntax diagrams

A syntax diagram uses symbols to represent the elements of a command and to specify the rules for using these elements. This section shows you how to read the syntax diagrams that represent the Storage Management CLI and the Copy Services CLI commands. In doing so, it defines the symbols that represent the CLI command elements.

**Main path line**

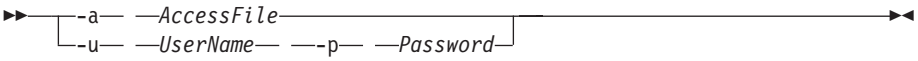


Begins on the left with double arrowheads (>>) and ends on the right with two arrowheads facing each other (><). If a diagram is longer than one line, each line to be continued ends with a single arrowhead (>) and the next line begins with a single arrowhead. Read the diagrams from left-to-right, top-to-bottom, following the main path line.

**Keyword**


Represents the name of a command, flag, parameter, or argument. A keyword is not in italics. Spell a keyword exactly as it is shown in the syntax diagram.

**Required keywords**




Indicate the parameters or arguments you must specify for the command. Required keywords appear on the main path line. Mutually exclusive required keywords are stacked vertically.

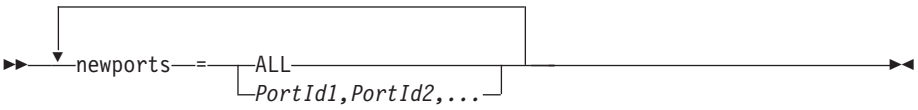
**Optional keywords**


Indicate the parameters or arguments you can choose to specify for the command. Optional keywords appear below the main path line. Mutually exclusive optional keywords are stacked vertically.

**Default value**


Appears above the main path line.

**Repeatable keyword or value**

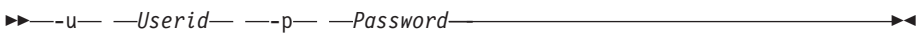



Represents a parameter or argument that you can specify more than once. A repeatable keyword or value is represented by an arrow returning to the left above the keyword or value.

**Variable**


Represents the value you need to supply for a parameter or argument, such as a file name, user name, or password. Variables are in italics.

**Space separator**

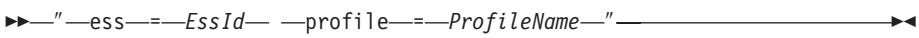



Adds a blank space on the main path line to separate keywords, parameters, arguments, or variables from each other.

**Quotation mark delimiters**


Indicates the start and end of a parameter or argument that contains multiple values. Enclose one or more name-value pairs in a set of double quotation marks for a particular parameter or argument. If the value of a parameter or name-value pair contains a blank or white space, enclose the entire value in a set of single quotation marks.

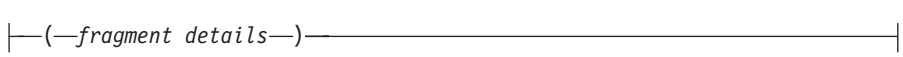
**Equal-sign operator**




Separates a name from its value in a name-value pair.

**Syntax fragment**


**Fragment name:**




Breaks up syntax diagrams that are too long, too complex, or repetitious. The fragment name is inserted in the main diagram, and the actual fragment is shown below the main diagram.

## Special characters

The following special characters are used in the CLI command examples:

**– (minus) or / (slash) sign**
Flags are prefixed with a – (minus) or / (slash) sign. Flags define the action of a command or modify the operation of a command. You can use multiple flags, followed by parameters, when you issue a command.

**[] square brackets**
Optional values are enclosed in square brackets.

**{ } braces** Required or expected values are enclosed in braces.

**| vertical bar** A vertical bar signifies that you choose only one value.

For example, `[ a | b ]` indicates that you can choose a, b, or nothing. Similarly, `{ a | b }` indicates that you must choose either a or b.

**... ellipsis** An ellipsis signifies the values that can be repeated on the command line.

## Related information

The tables in this section list and describe the following publications:

- The publications that make up the IBM® TotalStorage™ Enterprise Storage Server™ (ESS) library
- Other IBM publications that relate to the ESS
- Non-IBM publications that relate to the ESS

See “Ordering IBM publications” on page xix for information about how to order publications in the IBM TotalStorage ESS publication library. See “How to send your comments” on page xxi for information about how to send comments about the publications.

## ESS library

The following customer publications make up the ESS library. Unless otherwise noted, these publications are available in Adobe portable document format (PDF) on a compact disc (CD) that comes with the ESS. If you need additional copies of this CD, the order number is SK2T-8803. These publications are also available as PDF files by clicking on the **Documentation link** on the following ESS Web site:

http://www-1.ibm.com/servers/storage/support/disk/2105.html

See “IBM publications center” on page xx for information about ordering these and other IBM publications.

| Title | Description | Order Number |
|---|---|---|
| *IBM TotalStorage Enterprise Storage Server: Command-Line Interfaces User's Guide* | This guide describes the commands that you can use from the ESS Copy Services command-line interface (CLI) for managing your ESS configuration and Copy Services relationships. The CLI application provides a set of commands that you can use to write customized scripts for a host system. The scripts initiate predefined tasks in an ESS Copy Services server application. You can use the CLI commands to indirectly control peer-to-peer remote copy and FlashCopy® configuration tasks within an ESS Copy Services server group. | SC26-7494 (See Note.) |
| *IBM TotalStorage Enterprise Storage Server: Configuration Planner for Open-systems Hosts* | This guide provides guidelines and work sheets for planning the logical configuration of an ESS that attaches to open-systems hosts. | SC26-7477 (See Note.) |
| *IBM TotalStorage Enterprise Storage Server: Configuration Planner for S/390® and IBM @server zSeries® Hosts* | This guide provides guidelines and work sheets for planning the logical configuration of an ESS that attaches to either the IBM S/390® and IBM @server zSeries host system. | SC26-7476 (See Note.) |
| *IBM TotalStorage Enterprise Storage Server: Host Systems Attachment Guide* | This guide provides guidelines for attaching the ESS to your host system and for migrating to fibre-channel attachment from either a small computer system interface or from the IBM SAN Data Gateway. | SC26-7446 (See Note.) |
| *IBM TotalStorage Enterprise Storage Server: DFSMS Software Support Reference* | This publication provides an overview of the ESS and highlights its unique capabilities. It also describes Data Facility Storage Management Subsystems (DFSMS) software support for the ESS, including support for large volumes. | SC26-7440 (See Note.) |

| Title | Description | Order Number |
|---|---|---|
| *IBM TotalStorage Enterprise Storage Server: Introduction and Planning Guide* | This guide introduces the ESS product and lists the features you can order. It also provides guidelines for planning the installation and configuration of the ESS. | GC26-7444 |
| *IBM TotalStorage Enterprise Storage Server: Quick Configuration Guide* | This booklet provides flow charts for using the TotalStorage Enterprise Storage Server Specialist (ESS Specialist). The flow charts provide a high-level view of the tasks that the IBM service support representative performs during initial logical configuration. You can also use the flow charts for tasks that you might perform when you are modifying the logical configuration. | SC26-7354 |
| *IBM TotalStorage Enterprise Storage Server: S/390 Command Reference* | This publication describes the functions of the ESS and provides reference information, such as channel commands, sense bytes, and error recovery procedures for IBM S/390 and zSeries hosts. | SC26-7298 |
| *IBM TotalStorage Safety Notices* | This publication provides translations of the danger notices and caution notices that IBM uses in ESS publications. | GC26-7229 |
| *IBM TotalStorage Enterprise Storage Server: SCSI Command Reference* | This publication describes the functions of the ESS. It provides reference information, such as channel commands, sense bytes, and error recovery procedures for UNIX®, IBM Application System/400® (AS/400®), and @server iSeries™ 400 hosts. | SC26-7297 |
| *Subsystem Device Driver User's Guide for the IBM TotalStorage Enterprise Storage Server and the IBM TotalStorage SAN Volume Controller* | This publication describes how to use the IBM Subsystem Device Driver (SDD) on open-systems hosts to enhance performance and availability on the ESS. SDD creates redundant paths for shared logical unit numbers. SDD permits applications to run without interruption when path errors occur. It balances the workload across paths, and it transparently integrates with applications. | SC26-7540 |
| *IBM TotalStorage Enterprise Storage Server: User's Guide* | This guide provides instructions for setting up and operating the ESS and for analyzing problems. | SC26-7445 (See Note.) |
| *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* | This guide provides instructions for using the two ESS Web interfaces, ESS Specialist and ESS Copy Services. | SC26-7448 (See Note.) |
| *IBM TotalStorage Common Information Model Agent for the Enterprise Storage Server: Installation and Configuration Guide* | This guide introduces the common interface model (CIM) concept and provides instructions for installing and configuring the CIM Agent. The CIM Agent acts as an open-system standards interpreter, allowing other CIM-compliant storage resource management applications (IBM and non-IBM) to interoperate with each other. | GC35-0485 |
| *IBM TotalStorage Enterprise Storage Server Application Programming Interface Reference* | This publication provides reference information for the IBM TotalStorage Enterprise Storage Server (ESS) application programming interface (API) and provides instructions for installing the Common Information Model Agent, which implements the ESS API. | GC35-0489 |
| **Note:** No hardcopy book is produced for this publication. However, a PDF file is available from the following Web site:<br><br>http://www-1.ibm.com/servers/storage/support/disk//2105.html | | |

## Other IBM publications

Other IBM publications contain additional information that is related to the ESS. The following list is divided into categories to help you find publications that are related to specific topics. Some of the publications are listed under more than one category. See “IBM publications center” on page xx for information about ordering these and other IBM publications.

| Title | Description | Order Number |
|---|---|---|
| **Data-copy services** | | |
| *z/OS DFSMS Advanced Copy Services* | This publication helps you understand and use IBM Advanced Copy Services functions. It describes three dynamic copy functions and several point-in-time copy functions. These functions provide backup and recovery of data if a disaster occurs to your data center. The dynamic copy functions are peer-to-peer remote copy, extended remote copy, and coupled extended remote copy. Collectively, these functions are known as remote copy. FlashCopy, ShapShot, and concurrent copy are the point-in-time copy functions. | SC35-0428 |
| *DFSMS/MVS V1: Remote Copy Guide and Reference* | This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts. | SC35-0169 |
| *IBM Enterprise Storage Server* | This publication, from the IBM International Technical Support Organization, introduces the ESS and provides an understanding of its benefits. It also describes in detail the architecture, hardware, and functions, including the advanced copy functions, of the ESS. | SG24-5465 |
| *Implementing Copy Services 0n S/390* | This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on an ESS that is attached to an S/390 or zSeries host system. Copy Services functions include peer-to-peer remote copy, extended remote copy, FlashCopy®, and concurrent copy. This publication describes the functions, prerequisites, and corequisites and describes how to implement each function into your environment. | SG24-5680 |
| *IBM TotalStorage ESS Implementing Copy Services in an Open Environment* | This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure ESS Copy Services on UNIX, Windows NT®, Windows 2000, Sun Solaris, HP-UX, Tru64, OpenVMS, and iSeries host systems. The Copy Services functions that are described include peer-to-peer remote copy and FlashCopy. This publication describes the functions and shows you how to implement them into your environment. It also shows you how to implement these functions in a high-availability cluster multiprocessing environment. | SG24-5757 |
| **Fibre channel** | | |
| *Fibre Channel Connection (FICON) I/O Interface: Physical Layer* | This publication provides information about the fiber-channel I/O interface. This book is also available as a PDF file from the following Web site:<br><br>www.ibm.com/servers/resourcelink/ | SA24-7172 |
| *Fibre-channel Subsystem Installation Guide* | This publication tells you how to attach the IBM xSeries™ 430 and NUMA-Q® host systems with fibre-channel adapters to the ESS.<br><br>Contact your sales representative to obtain this publication. | No order number |
| *Fibre Transport Services (FTS): Physical and Configuration Planning Guide* | This publication provides information about fibre-optic and ESCON-trunking systems. | GA22-7234 |

| Title | Description | Order Number |
|---|---|---|
| *IBM SAN Fibre Channel Managed Hub: 3534 Service Guide* | This guide explains how to convert the IBM SAN Fibre Channel Managed Hub from a Fibre-Channel Arbitrated Loop (FC-AL) configuration to a fabric-capable switched environment. | SY27–7616 |
| *IBM SAN Fibre Channel Managed Hub: 3534 User's Guide* | This guide provides an overview of the product and discusses available features and upgrades. It also tells you how to install the hub, how to manage and monitor it using zoning, and how to manage it remotely. It also tells you how to use the IBM 3534 SAN Fibre Channel Managed Hub TotalStorage ESS Specialist. | GC26-7391 |
| *IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide* | This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08. | SC26-7350 |
| *IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide* | This guide describes the IBM SAN Fibre Channel Switch and the IBM TotalStorage ESS Specialist. It provides information about the commands and how to manage the switch with Telnet and the Simple Network Management Protocol. | SC26-7349 |
| *IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide* | This publication describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S16. It is intended for trained service representatives and service providers. | SC26-7352 |
| *IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide* | This guide introduces the IBM SAN Fibre Channel Switch 2109 Model S16 and tells you how to manage and monitor the switch using zoning and how to manage the switch remotely. | SC26-7351 |
| *Implementing Fibre Channel Attachment on the ESS* | This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the ESS. It provides you with a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment. This book also describes the steps required to migrate to direct fibre-channel attachment from native SCSI adapters and from fibre-channel attachment through the SAN Data Gateway. | SG24-6113 |
| **Open-systems hosts** | | |
| *ESA/390: ESCON I/O Interface* | This publication provides a description of the physical and logical ESA/390 I/O interface and the protocols that govern information transfer over that interface. It is intended for designers of programs and equipment associated with the ESCON I/O interface and for service personnel who maintain that equipment. However, anyone concerned with the functional details of the ESCON I/O interface can find it useful. | SA22-7202 |
| *ESS Solutions for Open Systems Storage: Compaq AlphaServer, HP, and Sun* | This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure the ESS when you attach Compaq AlphaServer (running Tru64 UNIX), HP, and Sun hosts. This book does not cover Compaq AlphaServer that is running the OpenVMS operating system. This book also focuses on the settings that are required to give optimal performance and on the settings for device driver levels. This book is for the experienced UNIX professional who has a broad understanding of storage concepts. | SG24-6119 |
| *Fibre-channel Subsystem Installation Guide* | This publication tells you how to attach the IBM xSeries 430 and NUMA-Q host systems with fibre-channel adapters to the ESS.<br><br>Contact your sales representative to obtain this publication. | No order number |

| Title | Description | Order Number |
|---|---|---|
| *IBM TotalStorage ESS Implementing Copy Services in an Open Environment* | This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure ESS Copy Services on UNIX, Windows NT, or Windows 2000 host systems. The Copy Services functions that are described include peer-to-peer remote copy and FlashCopy. This publication describes the functions and shows you how to implement them into your environment. It also shows you how to implement these functions in a high-availability cluster multiprocessing environment. | SG24-5757 |
| *Implementing Fibre Channel Attachment on the ESS* | This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the ESS. It gives you a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment. This book also describes the steps that are required to migrate to direct fibre-channel attachment from native SCSI adapters and from fibre-channel attachment through the SAN Data Gateway. | SG24-6113 |
| **S/390 and zSeries hosts** | | |
| *Device Support Facilities: User's Guide and Reference* | This publication describes the IBM Device Support Facilities (ICKDSF) product that are used with IBM direct access storage device (DASD) subsystems. ICKDSF is a program that you can use to perform functions that are needed for the installation, the use, and the maintenance of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance. | GC35-0033 |
| *z/OS Advanced Copy Services* | This publication helps you understand and use IBM Advanced Copy Services functions. It describes three dynamic copy functions and several point-in-time copy functions. These functions provide backup and recovery of data if a disaster occurs to your data center. The dynamic copy functions are peer-to-peer remote copy, extended remote copy, and coupled extended remote copy. Collectively, these functions are known as remote copy. FlashCopy, SnapShot, and concurrent copy are the point-in-time copy functions. | SC35-0428 |
| *DFSMS/MVS V1: Remote Copy Guide and Reference* | This publication provides guidelines for using remote copy functions with S/390 and zSeries hosts. | SC35-0169 |
| *ESA/390: ESCON I/O Interface* | This publication provides a description of the physical and logical ESA/390 I/O interface and the protocols that govern information transfer over that interface. It is intended for designers of programs and equipment associated with the ESCON I/O interface and for service personnel who maintain that equipment. However, anyone concerned with the functional details of the ESCON I/O interface will find it useful. | SA22-7202 |
| *Fibre Transport Services (FTS): Physical and Configuration Planning Guide* | This publication provides information about fibre-optic and ESCON-trunking systems. | GA22-7234 |
| *Implementing ESS Copy Services on S/390* | This publication, from the IBM International Technical Support Organization, tells you how to install, customize, and configure Copy Services on an ESS that is attached to an S/390 or zSeries host system. Copy Services functions include Peer-to-Peer Remote Copy, Extended Remote Copy, FlashCopy, and Concurrent Copy. This publication describes the functions, prerequisites, and corequisites and describes how to implement each function into your environment. | SG24-5680 |

| Title | Description | Order Number |
|---|---|---|
| *ES/9000, ES/3090: IOCP User Guide Volume A04* | This publication describes the Input/Output Configuration Program that supports the Enterprise Systems Connection (ESCON) architecture. It describes how to define, install, and configure the channels or channel paths, control units, and I/O devices on the ES/9000 processors and the IBM ES/3090 Processor Complex. | GC38-0097 |
| *IOCP User's Guide, IBM @server zSeries 800 and 900* | This publication describes the Input/Output Configuration Program that supports the zSeries 800 and 900 servers. This publication is available in PDF format by accessing ResourceLink at the following Web site:<br><br>www.ibm.com/servers/resourcelink/ | SB10-7029 |
| *IOCP User's Guide, IBM @server zSeries* | This publication describes the Input/Output Configuration Program that supports the zSeries server. This publication is available in PDF format by accessing ResourceLink at the following Web site:<br><br>www.ibm.com/servers/resourcelink/ | SB10-7037 |
| *S/390: Input/Output Configuration Program User's Guide and ESCON Channel-to-Channel Reference* | This publication describes the Input/Output Configuration Program that supports ESCON architecture and the ESCON multiple image facility. | GC38-0401 |
| *IBM z/OS Hardware Configuration Definition User's Guide* | This guide provides conceptual and procedural information to help you use the z/OS Hardware Configuration Definition (HCD) application. It also explains:<br>• How to migrate existing IOCP/MVSCP definitions<br>• How to use HCD to dynamically activate a new configuration<br>• How to resolve problems in conjunction with MVS/ESA HCD | SC33-7988 |
| *OS/390: Hardware Configuration Definition User's Guide* | This guide provides detailed information about the input/output definition file and about how to configure parallel access volumes. This guide discusses how to use Hardware Configuration Definition for both OS/390® and z/OS V1R1. | SC28-1848 |
| *OS/390 V2R10.0: MVS System Messages Volume 1 (ABA - ASA)* | This publication lists OS/390 MVS™ system messages ABA to ASA. | GC28-1784 |
| *Using IBM 3390 Direct Access Storage in a VM Environment* | This publication provides device-specific information for the various models of the 3390 and describes methods you can use to manage storage efficiently using the VM operating system. It provides guidance on managing system performance, availability, and space through effective use of the direct access storage subsystem. | GG26-4575 |
| *Using IBM 3390 Direct Access Storage in a VSE Environment* | This publication helps you use the 3390 in a VSE environment. It includes planning information for adding new 3390 units and instructions for installing devices, migrating data, and performing ongoing storage management activities. | GC26-4576 |
| *Using IBM 3390 Direct Access Storage in an MVS Environment* | This publication helps you use the 3390 in an MVS environment. It includes device-specific information for the various models of the 3390 and illustrates techniques for more efficient storage management. It also offers guidance on managing system performance, availability, and space utilization through effective use of the direct access storage subsystem. | GC26-4574 |
| *z/Architecture Principles of Operation* | This publication provides a detailed definition of the z/Architecture™. It is written as a reference for use primarily by assembler language programmers and describes each function at the level of detail needed to prepare an assembler language program that relies on a particular function. However, anyone concerned with the functional details of z/Architecture will find this publication useful. | SA22-7832 |

| Title | Description | Order Number |
|---|---|---|
| | **SAN** | |
| *IBM OS/390 Hardware Configuration Definition User's Guide* | This guide explains how to use the Hardware Configuration Data application to perform the following tasks:<br>• Define new hardware configurations<br>• View and modify existing hardware configurations<br>• Activate configurations<br>• Query supported hardware<br>• Maintain input/output definition files (IODFs)<br>• Compare two IODFs or compare an IODF with an actual configuration<br>• Print reports of configurations<br>• Create graphical reports of a configuration<br>• Migrate existing configuration data | SC28-1848 |
| *IBM SAN Fibre Channel Managed Hub: 3534 Service Guide* | This guide explains how to convert the IBM SAN Fibre Channel Managed Hub from a Fibre-Channel Arbitrated Loop (FC-AL) configuration to a fabric-capable switched environment. | SY27–7616 |
| *IBM SAN Fibre Channel Managed Hub: 3534 User's Guide* | This guide provides an overview of the product and discussed the features and upgrades available. It also tells you how to install the hub, how to manage and monitor it using zoning, and how to manage it remotely. It also tells you how to use the IBM 3534 SAN Fibre Channel Managed Hub TotalStorage ESS Specialist. | GC26-7391 |
| *IBM SAN Fibre Channel Switch: 2109 Model S08 Installation and Service Guide* | This guide describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S08. | SC26-7350 |
| *IBM SAN Fibre Channel Switch: 2109 Model S08 User's Guide* | This guide describes the IBM SAN Fibre Channel Switch and the IBM TotalStorage ESS Specialist. It provides information about the commands and how to manage the switch with Telnet and the Simple Network Management Protocol (SNMP). | SC26-7349 |
| *IBM SAN Fibre Channel Switch: 2109 Model S16 Installation and Service Guide* | This publication describes how to install and maintain the IBM SAN Fibre Channel Switch 2109 Model S16. It is intended for trained service representatives and service providers. | SC26-7352 |
| *IBM SAN Fibre Channel Switch: 2109 Model S16 User's Guide* | This guide introduces the IBM SAN Fibre Channel Switch 2109 Model S16 and tells you how to manage and monitor the switch using zoning and how to manage the switch remotely. | SC26-7351 |
| *Implementing Fibre Channel Attachment on the ESS* | This publication, from the IBM International Technical Support Organization, helps you install, tailor, and configure fibre-channel attachment of open-systems hosts to the ESS. It provides you with a broad understanding of the procedures that are involved and describes the prerequisites and requirements. It also shows you how to implement fibre-channel attachment. This book also describes the steps required to migrate to direct fibre-channel attachment from native SCSI adapters and from fibre-channel attachment through the SAN Data Gateway. | SG24-6113 |
| | **Seascape family** | |
| *IBM Enterprise Storage Server* | This publication, from the IBM International Technical Support Organization, introduces the ESS and provides an understanding of its benefits. It also describes in detail the architecture, hardware, and functions, including the advanced copy functions, of the ESS. | SG24-5465 |

| Title | Description | Order Number |
|---|---|---|
| *IBM Enterprise Storage Server Performance Monitoring and Tuning Guide* | This guide, from the IBM International Technical Support Organization, provides guidance on the best way to configure, monitor, and manage your ESS to ensure optimum performance. | SG24-5656 |
| *IBM Versatile Storage Server: Introduction and Planning Guide* | This publication introduces the IBM Versatile Storage Server™ and lists the features you can order. It also provides planning information for both 2105 Models B09 and 100. | GC26-7223 |
| *Implementing the IBM Enterprise Storage Server in Your Environment* | This publication, from the IBM International Technical Support Organization, can help you install, tailor, and configure the ESS in your environment. | SG24-5420 |
| **Storage management** | | |
| *Device Support Facilities: User's Guide and Reference* | This publication describes the IBM Device Support Facilities (ICKDSF) product used with IBM direct access storage device (DASD) subsystems. ICKDSF is a program that you can use to perform functions that are needed for the installation, the use, and the maintenance of IBM DASD. You can also use it to perform service functions, error detection, and media maintenance. | GC35-0033 |
| *IBM TotalStorage Solutions Handbook* | This handbook, from the IBM International Technical Support Organization, helps you understand what makes up enterprise storage management. The concepts include the key technologies that you must know and the IBM subsystems, software, and solutions that are available today. It also provides guidelines for implementing various enterprise storage administration tasks so that you can establish your own enterprise storage management environment. | SG24-5250 |
| *IBM TotalStorage Expert: Hands-On Usage Guide* | This guide, from the IBM International Technical Support Organization, helps you install, tailor, configure, and use TotalStorage ESS Expert. | SG24-6102 |
| *IBM TotalStorage Expert Installation Guide* | This guide helps you install the IBM TotalStorage Expert (formerly the IBM StorWatch Expert) program. The IBM TotalStorage Expert provides asset, capacity, and performance management information for disk and tape storage systems. | GC26-7436 |
| *Using IBM 3390 Direct Access Storage in a VM Environment* | This publication provides device-specific information for the various models of the 3390 and describes methods that you can use to manage storage efficiently using the VM operating system. It provides guidance for managing system performance, availability, and space through effective use of the direct access storage subsystem. | GG26-4575 |
| *Using IBM 3390 Direct Access Storage in a VSE Environment* | This publication helps you use the 3390 in a VSE environment. It includes planning information for adding new 3390 units and instructions for installing devices, migrating data, and performing ongoing storage management activities. | GC26-4576 |
| *Using IBM 3390 Direct Access Storage in an MVS Environment* | This publication helps you use the 3390 in an MVS environment. It includes device-specific information for the various models of the 3390 and illustrates techniques for more efficient storage management. It also offers guidance for managing system performance, availability, and space use through effective use of the direct access storage subsystem. | GC26-4574 |

## Ordering IBM publications

This section tells you how to order copies of IBM publications and how to set up a profile to receive notifications about new or changed publications.

### IBM publications center

The publications center is a worldwide central repository for IBM product publications and marketing material.

The IBM publications center offers customized search functions to help you find the publications that you need. Some publications are available for you to view or download free of charge. You can also order publications. The publications center displays prices in your local currency. You can access the IBM publications center through the following Web site:

www.ibm.com/shop/publications/order/

### Publications notification system

The IBM publications center Web site offers you a notification system for IBM publications. Register and you can create your own profile of publications that interest you. The publications notification system sends you a daily e-mail that contains information about new or revised publications that are based on your profile.

If you want to subscribe, you can access the publications notification system from the IBM publications center at the following Web site:

www.ibm.com/shop/publications/order/

## Non-IBM publications

Other related publications are not available through IBM ordering systems. To order them, contact the sales representative at the branch office in your locality.

| Title | Description |
|---|---|
| *Quick Start Guide: An Example with Network File System (NFS)* | This guide tells you how to configure the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server User's Guide*. |
| *Veritas Cluster Server Installation Guide* | This guide tells you how to install the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server Release Notes*. |
| *Veritas Cluster Server Release Notes* | These release notes tell you how to install the Veritas Cluster Server. See also the companion document, *Veritas Cluster Server Installation Guide*. |
| *Veritas Cluster Server User's Guide* | This guide tells you how to configure the Veritas Cluster Server. See also the companion document, *Quick Start Guide: An Example with Network File System (NFS)*. |
| *Veritas Volume Manager Hardware Notes* | These hardware notes tell you how to implement multiple paths dynamically. |
| *Veritas Volume Manager Installation Guide* | This guide tells you how to install VxVM. |
| *Veritas Volume Manager Storage Administrators Guide* | This guide tells you how to administer and configure the disk volume groups. |

## Web sites

The following Web sites provide information about the ESS and other IBM storage products.

| Type of Storage Information | Web Site |
|---|---|
| Concurrent Copy for S/390 and zSeries host systems | http://www.storage.ibm.com/software/sms/sdm/ |
| Enterprise Storage Server (ESS) | http://www.storage.ibm.com/disk/ess/index.html?/ess.htm |
| ESS Copy Services command-line interface (CLI) | http://www-1.ibm.com/servers/storage/support/software/cscli.html |
| ESS publications | http://www-1.ibm.com/servers/storage/support/disk/2105.html<br>Click **Documentation**. |
| FlashCopy for S/390 and zSeries host systems | http://www.storage.ibm.com/software/sms/sdm/ |
| Host system models, operating systems, and adapters that the ESS supports | http://www-1.ibm.com/servers/storage/support/disk/2105.html<br>Click **Interoperability matrix**. |
| IBM storage products | http://www.storage.ibm.com/ |
| IBM version of the Java (JRE) that is often required for IBM products | http://www-106.ibm.com/developerworks/java/jdk/ |
| Multiple Device Manager (MDM) | http://www.ibm.com/servers/storage/support/<br>Click **Storage Virtualization**. |
| NUMA-Q host systems | http://publib.boulder.ibm.com/xseries/ |
| PPRC for S/390 and zSeries host systems | http://www.storage.ibm.com/software/sms/sdm/ |
| SAN fibre channel switches | http://www.ibm.com/storage/fcswitch/ |
| Storage Area Network Gateway and Router | http://www-1.ibm.com/servers/storage/support/san/index.html? |
| Subsystem Device Driver (SDD) | http://www-1.ibm.com/servers/storage/support/software/sdd.html |
| TotalStorage Expert | http://www-1.ibm.com/servers/storage/support/software/swexpert.html |
| XRC for S/390 and zSeries host systems | http://www.storage.ibm.com/software/sms/sdm/ |

## How to send your comments

Your feedback is important to help us provide the highest quality information. If you have any comments about this book or any other ESS documentation, you can submit them in one of the following ways:

- e-mail

  Submit your comments electronically to the following e-mail address:

  starpubs@us.ibm.com

  Be sure to include the name and order number of the book and, if applicable, the specific location of the text you are commenting on, such as a page number or table number.
- Mail

  Fill out the Readers' Comments form (RCF) at the back of this book. Return it by mail or give it to an IBM representative. If the RCF has been removed, you can address your comments to:

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# Summary of Changes

This document contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change. This summary of changes describes new functions that have been added to this release.

## Summary of Changes for SC26-7494-04 IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide

This document contains information previously presented in *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*, SC26-7494-03.

**Note:** Because of publication format changes in Chapter 1, revision bars for updated material print only at the heading level and at the last line of the changed section. Revision bars print as straight lines in the remaining chapters.

### New Information

This edition includes the following new information for the Storage Management CLI:

- New installation instructions that allow you to install the command line interface through Installshield, the console, or in silent mode. OpenVMS is the only operation system that can only be performed using the console.
- Updates to list server output fields in support of the ESS Model 750
- Updates to the show task output fields in support of the asynchronous PPRC feature.

This edition includes the following new information for the Copy Services CLI:

- The new rsFlashCopyQuery command that allows you to synchronously query a user-specified volume or group of volumes to retrieve FlashCopy data.
- Updates to the rsQuery output fields in support of the asynchronous PPRC feature.

### Deleted Information

- Previous installation instructions for the Storage Management CLI and the Copy Services CLI.

## Summary of Changes for SC26-7494-03 IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide

This document contains information previously presented in *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*, SC26-7494-02.

### New Information

This edition includes the following new information for the Storage Management CLI:

- The **create perfstats** command that allows you to register a client to collect performance information from your ESS

- The **delete perfstats** command that allows you to remove a client registration that was created using the **create perfstats** command
- Addition of the following new messages for the ESS Storage Management CLI: 557, 559, 706, 707, 708

## Deleted Information

Support for the ESS Storage Management CLI **set perfstats** command

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# Summary of Changes for SC26-7494-02 IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide

This document contains information previously presented in *IBM TotalStorage Enterprise Storage Server Command-Line Interfaces User's Guide*, SC26-7494-01.

The following sections summarize the changes to that information.

## New Information

This edition includes the following new information for the Storage Management CLI:

- Space management that provides commands to create new volumes from a volume space and allow you to query the available free space. You can also create and delete volume spaces.
- Deleting parallel access volumes
- Adding, modifying, or deleting ESS Web user accounts including changing passwords and access levels to the ESS
- Setting remote support on an ESS
- Showing, creating, and deleting e-mails
- Showing, creating, and deleting, pagers
- Showing, creating, and deleting SNMP traps
- Showing and deleting active problems on the ESS
- Viewing feature codes active on the ESS
- Support for new operating systems: Windows® Server 2003, Windows NT, AIX® 5.2, RedHat 7.3, SuSE Linux SLES7

This edition includes the following new information for the Copy Services CLI:

- Support for the following operating systems: Windows Server 2003 and AIX 5.2

## Changed Information

Definitions for **-s** (primaryserver) and **-b** (backupserver) in the Copy Services Commands section have changed to support the dual active servers function.

# Chapter 1. Installing and removing the CLI

This chapter contains information to help you install and remove the command line interface (CLI). You can install and remove the CLI in silent mode, console mode, or by using an Installshield. There is a unique set of instructions if you are installing on an OpenVMS system.

## Supported operating systems for the command-line interface

You can install the command-line interface on these operating system levels.

**Supported operating systems for the command-line interface**

- AIX 4.3.3, 5.1, 5.2
- HPUX 10.20, 11.0, 11i
- Linux (Red Hat: 7.1, 7.2, 7.3, RHEL 2.1, RHEL 3, SUSE LINUX 7.2, 7.3, SLES 7, SLES 8)
- Sun Solaris 7, 8, 9
- Windows NT 4.0, Windows 2000, Windows Datacenter, and Windows 2003
- OpenVMS Alpha 7.3
- HP Tru64 4.0F, 4.0G, 5.1, 5.1A
- IBM NumaQ 4.4.x, 4.5.x, 4.6.*x*
- Novell Netware 4.2, 5.1, 6.0

## CLI operational limitations

This topic describes the ESS CLI operational limitations.

**ESS CLI operational limitations**

- Fixed block and S/390 volumes in the same volume space or the same logical subsystem cannot be mixed. This is a limitation of the ESS.
- Logical subsystems cannot be created using the ESS Storage Management CLI.
- Individual volumes cannot be deleted. This is a limitation of the ESS.
- LUNs cannot be exposed or unexposed to parallel SCSI-3 hosts using the ESS Storage Management CLI.
- Parallel SCSI-3 attached hosts or host connections cannot be managed using the ESS Storage Management CLI.
- Parallel SCSI-3 host adapter ports cannot be configured using the ESS Storage Management CLI.
- A maximum of 256 volumes for each logical subsystem can be defined. This is a limitation of the ESS.

## Preparing for installation

Perform these tasks to prepare your system for the CLI installation.

Be aware of the following requirements before you begin the installation:

- You must have Java 1.1.8 or later installed on your machine unless you are installing on Windows, AIX, or Sun.
- If you are installing on a Compaq Tru64 or NumaQ ptx system, you must use the ksh (Korn shell) or bash (Bourne again shell) shell. Installshield does not support

the bash (.sh) shell. You must perform all Compaq Tru64 and NumaQ ptx installations using the **setupgenericunix.sh** file that is located on the installation compact disc.

- You must remove any existing version of the Storage Management CLI before you can install LIC level 2.4.0 on your system. See the previous version of the *IBM TotalStorage Enterprise Storage Server Command-Line Interface User's Guide* (SC26-7494-03) for removal instructions. The removal instructions that are provided in this publication will only remove LIC level 2.4.0.
- The installation process installs the CLI in the following default directory:

  **AIX** /opt/ibm/ESScli

  **HPUX** /opt/ibm/ESScli

  **Linux** /opt/ibm/ESScli

  **Sun Solaris**
  /opt/ibm/ESScli

  **Windows**
  C:\Program Files\IBM\ESScli

  **HP Tru64**
  /opt/ibm/ESScli

  **IBM NumaQ**
  /opt/ibm/ESScli

  **Novell Netware**
  SYS:\ESScli

1. Log on to your host system as a root user or administrator.
2. Insert the CLI product CD into the CD drive. If a window pops up for the CD drive, close the window.
3. Mount the CD drive using the **mount** command according to your system. You can mount your CD drive using the following examples:

   **AIX** Create a directory for the CD-ROM by entering the following command:

   ```
   mkdir /cdrom -p
   ```

   Create a directory for the CD-ROM by entering the following command:

   ```
   crfs -v cdrfs -p ro -d cd0 -m /cdrom
   ```

   where *cd0* is the standard representation for the CD-ROM drive.

   Mount the CD-ROM file system by entering the following command:

   ```
   mount /cdrom
   ```

   **HPUX** Mount the CD to your SD_CDROM using the path name for your environment by typing the following commands:

   ```
   ioscan -fmkC disk | more
   mount /dev/ask/c?t?d? /SD_CDROM
   ```

   **Linux** Type the following command on Red Hat systems:

   ```
   mount /dev/cdrom
   ```

   Type the following command on SuSE systems:

   ```
   mount /dev/media
   ```

   **Sun Solaris**
   Type the following command:

```
mkdir /mnt
mount -F hsfs -r /dev/dsk/c0t6d0s2 /mnt
```

**Note:** The device name /dev/dsk/c0t6d0s2 is the default name for Sun Solaris. The device name may be different on your system depending on your hardware configuration.

**Windows**

You do not need to mount the CD if you are using this operating system.

**HP Tru64**

Type the following command:

```
mount -t cdfs -o noversion /dev/rznn /mnt
```

where *nn* represents the number of CD devices.

**IBM NumaQ**

Type the following command to mount partition #0 in read-only mode:

```
/etc/mount/ -r -f cdfs /dev/dsk/cd0 /mnt
```

If cd0 does not exist, type the following command to find the CD device name:

```
/etc/dumpconf | grep cd
```

Substitute cd0 with the device name that you just found, and type the following command again:

```
/etc/mount/ -r -f cdfs /dev/dsk/your_device_name /mnt
```

where *your_device_name* is the name of the device that you just found.

**Novell Netware**

You do not need to mount the CD if you are using this operating system.

4. Navigate to your CD drive and proceed with either the silent, console, or Installshield installation.

## Installing the CLI using the silent mode

This topic describes how to install the CLI using the silent mode.

The CLI can be installed silently through the command-line. If you only use the silent option, the installation uses the default options rather than allowing you to select options. Perform the following steps to install the CLI in silent mode:

1. Type the following Java command on the command-line: setup<platform>.<exe|bin|sh> -silent
2. You can run a silent installation and also specify which options are chosen by using an options file located on the compact disk. The options file allows you to specify the options that you want to use during the installation. On the command-line, add the following flag to the installation command: -options options.txt. The following is an example of an options file:

```
 InstallShield Options File Template
#
# Wizard name: Install
# Wizard source: setup.jar
# Created on: Mon Dec 08 16:35:04 MST 2003
# Created by: InstallShield Options File Generator
#
```

```
# This file can be used to create an options file (i.e., response file) for the
# wizard "Install". Options files are used with "-options" on the command-line
# to modify wizard settings.
#
# The settings that can be specified for the wizard are listed below. To use
# this template, follow these steps:
#
#    1. Enable a setting below by removing leading '###' characters from the
#    line (search for '###' to find settings you can change).
#
#    2. Specify a value for a setting by replacing the characters '<value>'.
#    Read each setting's documentation for information on how to specify its
#    value.
#
#    3. Save the changes to the file.
#
#    4. To use the options file with the wizard, specify -options <file name>
#    as a command-line argument to the wizard, where <file name> is the name
#    of this options file.
#
###########################################################################

###########################################################################
#
# License Agreement State
#
# The initial state of the License Agreement panel. Legal values are:
#
#    0 - Nothing will be selected
#    1 - "I accept the terms of the license agreement." will be selected
#    2 - "I do not accept the terms of the license agreement." will be
#        selected
#
# For example, to configure the panel to initially display "I do not accept the
# terms of the license agreement.", use
#
#    -W bean.selection=2
#

 -W bean.selection=1


###########################################################################
#
# User Input Field - Win_Novell_select
#
#
#    0 - Novell 4
#    1 - Novell 5/6
#    2 - Windows

 -W win_user_input.Win_Novell_select="2"


###########################################################################
#
# command-line Interface Install Location
#
# The install location of the product. Specify a valid directory into which the
# product should be installed. If the directory contains spaces, enclose it in
# double-quotes. For example, to install the product to C:\Program Files\My
# Product, use
#
#    -P installLocation="C:\Program Files\My Product"
```

```
#

 -P installLocation="C:\temp\CLI"
```

If you are installing on Windows, your system will automatically restart when the installation is complete. You can verify that the command-line interface has installed correctly by reviewing the CLI.CFG file in the directory that you chose for installation.

**Note:** In CLI.CFG file, the JAVA_INSTALL variable must be set to the location of the Java executable, for example, `JAVA_INSTALL=/usr/java/jre/bin`. If the Java executable is named ″jre″, then JAVA_JRE must be set to `JRE:JAVA_JRE=JRE`. If it is called ″java″, then JAVA_JRE should be empty, for example, `JAVA_JRE=` .

The installer will typically be able to auto-detect the correct values. If the correct values are not detected, then you should edit the CLI.CFG file to reflect the actual java installation location.

## Removing the CLI using the silent mode

This topic describes how to remove the CLI using the silent mode.

Be aware of the following requirements before you begin the installation:

- If you are installing on a Compaq Tru64 or NumaQ ptx system, you must use the ksh (Korn shell) or bash (Bourne again shell) shell. Installshield does not support the bash (.sh) shell. You must perform all Compaq Tru64 and NumaQ ptx installations using the **setupgenericunix.sh** file that is located on the installation compact disc.

The CLI can be removed silently through the command-line. If you only use the silent option the uninstallation program uses the default options rather than allowing you to select options.
To install in silent mode, type the following command at that command prompt:
<install directory>/_uninst/uninstaller.<exe|sh|bin> -silent

## Installing the CLI using the console mode

This topic describes how to install the CLI using the console mode.

Perform the following steps to install the CLI using the console mode:

1. Open a command prompt and locate the following files:
   - setupgenericunix.sh
   - setuplinux.bin
   - setupwin32console.exe
   - setup.jar
   - setuphp1020.bin
   - setupsolarisSparc.bin
   - setupaix.bin
   - setuphp11x.bin
   - setupwin32.exe

2. Type the following command on the command-line:
   setup<platform>.<exe|bin|sh> -console
3. The Welcome screen is displayed. Press 1 (or Enter) for Next, 3 to Cancel, or 4 to Redisplay.

```
Initializing InstallShield Wizard...
Preparing Java(tm) Virtual Machine...
...............................................................
...............................................................
-------------------------------------------------------------------------------
Welcome to the InstallShield Wizard for IBM command-line Interface (CLI) for
Enterprise Storage Servers (ESS)
 The InstallShield Wizard installs IBM command-line Interface on your computer.

 To continue, choose Next.


    command-line Interface
    IBM Corporation

Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]
```

4. The License Agreement screen is displayed. You must accept the terms of the license agreement to continue with the installation. If there is already an X next to ″I accept the terms of the license agreement″, press Enter to continue. If not, press 1, then Enter and the screen should redisplay.

```
Read the following license agreement carefully.

Use of the IBM TotalStorage Enterprise Storage Server (ESS) command-line
interface (CLI) is governed by the IBM Agreement for Licensed Internal Code, a
copy of which has been provided with your ESS Machine.

 (C) Copyright 2000, 2003 International Business Machines
     Corporation All rights reserved.

Please choose from the following options:

[X] 1 - I accept the terms of the license agreement.
[ ] 2 - I do not accept the terms of the license agreement.

To select an item enter its number, or 0 when you are finished: [0]
```

5. Once you have accepted the terms of the license agreement, press Enter. The following screen is displayed. Press Enter to continue.

```
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

6. The Window User's screen is displayed. This screen is only displayed if you are installing on a Windows system or are pointing to a Novell system. If you want Windows, press Enter. If you want one of the Novell systems, enter 1 or 2, and then press Enter. If you choose 1 or 2, the screen is updated with an X next to the Novell system that you selected.

```
Select the appropriate target system for the CLI installation:

[ ] 1 - Novell 4
[ ] 2 - Novell 5/6
[X] 3 - Windows

To select an item enter its number, or 0 when you are finished: [0]
```

7. Once you have selected a target system, press Enter. The following screen is displayed. Press Enter to continue.

```
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

8. The Installation Location screen is displayed. If you are satisfied with the given directory shown in brackets, press `Enter`. If not, enter the directory where you want to install the CLI, and press `Enter`.

```
command-line Interface Install Location

Please specify a directory or press Enter to accept the default directory.

Directory Name: [C:\Program Files\ibm\ESScli]

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

9. Once you have selected an installation location, the following screen is displayed. Press `Enter` to continue.

```
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

10. The Installation Preview screen is displayed. Press `1` or `Enter` to continue.

```
command-line Interface will be installed in the following location:

C:\Program Files\ibm\ESScli

for a total size:

 26.3 MB

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

11. The Installation Preview screen is displayed. Press `1` or `Enter` to continue after the installation completes.

```
Installing command-line Interface. Please wait...


|-----------|-----------|-----------|------------|
0%         25%         50%         75%        100%
||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||

Creating uninstaller...
```

12. The Installation Completed screen is displayed. Review the readme information. If you are satisfied with the installation, press `Enter` or `3` and then `Enter`.

```
The InstallShield Wizard has successfully installed command-line Interface.
Choose Next to continue the wizard.
Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

13. The Readme screen displays specific operating system information that you need to know about the command-line interface. Press `Enter` to review the readme information, then `1` and `Enter` to continue if you are installing on a Windows system. For all other systems, press 3 and `Enter` to finish the installation.

```
Read the following information below.

        IBM(R) TotalStorage(TM) Enterprise Storage Server(TM)
               Storage Management Command-Line Interface
          for Windows NT(R) or Windows 2000(R) Host Systems

                             README
-------------------------------------------------------------------
Contents

1.0     About this README file
1.1     Who should read this README file
1.2     Help contacts
2.0     Where to find more information
3.0     Contents of Windows CLI package
4.0     Notices
```

```
5.0     Trademarks and service marks

-----------------------------------------------------------------
1.0     About this README file



Press ENTER to read the text [Type q to quit]
        This README file tells you where to find user
        information about the IBM Storage Management Command-Line
        Interface (CLI) and lists the contents of the CLI
        package for Windows NT(R) or Windows 2000(R) host
        system.


1.1     Who should read this README file


        This README file is intended for system administrators
        who are familiar with the Windows NT(R) or Windows 2000(R)
        environment and need to use the CLI to work with the ESS.


1.2     Help contacts


        1.  For administrative or non-technical support:


Press ENTER to read the text [Type q to quit]

            1-877-426-6006 (Please listen to voice prompts)

            (You may call this number if you have questions
             on hardware/software orders, hardware maintenance,
             services contracts of entitlement, and invoices,
             Commercial or State & Local Support Operations)


        2.  Business Partner Support Operations:

            1-800-426-9990

        3.  Federal Government Support Operations:

            1-800-333-6705

-----------------------------------------------------------------
2.0     Where to find more information

        See IBM TotalStorage Enterprise Storage Server Command-Line

Press ENTER to read the text [Type q to quit]

        Interface User's Guide for detailed descriptions of the following:

        o   Installing the Storage Management CLI and Copy Services CLI
        o   Using the Storage Management CLI and Copy Services CLI commands
   o    Understanding the Storage Management CLI and Copy Services CLI messages
        o   Troubleshooting the Copy Services CLI

        IBM TotalStorage Enterprise Storage Server Command-Line
        Interface User's Guide is available to you in PDF format.
        You can locate the PDF file (f2bc1i00.pdf) in the /cliReadmes
        directory of the MegaCDR.

-----------------------------------------------------------------
```

```
3.0     Contents of Windows CLI package

The Windows CLI package contains the following files:

        README_WINDOWS.txt
        AccessFile.sample1
        AccessFile.sample2

Press ENTER to read the text [Type q to quit]

        esscli.exe
        rsExecuteTask.exe
        rsList2105s.exe
        rsPrimeServer.exe
        rsQuery.exe
        rsQueryComplete.exe
        rsTestConnection.exe
        rsCopyServices.jar
        rsCliSeascape.jar
        ibmjsse.jar
        CLI.CFG

------------------------------------------------------------
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                2-31 Roppongi 3-chome, Minato-ku
                Tokyo 106, Japan

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        IBM
        TotalStorage


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Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

14. If you are installing on a Windows system, the Restart screen is displayed. Press 3 to complete the installation.

```
To complete the installation you must restart your computer.

   [X] 1 - Yes, restart my computer.
   [ ] 2 - No, I will restart my computer at a later time.

To select an item enter its number, or 0 when you are finished:
 [0] To select an item enter its number, or 0 when you are finished: [0] 2

   [] 1 - Yes, restart my computer.
     [X] 2 - No, I will restart my computer at a later time.

To select an item enter its number, or 0 when you are finished: [0]


Press 3 to Finish or 4 to Redisplay [3]
```

You can verify that the command-line interface has installed correctly by reviewing the CLI.CFG file in the directory that you chose for installation.

**Note:** In CLI.CFG file, the JAVA_INSTALL variable must be set to the location of the Java executable, for example, `JAVA_INSTALL=/usr/java/jre/bin`. If the Java executable is named ″jre″, then JAVA_JRE must be set to `JRE:JAVA_JRE=JRE`. If it is called ″java″, then JAVA_JRE should be empty, for example, `JAVA_JRE=` .

The installer will typically be able to auto-detect the correct values. If the correct values are not detected, then you should edit the CLI.CFG file to reflect the actual java installation location.

## Removing the CLI using the console mode

This topic describes how to remove the CLI using the console mode.

Be aware of the following requirements before you begin the installation:

- If you are installing on a Compaq Tru64 or NumaQ ptx system, you must use the ksh (Korn shell) or bash (Bourne again shell) shell. Installshield does not support the bash (.sh) shell. You must perform all Compaq Tru64 and NumaQ ptx installations using the **setupgenericunix.sh** file that is located on the installation compact disc.

Perform the following steps to remove the CLI using the console mode:

1. Type the following command at that command prompt: <install directory>/_uninst/uninstaller.<exe|sh|bin> -console
2. The Welcome screen displays. Press `1` and `Enter` to continue, or `3` to `Cancel` the removal process.

```
Welcome to the InstallShield Wizard for IBM command-line Interface (CLI) for
Enterprise Storage Servers (ESS)
The InstallShield Wizard uninstalls IBM command-line Interface on your
computer.

 To continue, choose Next.


    command-line Interface
    IBM Corporation

Press 1 for Next, 3 to Cancel or 4 to Redisplay [1]
```

3. The Uninstallation Location screen is displayed. Press `1` and `Enter` to continue, or `3` and `Cancel` to exit the removal process.

```
command-line Interface will be uninstalled from the following location:

C:\Program Files\ibm\ESScli

Press 1 for Next, 2 for Previous, 3 to Cancel or 4 to Redisplay [1]
```

4. The Uninstallation progress screen is displayed while the command-line interface is being removed.

```
Uninstalling command-line Interface...
```

5. The Uninstallation Complete screen is displayed. Press `3` to finish the removal.

```
The InstallShield Wizard has successfully uninstalled command-line Interface.
Choose Finish to exit the wizard.

Press 3 to Finish or 4 to Redisplay [3]
```

## Installing the CLI using Installshield

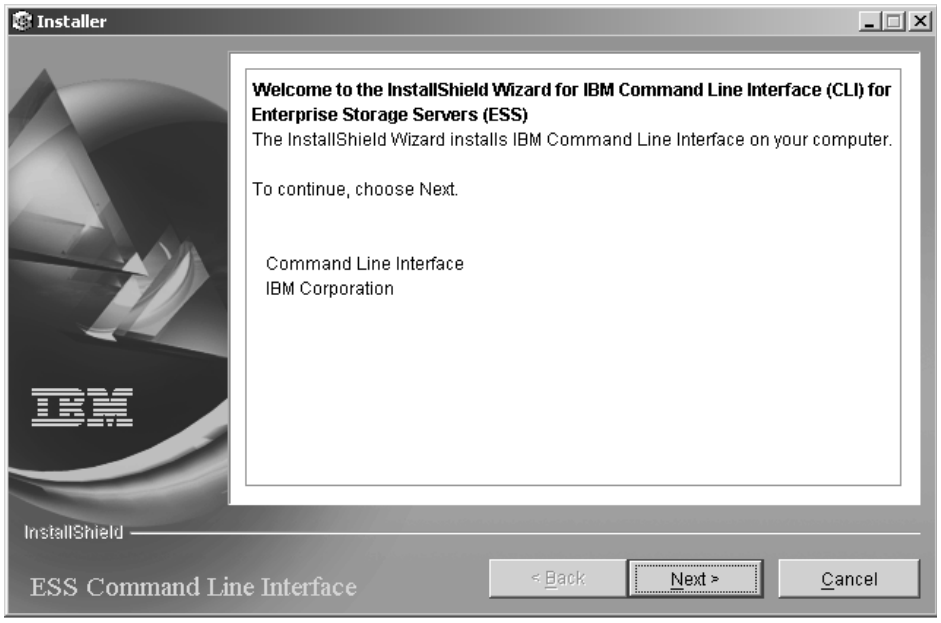
This topic describes how to install the CLI using the Installshield program.

Perform the following steps to install the CLI using Installshield:

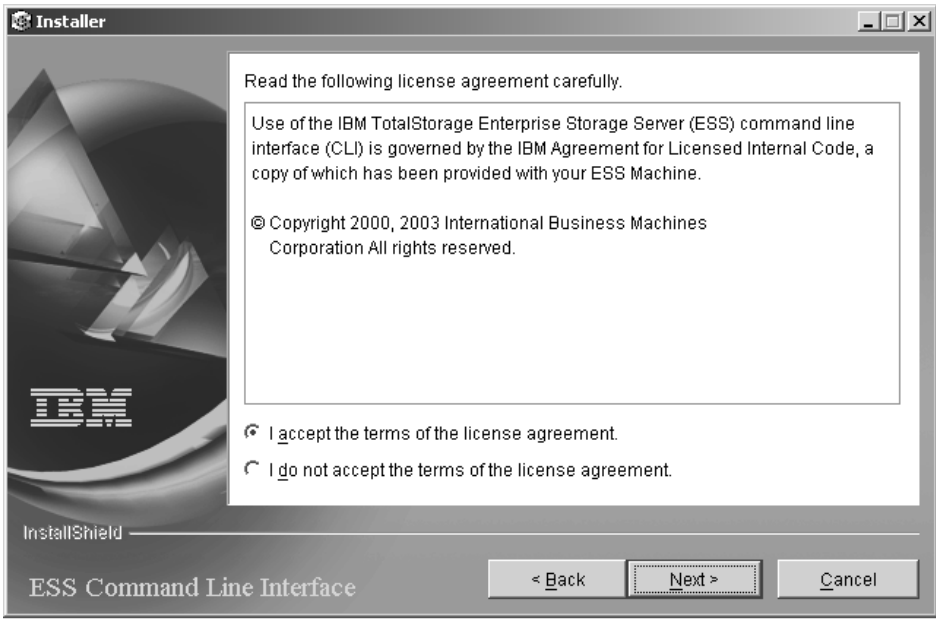
1. Locate the following files on your installation compact disk:
   - setupgenericunix.sh
   - setuplinux.bin
   - setupwin32console.exe
   - setup.jar
   - setuphp1020.bin

- setupsolarisSparc.bin
- setupaix.bin
- setuphp11x.bin
- setupwin32.exe

2. Execute the setup file that is appropriate for your operating system.
3. The Welcome screen is displayed. Click **Next** to continue or **Cancel** to exit the installation.

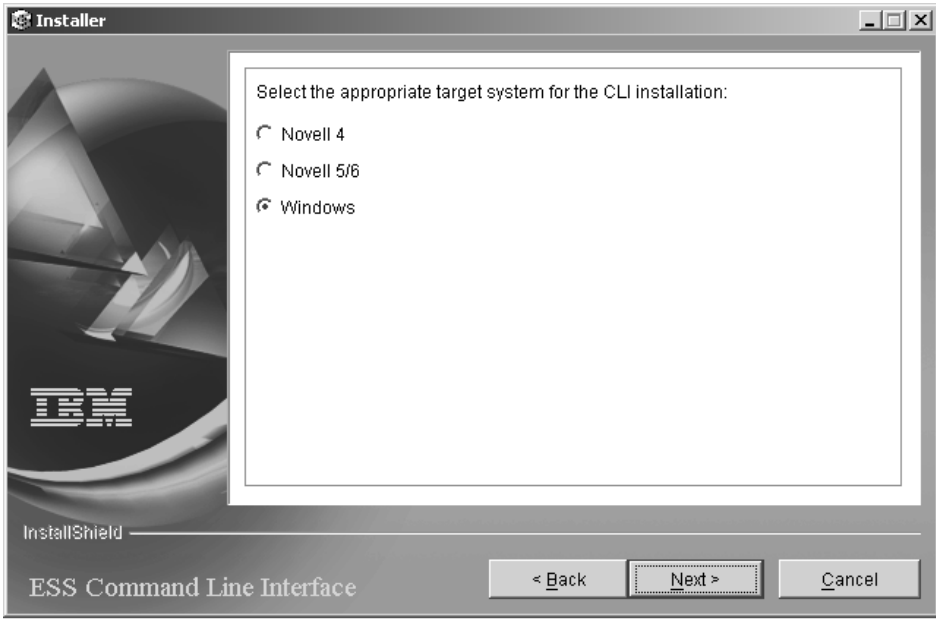



4. The License Agreement screen is displayed. Select ″**I accept the terms of this license agreement**″ to continue. Click ″**I do not accept the terms of this license agreement**″ or **Cancel** to exit the installation.

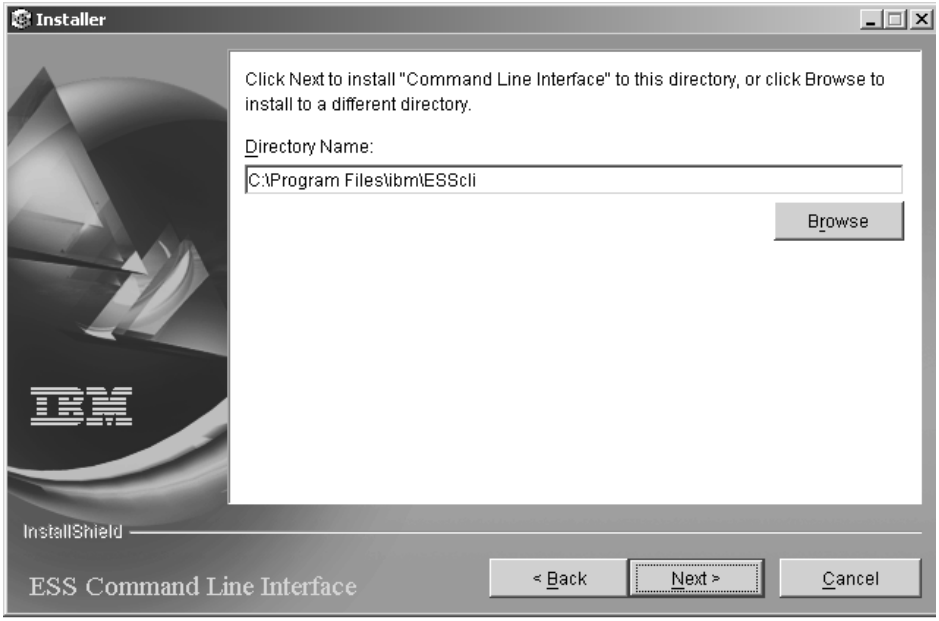



5. The Window User's panel is displayed. This panel only is displayed if you are installing on a Windows system or pointing to a Novell system. Select the appropriate target system, and then click **Next** to continue or **Cancel** to exit

the installation.

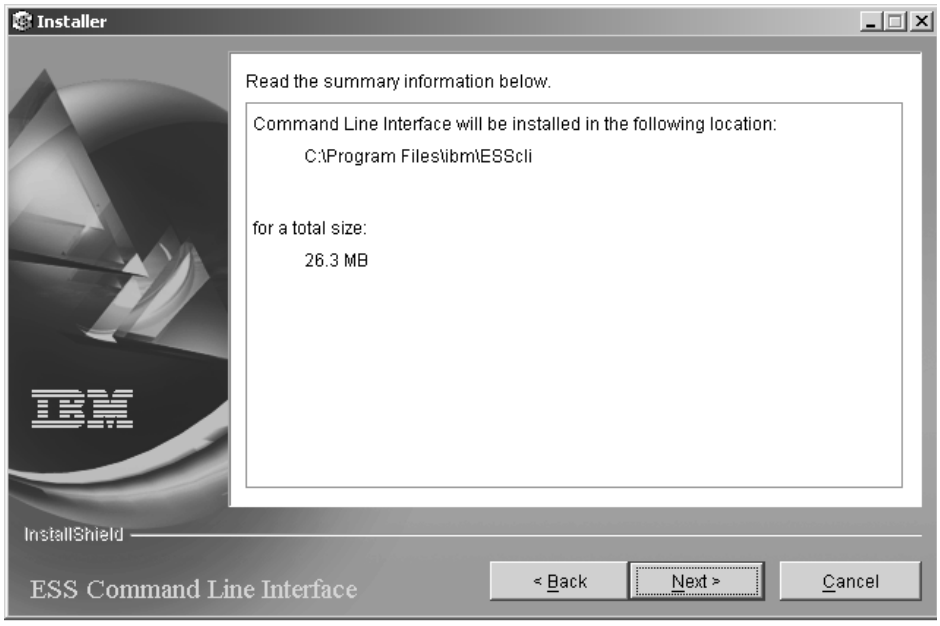



6. The Installation Location panel is displayed. If you are satisfied with the default directory, click **Next**. If not, type the directory path where you want to install the CLI and click **Next**. Click **Cancel** if you want to exit the installation.

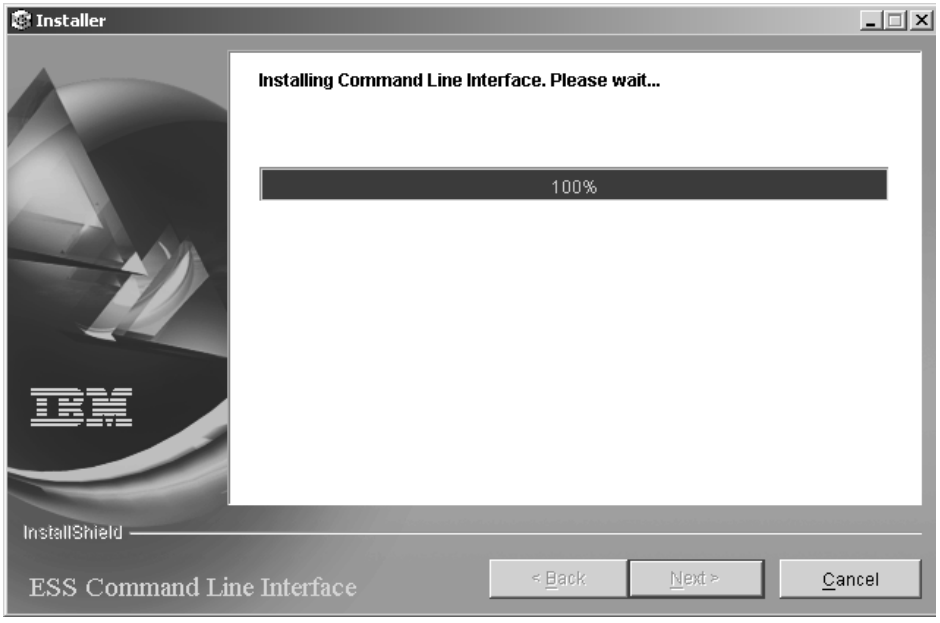



7. The Installation Preview panel is displayed. This panel reviews where the command-line interface will be installed and how much space it will take up on your drive. Click **Next** to continue or **Cancel** to exit the installation. You can

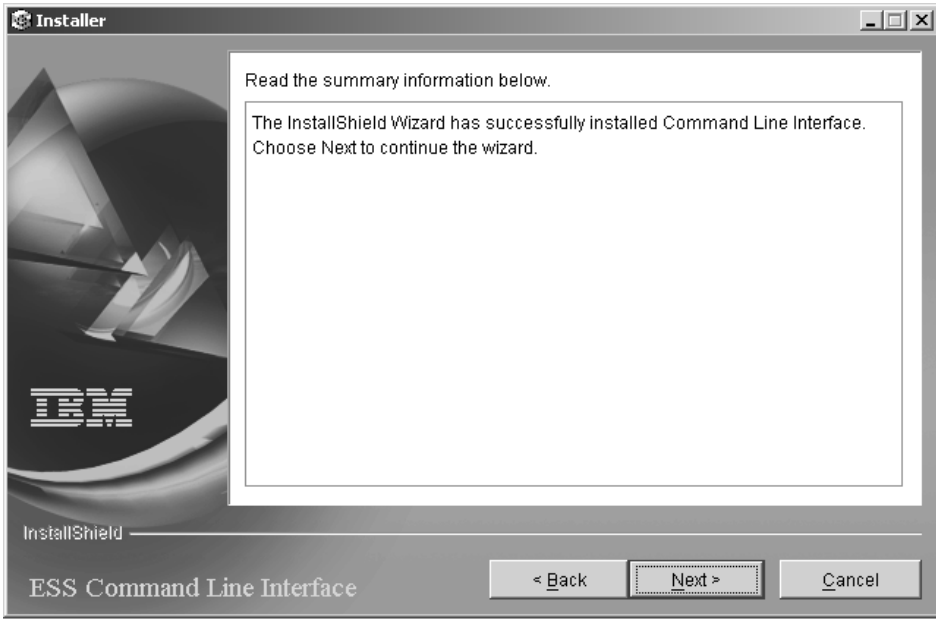
change the installation directory by clicking **Back**.



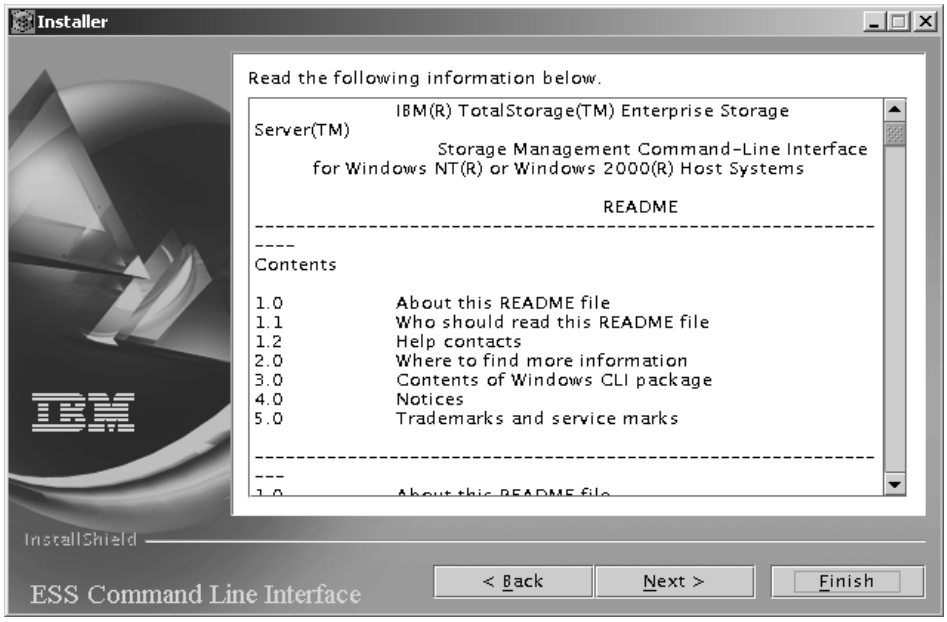

8. The Installation Progress panel is displayed. This panel shows the progress of the command-line interface installation. Click **Next** to continue or **Cancel** to exit the installation.



9. The Installation Summary panel is displayed. This panel shows the installation summary information. Click **Next** to continue or **Cancel** to exit the installation.

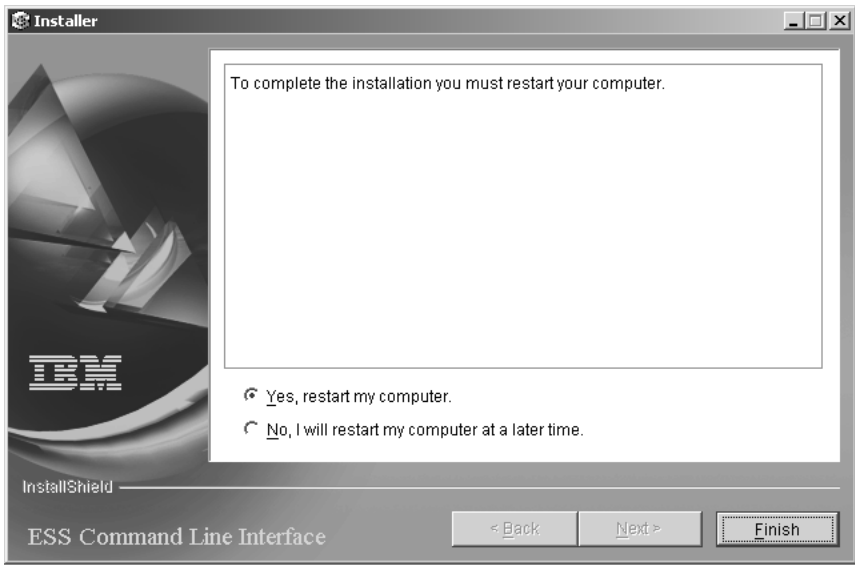



10. The Readme panel contains information that is specific to the operating system that you are installing on. These instructions display an example of the Windows operating system. Review the information, then click **Finish** to complete the installation, or click **Next** if you are installing on a Windows system.




**Note:** If you are installing on a Windows system, another panel asks if you want to restart your computer to complete the installation. Click **Yes** to

restart your system or **No** to restart your system at a later time.




You can verify that the command-line interface has installed correctly by reviewing the CLI.CFG file in the directory that you chose for installation.

**Note:** In CLI.CFG file, the JAVA_INSTALL variable must be set to the location of the Java executable, for example, `JAVA_INSTALL=/usr/java/jre/bin`. If the Java executable is named ″jre″, then JAVA_JRE must be set to `JRE: JAVA_JRE=JRE`. If it is called ″java″, then JAVA_JRE should be empty, for example, `JAVA_JRE=` .

The installer will typically be able to auto-detect the correct values. If the correct values are not detected, then you should edit the CLI.CFG file to reflect the actual java installation location.

## Removing the CLI using Installshield

This topic describes how to remove the CLI using the Installshield program.

Be aware of the following requirements before you begin the installation:

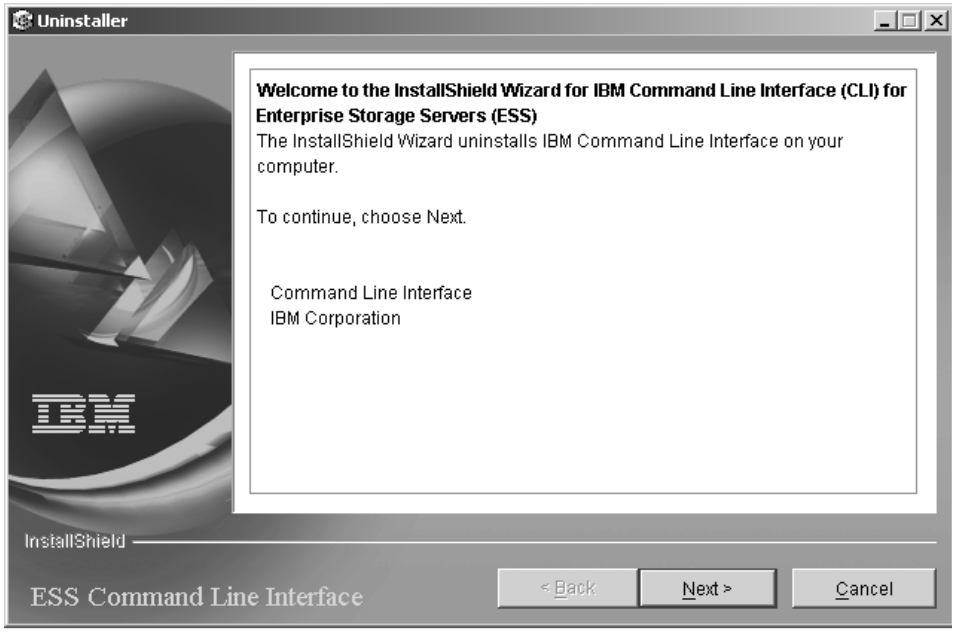
- If you are installing on a Compaq Tru64 or NumaQ ptx system, you must use the ksh (Korn shell) or bash (Bourne again shell) shell. Installshield does not support the bash (.sh) shell. You must perform all Compaq Tru64 and NumaQ ptx installations using the **setupgenericunix.sh** file that is located on the installation compact disc.

Perform the following steps to remove the CLI using Installshield:

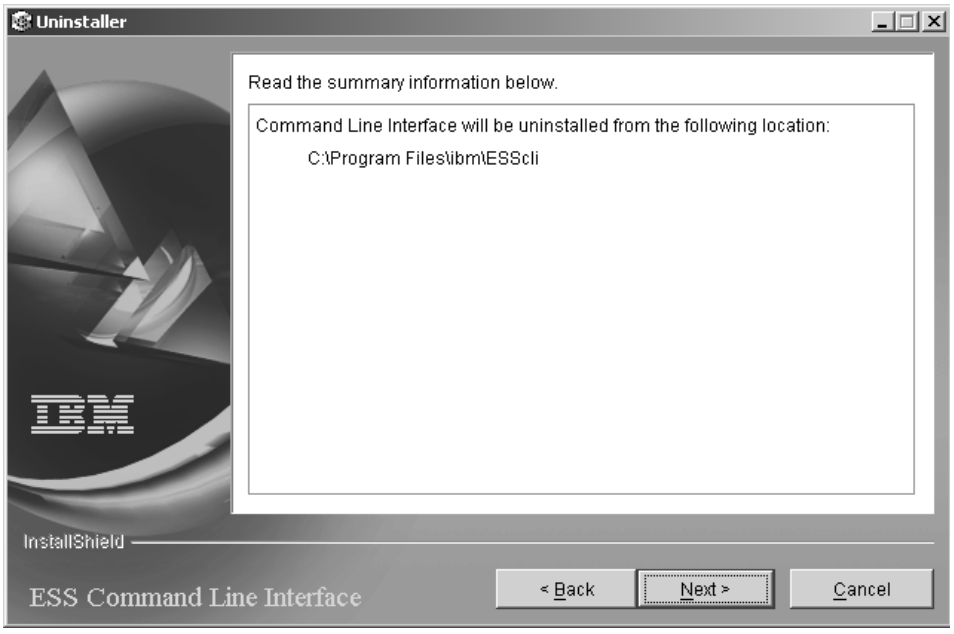
1. Locate the uninstaller file in the /_uninst folder. If you selected the default directory, you can find _uninst folder using the /opt/ibm/ESScli path. The uninstaller file name is uninstaller.*xxx*, with *xxx* depending on the operating system. If you have a Windows system, then the file name is uninstaller.exe. If you have a Linux, Hewlett Packard, Sun, or AIX system, then the file name is uninstaller.bin. For all other operating systems the file name is uninstaller.sh.

   **Note:** If you have a Windows system, you must start the removal by using the **Add/Remove Programs** feature.

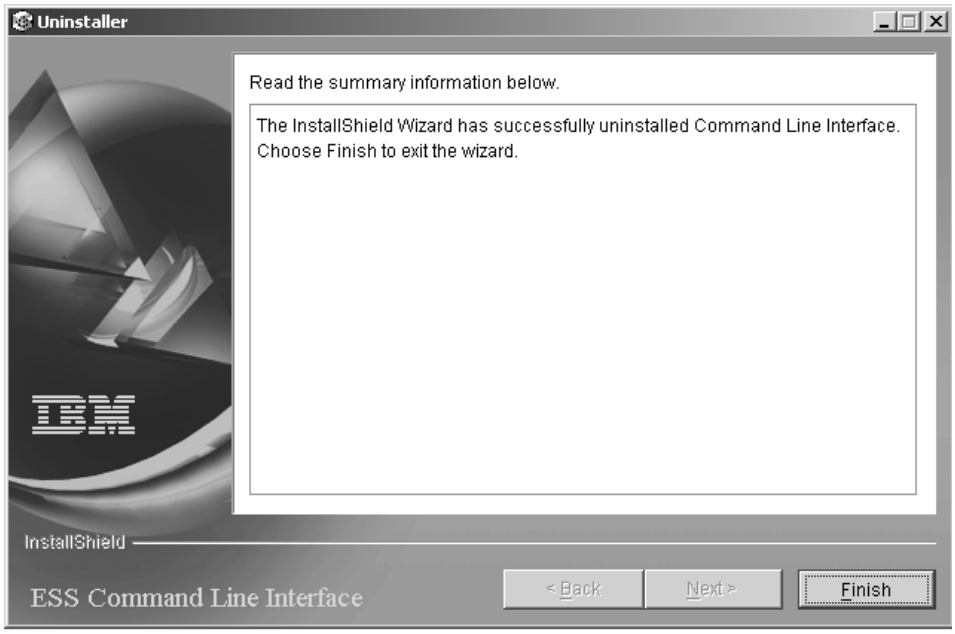
2. Run the uninstaller file to begin the Installshield command-line interface uninstaller. The uninstaller Welcome panel is displayed. Click **Next** to Continue or **Cancel** to exit the uninstaller.




3. A summary panel that shows where the command-line interface will be removed from is displayed. Click **Next** to Continue or **Cancel** to exit the uninstaller.



4. A confirmation panel that the command-line interface has been uninstalled is displayed. Click **Finish** to complete the command-line interface removal.




## Installing the CLI on OpenVMS

This topic describes how to install the CLI on an OpenVMS system.

Perform the following steps before you install the command-line interface:

1. Extract and check the Release Notes file from the Copy Services CLI installation package in the root directory of the CD.
2. Install the required prerequisite patches (ECOs) on your OpenVMS Alpha 7.3 host system.

   The command-line interface installation process automatically installs Java™ Runtime Environment (JRE) 1.3.1-3 on your host system. To use the required JRE, you must install the following patches:

   - vms73_librtl-v0200
   - vms73_update-v0100
   - vms73_sys-v0300
   - vms73_acrtl-v0200

   You can find and download OpenVMS patches using the following search engine:

   http://ftp.support.compaq.com.au/ecos.phtml
3. Make sure that you have at least 140000 blocks of free space on the installation CD. Half of the free space is used by the program and the other half is used for temporary files.

The command-line interface uses the Polycenter Software Installation utility. The installation process places all command-line interface files in the [ibm2105...] directory, a subdirectory of the Polycenter destination directory.

You can specify this directory by using the product install command with the /destination=devicename:[directoryname]qualifier. If you omit the device name, the

Polycenter installation utility uses your current default device. If you omit the directory name, the Polycenter installation utility uses the [vms$common] directory as the default destination directory.

If you do not use the /destination= devicename:[directoryname] qualifier at all, the Polycenter installation utility installs the software in a directory that is defined by the pcsi$destination logical name. If you do not define this logical name, the Polycenter installation utility installs the command-line interface in the sys$sysdevice:[vms$common.ibm2105...] directory.

Perform the following steps to install the command-line interface on your OpenVMS system.

1. Log on to your host system as a user with syslck, sysnam, sysprv, (or a system UIC), tmpmbx, and cmkrnl privileges.
2. Insert the CLI product CD into the CD drive.
3. Mount the CD drive. For example, for an IDE CD device DQA0, type the following command: mount/noassist/override=identification/media_format=cdrom dqa0. A message similar to the following is displayed:

   ```
   mount/noassist/override=identification/media_format=cdrom dqa0:
   %MOUNT-I-WRITELOCK,volume is write locked
   %MOUNT-I-CDROM_ISO, : (1 of 1) , mounted on VMS1$DQA0:
   ```

   a. For a SCSI CD device DKA*nnn*, type the following command: mount/noassist/override=identification/media_format=cdrom dka *nnn*:, where *nnn* represents the number that is assigned by the OpenVMS system to your CD device.
4. Type the following command and press Enter to access the command-line interface installation package in the root directory of the CD: directory/full dqa0:[000000]imb-axpvms-ibm2105cli-*.pcsi. A message similar to the following is displayed:

   ```
   Directory DQA0:[000000]

   IBM-AXPVMS-IBM2105CLI-V0201-0F1-1.PCSI;1              File ID:  (4,7,0)
   Size:        62560/62560      Owner:    [0,0]
   Created:   16-AUG-2002 20:47:00.00
   Revised:   16-AUG-2002 20:47:00.00 (1)
   Expires:   <None specified>
   Backup:    <No backup recorded>
   Effective: <None specified>
   Recording: 16-AUG-2002 21:22:00.00
   File organization:  Sequential
   Shelved state:      Online
   Caching attribute:  Writethrough
   File attributes:    Allocation: 62560, Extend: 0, Global buffer count: 0,
               Version limit: 0, Backups disabled
   Record format:      Undefined, maximum 0 bytes, longest 0 bytes
   Record attributes:  None
   RMS attributes:     None
   Journaling enabled: None
   File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
   Access Cntrl List:  None
   Client attributes:  None

   Total of 1 file, 62560/62560 blocks.
   ```
5. Type the following command and press Enter to extract the command-line interface for OpenVMS release notes: product extract release_notes ibm2105cli /source=dqa0:[000000]- [/file= filespec]

**Note:** If you do not use the /file=filespec qualifier, the release notes are written to the default.pcsi$release_notes file in your current default directory. The release notes contain additional installation, postinstallation, and related information about the command-line interface for an OpenVMS Alpha host system. It might also contain last-minutes technical changes.

6. Type the following command and press Enter to invoke the command-line interface installation process: product install ibm2105cli /source=dqa0:[000000]- [/destination= devicename:[directoryname]]. A message similar to the following is displayed:

```
 The following product has been selected:

  IBM AXPVMS IBM2105CLI V9.9-9F1  Layered Product

 Do you want to continue? [YES]
```

7. Type Yes and press Enter to continue the installation process. The following configuration options message is displayed:

```
Configuration phase starting ...

You will be asked to choose options, if any, for each selected product and for
any products that may be installed to satisfy software dependency requirements.

IBM AXPVMS IBM2105CLI V9.9-9F1: IBM command-line Interface for ESS 2105

    This product uses the registered key : IBM2105

    International Business Machines Corporation (IBM)

    Copyright 2002 International Business Machines. All rights reserved.

Do you want the defaults for all options? [YES]
```

8. Type No and press Enter to review the installation options. The following Java license message is displayed:

```
Java RTE OpenVMS Alpha License Agreement

The IBM2105CLI requires the Java 1.3 Java Runtime Environments.
Installing the CLI program automatically installs the required Java. The
installed Java JRE is the intellectual property of and licensed by Compaq
Corp. You can view the license agreement on  the World Wide Web at :
     http://www.compaq.com/java/documentation/1.3.1/ovms/jre/LICENSE.TXT
The full text of the agreement is also available in the README_OpenVMS.txt
file on the installation CD in the cliReadmes directory. You can also view
the full copyright statement on the World Wide Web at
    http://www.compaq.com/java/documentation/1.3.1/ovms/jre/COPYRIGHT.TXT

Answer "Yes" to install the Java code. By installing this code, you are
certifying that you have read and accept the Compaq Java License agreement.

Answer "No" to terminate and exit the IBM2105CLI installation.

Do you want to continue? [YES]
```

**Note:** You can answer Yes if you install with the default options.

9. Type Yes and press Enter to accept the Java license agreement. The command-line interface requires Java 1.3.1 on an OpenVMS Alpha host system. If you answer No, the installation process automatically ends and exits. The following library update warning message is displayed:

```
WARNING: The global Help and Message libraries will be updated.

The IBM2105CLI program provides local Help and Message Library files.
By default, the CLI instalation integrates the local libraries into the
global Help and Message libraries. To prevent the modification of
```

```
the global libraries, answer "No" when prompted to integrate.

Would you like the local IBM2105CLI Help and Message libraries
to be integrated into the global libraries? Local copies of the
libraries are available under
    SYS$SYSDEVICE:[VMS$COMMON.IBM2105CLI.HLP]IBM2105_HLP.HLB
    SYS$SYSDEVICE:[VMS$COMMON.IBM2105CLI.HLP]IBM2105_HLPMSG.MSGHLP$DATA

Integrate the local and global libraries? [YES]
```

10. Type `Yes` and press `Enter` to update the global libraries with the CLI library contents. The following option review message is displayed:

```
Do you want to review the options?
```

11. Type `Yes` and press `Enter` to review and confirm selected options. The following library update confirmation message is displayed:

```
IBM AXPVMS IBM2105CLI V9.9-9F1: IBM command-line Interface for ESS 2105

Integrate the local and global libraries? [YES]
```

12. Type `Yes` and press `Enter` to confirm the library update option. The following confirmation message is displayed:

```
IBM AXPVMS IBM2105CLI V9.9-9F1: IBM command-line Interface for ESS 2105

Are you satisfied with these options? [YES]
```

13. Type `Yes` and press `Enter` to confirm and accept all selections. The following installation message with completion status is displayed:

```
Execution phase starting ...

The following product will be installed to destination:

    IBMAXPVMS IBM2105CLI V9.9-9F1         DISK$V73_COMMON:[VMS$COMMON.]

Portion done: 0%...10%...20%...40%...50%...60%...70%...100%
```

14. Review the Installation Verification Procedure (IVP) report which is similar to the following output and check for possible errors:

```
Beginning IBM 2105 CLI Installation Verification Procedure
--- Logical name verification started
--- Logical name verification passed
--- Image file verification started
--- Image file verification passed
--- Object file verification started
--- Object file verification passed
--- Java class verification started
--- Java class verification passed
--- Installed images verification started
--- Installed images verification passed
--- JRE verification started
--- JRE verification passed
--- Functionality verification started

The following test checks if rsList2105s runs correctly:
  You will see a list of all IBM2105 volumes attached to this node.
  If there are no such volumes, you get error %IBM2105-E-NO2105VOL.
  Any other warning or error indicates a problem!

disk name     2105 serial number
------------  ------------------
_$1010$DKA300   40213550
_$1010$DKA400   50513550

--- Functionality verification passed
--- Command help verification started
--- Command help verification passed
```

```
--- Message help verification started
--- Message help verification passed
IBM 2105 CLI Installation Verification Procedure Successful
```

15. Make sure that the installation completes. When the Polycenter installation utility finishes the command-line interface installation process, you will see a message similar to the following:

```
The following product has been installed:

    IBM AXPVMS IBM2105CLI V9.9-9F1    Layered Product

IBM AXPVMS IBM2105CLI V9.9-9F1: IBM command-line Interface for ESS 2105

Release notes for IBM 2105 command-line Interface available
```

16. Unmount the CD drive and remove the CD.

The command-line interface provides program startup, login, and shutdown procedures in the [destinationdir.ibm2105.mgr] directory. The installation process runs the startup and login procedures immediately before invoking the IVP procedure. But for persistent setup, you must complete the following postinstallation tasks before using the command-line interface.

**Note:** You must integrate the required ibm2105$startup.com and ibm2105$login.com procedures. You can also integrate the optional ibm2105$shutdown.com procedure. See the command-line interface release notes for information about the CLI startup, login, and shutdown procedure files.

Perform the following steps if you are using persistent setup for the command-line interface:

1. Add the required ibm2105$startup.comprocedure to your system startup processes.

   You can integrate the ibm2105$startup.com procedure by adding the following line to the sys$manager:systartup_vms.comscript:

   $ @destinationdev:[ destinationdiribm2105.mgr]ibm2105$startup

   where *destinationdev* is the name of the device that contains the command-line interface installation directory, and *destinationdir* is the name of the directory where you just installed the command-line interface.

   The ibm2105$startup.com procedure defines the logical names that are required for the command-line interface in your system logical name table and installs the command-line interface images with enhanced privileges. This program is automatically invoked during the system startup.

   If you want, you can alternatively add the ibm2105$startup.com procedure to the SYSMAN startup database.

2. Add the required ibm2105$login.com procedure to your system login processes.

   You can integrate the ibm2105$login.com procedure by adding the following line to the sys$login:login.comscript:

   $ @ibm2105$manager:ibm2105$login

   Run the ibm2105$login.com procedure only after you have successfully run the ibm2105$startup.com procedure.

   The ibm2105$login.com procedure sets up the JRE that is required by the command-line interface and defines the CLI commands as foreign DCL command symbols. It is intended to be invoked during the system-wide sys$manager:syslogin.com or user-specific sys$login:login.com procedure.

3. Add the optional ibm2105$shutdown.com procedure to your system shutdown processes.

   You can integrate the ibm2105$shutdown.com procedure by adding the following line to the sys$manager:syshutdown.com script:

   $ @ibm2105$manager:ibm2105$shutdown

   The ibm2105$shutdown.com function performs the install or remove operations for privileged images and undefines system-wide logical names that are associated with the removed images. It is intended to be invoked during the system shutdown process.

## Removing the CLI from your OpenVMS system

This topic describes how to remove the CLI from your OpenVMS system.

Perform the following steps to remove the CLI from your OpenVMS system:

1. Log on to your host system as a user with the following privileges: syslck, sysnam, sysprv, (or a system UIC), tmpmbx, and cmkrnl.
2. At the command prompt ($), type the following command to start the uninstallation process: product remove ibm2105cli. A message similar to the following is displayed:

```
The following product has been selected:

  IBM AXPVMS IBM2105CLI V2.1-0F0         Layered Product

Do you want to continue? [YES]
```

3. Type `Yes` and press `Enter` to confirm the uninstallation. The following uninstallation confirmation message with completion status is displayed:

```
The following product will be removed from destination:

  IBM AXPVMS IBM2105CLI V2.1-0F0         DISK$V73_COMMON:[VMS$COMMON.]

Portion done: 0%...30%...40%...50%...60%...70%...80%...90%...100%
```

4. When the uninstallation process ends, a message similar to the following is displayed:

```
The following product has been removed:

 IBM AXPVMS IBM2105CLI V2.1-0F0         Layered Product
```

5. Remove the command-line interface startup, login, and shutdown functions from your system startup, login, and shutdown processes.

## Checking your license information code level

This topic describes how to obtain you CLI license information code (LIC) level.

If you would like to identify the LIC version before installing CLI, the LIC version can be obtained from the label on the CLI installation compact disc.

1. Open the **OSinfo.txt** file located in your CLI installation directory.
2. Your current LIC level is the **CLI version** in the **OSinfo.txt** file. The following text is an example of what you might see in the **OSinfo.txt** file:

```
##########################
....
CLI version=9.9.9.9
....
```

# Chapter 2. Using the Storage Management CLI command

This chapter describes the Storage Management CLI command that you can use to invoke, perform, and manage various ESS functions from your host system. It also presents the full syntax, command flags, parameters, arguments, and usage examples of the command.

## Overview of the esscli command

The Storage Management CLI provides a single **esscli** command with multiple flags, parameters, and arguments you can specify. This section defines the **esscli** command and provides general usage guidelines.

## Description

You can use the **esscli** command to perform the following tasks:

- Manage one or more ESS servers by reporting about the volumes, volume spaces, I/O ports, disk groups, and host systems connected to each server
- Perform LUN masking by associating or disassociating a volume with a fibre-based host initiator and by providing volume access information even if the volume is not associated with an initiator
- Manage volume space by querying space availability and creating new volumes within a volume space
- Identify volumes with user-specified labels, if required
- List, create, and delete parallel access volumes (PAVs)
- Generate an audit log about user ID-specific configuration activities
- Define, undefine, and modify a host connection that provides the ESS server with the information about the host type and worldwide port name.
- Manage ESS Copy Services tasks by monitoring and querying the tasks in the Copy Services task repository
- Query and report the status of PPRC paths
- Manage remote support
- Manage Call home
- Manage Web or esscli user names and passwords
- List, create, and delete performance data entries

## General guidelines

The **esscli** command has two types of parameters: parameters with arguments and parameters without arguments. *Parameters without arguments* refer to those parameters that follow a flag and function as an individual argument to the flag, such as *AccessFile* in `-a AccessFile`. They do not have arguments to themselves. See “Parameters without arguments” on page 34 for more information.

*Parameters with arguments* refer to those parameters that precede a flag. These parameters consist of two main parts: keywords and arguments. *Keywords* are a verb-noun phrase, which represents an action-category relationship, for example, `list server`. The action keyword specifies the type of functions to be performed by the command, and the category keyword specifies the type of configuration objects to be manipulated.

*Arguments* refer to the -d flag followed with one or more name-value pairs enclosed in a set of double quotation marks. For example, `-d "ess=EssID name=LogName"` is the argument to the `list log` parameter, in which `ess=` is the name and *Essid* is the value in the name-value pair.

Follow these general guidelines when you use the **esscli** command and associated parameters and arguments:

- Specify at least one action-category parameter when you issue the **esscli** command for purposes other than requesting help.
- Specify only one action-category parameter in a single instance of the **esscli** command as the parameters of this type are mutually exclusive.
- Specify a flag prefixed with a minus (-) symbol as required for a particular parameter.
- Position the command flags and parameters in any desired order at the command line. For example, you can enter either one of the following commands:

  ```
  esscli -a AccessFile list server -d "ess=EssId"
  esscli list server -d "ess=EssId" -a AccessFile
  ```

- If a parameter or name-value argument pair allows multiple values, separate each value with a comma (,) as in `ports=A0,80,04`; do not add any space between values for the name in a pair.
- Enclose one or more name-value pairs in a set of double quotation marks for a particular parameter or argument. If the value of a parameter or name-value pair contains a blank or white space, enclose the entire value in a set of double quotation marks, as in:

  ```
  esscli -a "c:\data files\esscli\ess access file.dat"
  ```

  or single quotation marks, as in:

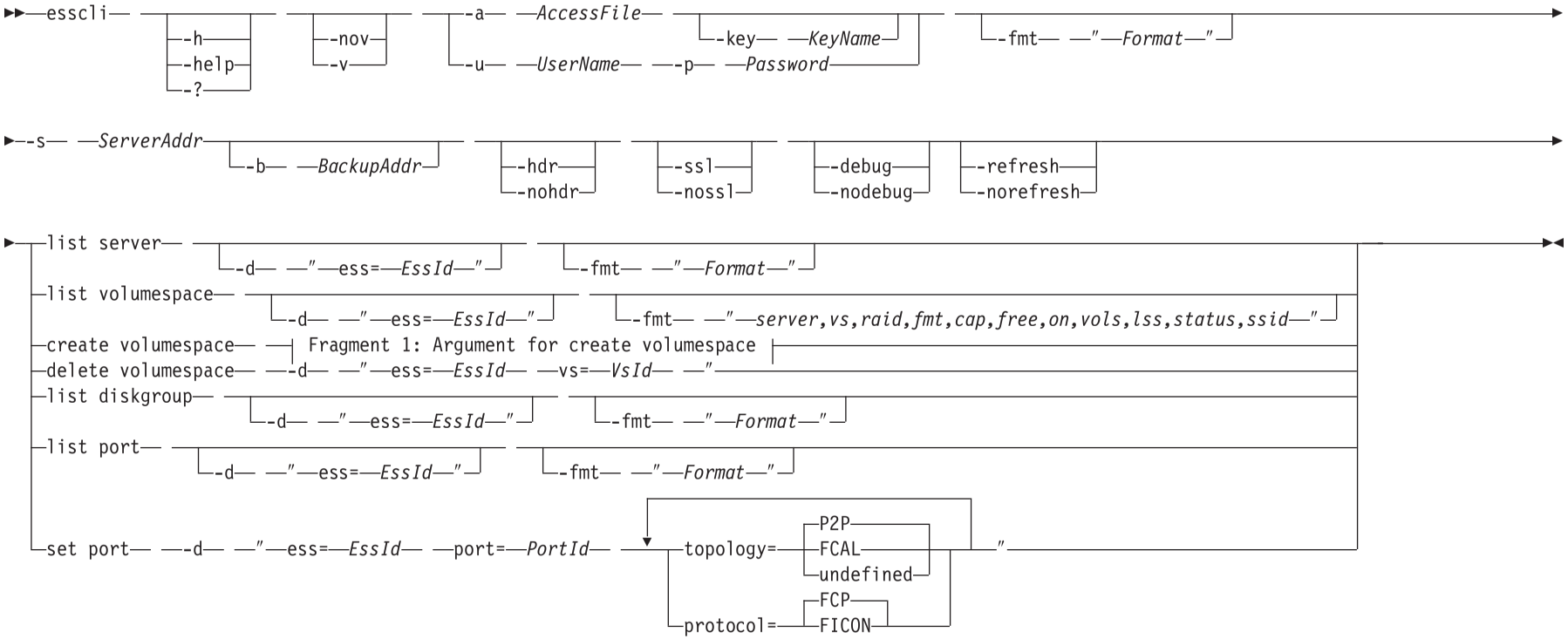
  ```
  create hostconnection -d "ess=2105.12345 host='Jean Luc' profile=linux".
  ```

- Specify the **esscli** command and associated flags, parameters, and arguments in any case of your desire. The command is not case-sensitive.

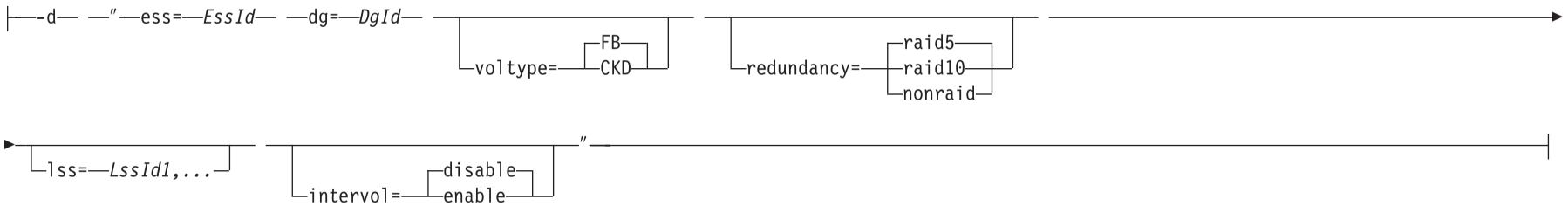
## Syntax

The following is the complete syntax of the **esscli** command. See “Syntax diagrams” on page ix for syntax reading instructions.

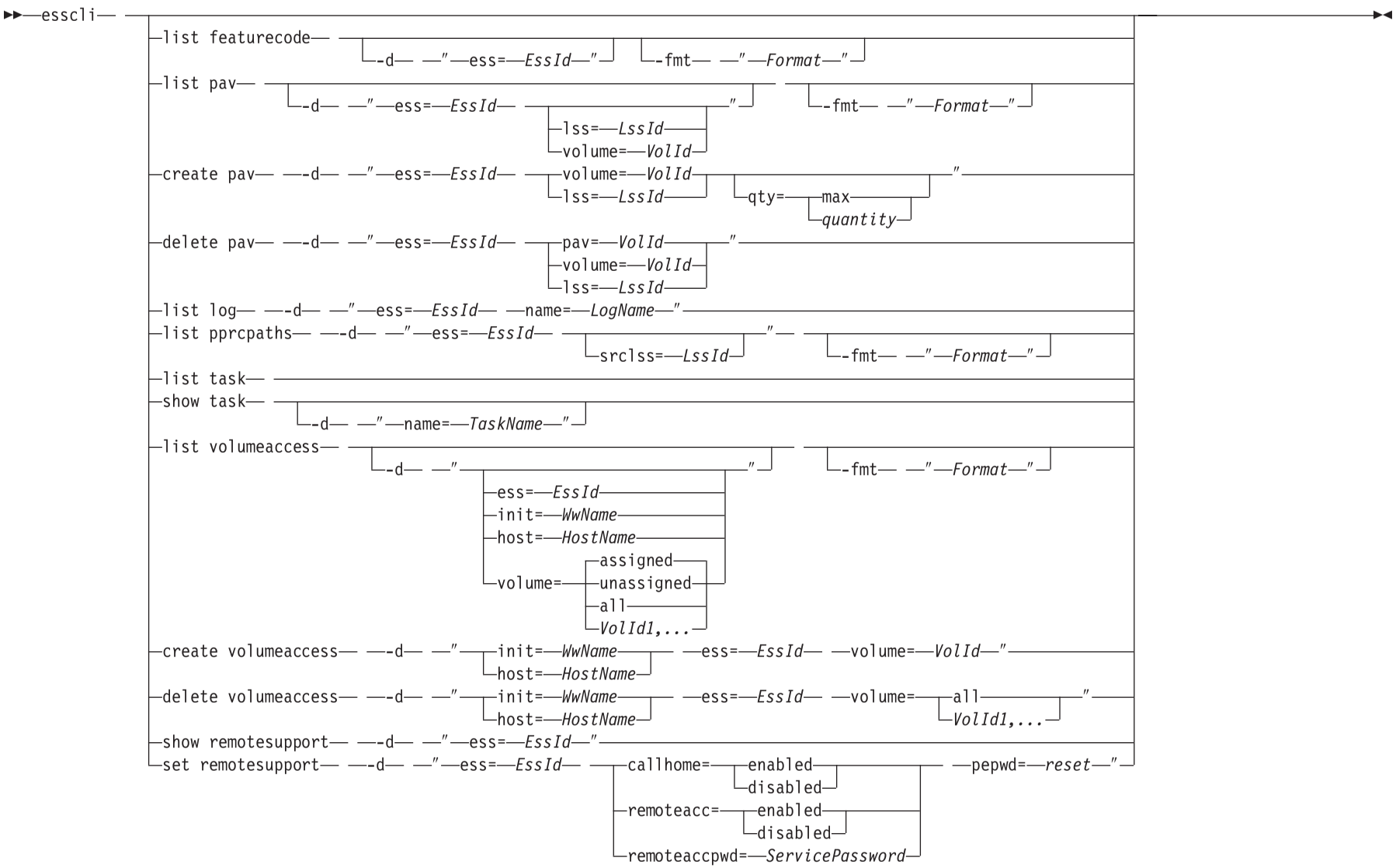
### esscli syntax



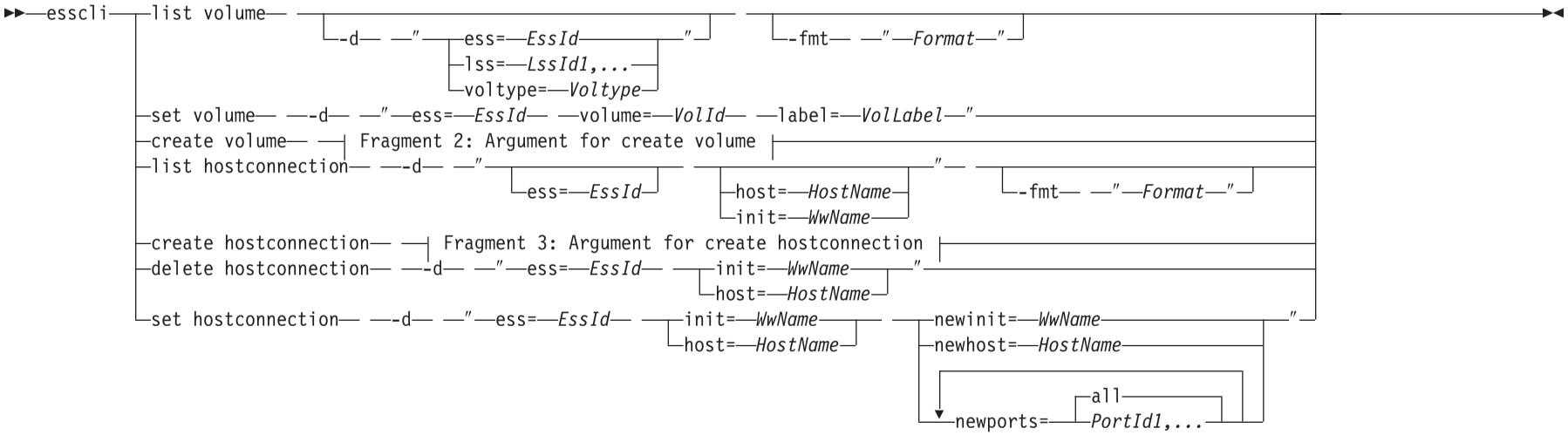

### Fragment 1: Argument for create volumespace:



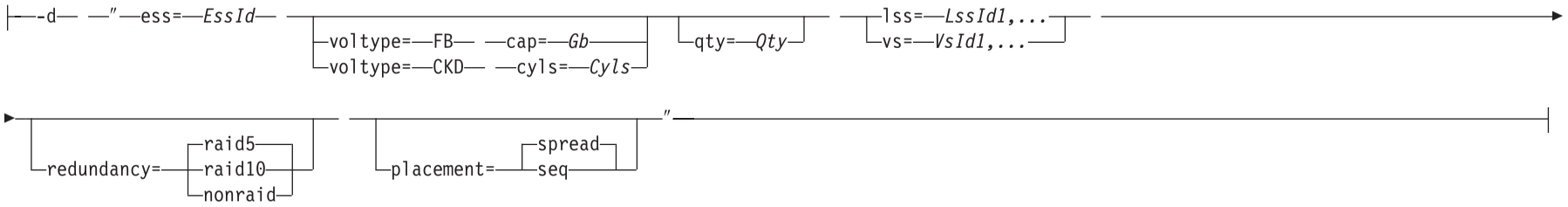
## esscli syntax cont'd



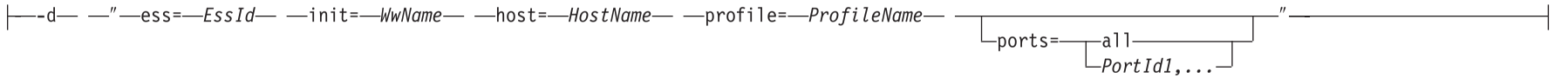
### esscli syntax cont'd



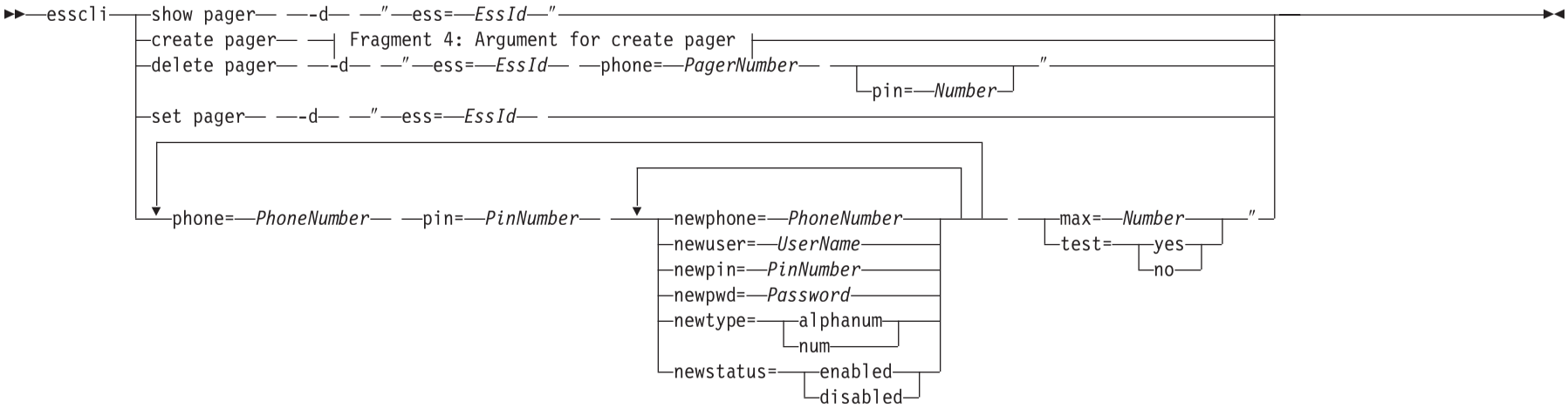

### Fragment 2: Argument for create volume:



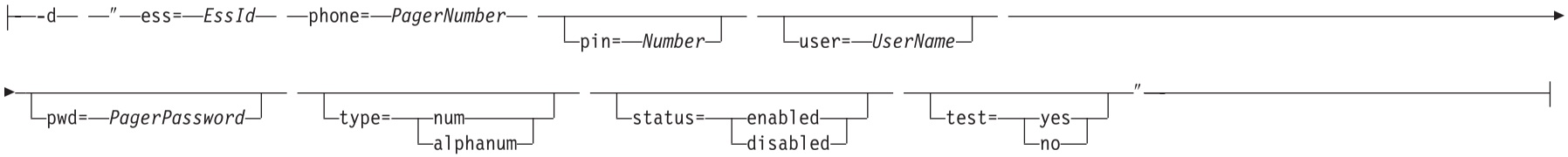

### Fragment 3: Argument for create hostconnection:



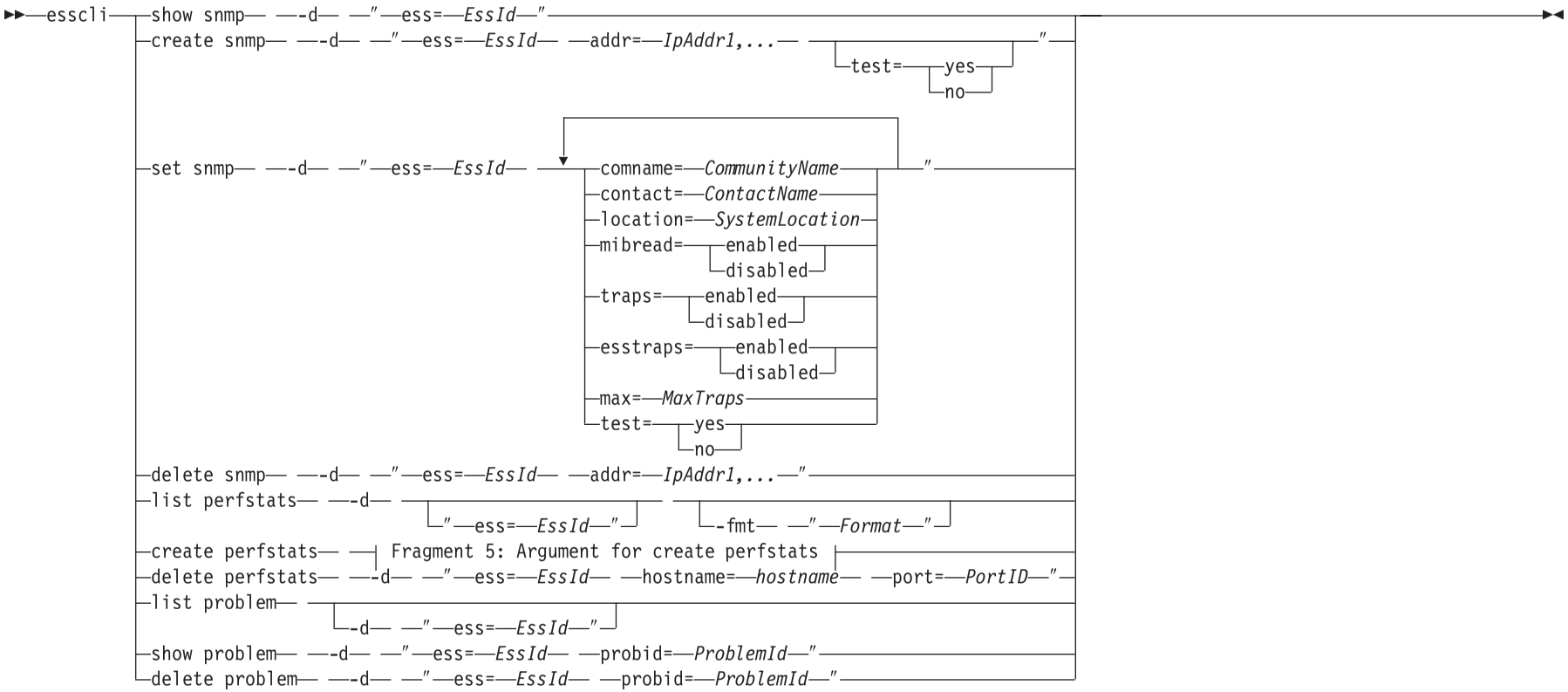
## esscli syntax cont'd



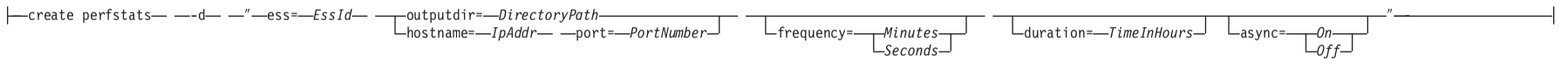

### Fragment 4: Argument for create pager:



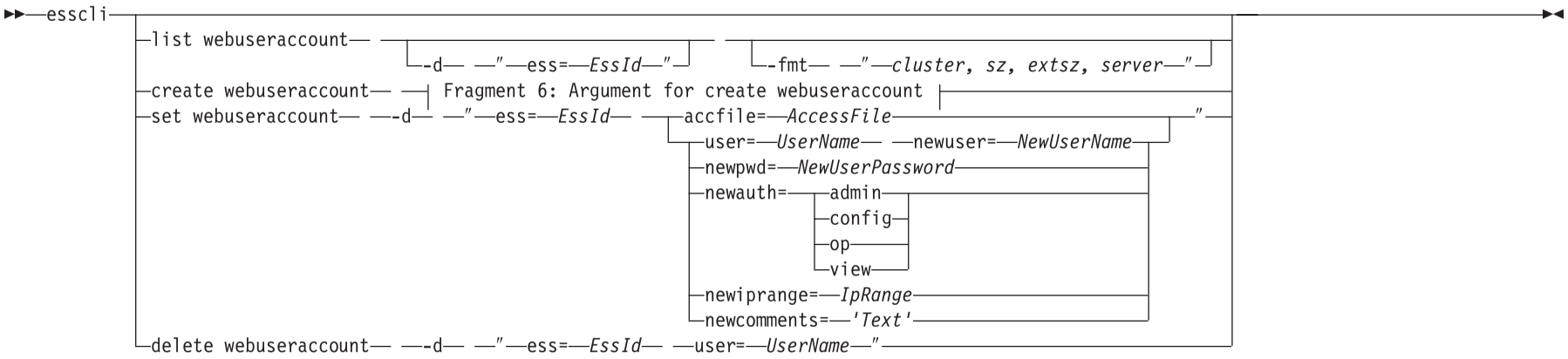
## esscli syntax cont'd



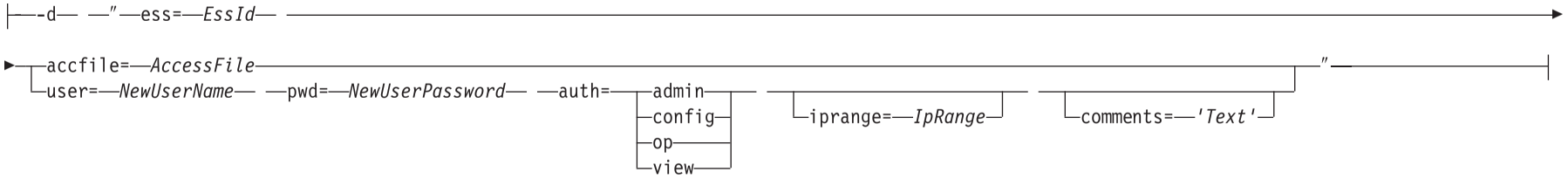

## Fragment 5: Argument for create perfstats:



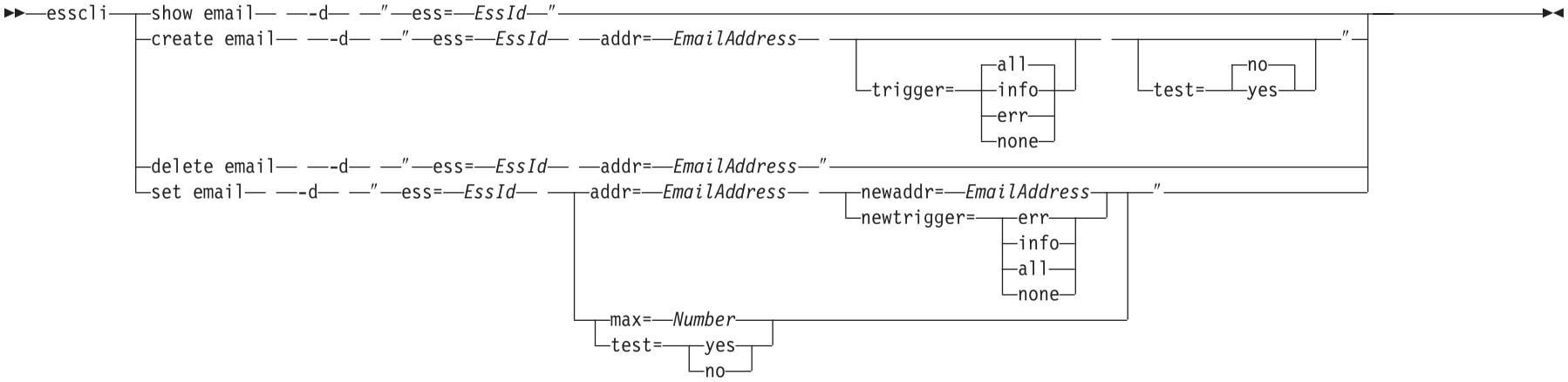
## esscli syntax cont'd




### Fragment 6: Argument for create webuseraccount:



## esscli syntax cont'd



## Flags and parameters

You can specify one or more flags, parameters, and arguments when you issue the **esscli** command. This section describes the flags and parameters for the **esscli** command.

## Parameters without arguments

You can specify one or more of the following parameters when you use the **esscli** command. See “Syntax” on page 26 for information about specifying these parameters.

**-?** Provides brief online help about the **esscli** command. The -? flag is optional and is the same as the -help and -h flags. The command ignores all other flags and parameters when the -? flag is specified.

**-refresh**
Provides access to the most recent information.

**-norefresh**
Provides the cache copy of the data on the server.

**-a** *AccessFile*
Specifies the user name, password, and other parameters to access and use the **esscli** command from your host system. If you include an access file as part of your command instances, you do not need to specify the flags and parameters it contains on the command line.

The access file has the following two valid formats:

**Simple format**
A simple text file that is supported by both the Copy Services CLI and the Storage Management CLI. An access file in this format functions the same way as the securityfilepath file for the Copy Services CLI commands. It simply contains a user name and a password, separated by two spaces, on the same line. For example, you can create a test01.txt access file to include tester1 (the username) and -testcase1 (the password). The test01.txt file looks like the following:

```
tester1  testcase1
```

You can then specify the `-a AccessFile` parameter when you issue the **esscli** command, for example:

```
esscli list task -s 9.46.23.187 -b 9.46.23.203 -a test01.txt
```

**Extended format**
A text file that is supported by the Storage Management CLI. An access file in extended format contains flags and parameters in addition to the user name and the password.

Begin the access file in this format with the word ″!VERSION″, followed by the version number, on the first line. Continue onto additional lines, as many as necessary, to specify arguments and parameters other than the action-category parameters, such as `list task`. Make sure that a parameter or argument is preceded by a valid flag and place both of them on the same line. The **esscli** command ignores any blank or comment (#) lines in the access file.

The following example shows the test01.txt file in extended format:

```
!VERSION 1.0
-u tester1  -p testcase1
-s 9.46.23.187
-b 9.46.23.203
-nov
-d "ess=2105.12345"
-fmt "server,vol,label,cap,units,volser"
```

You can then specify the -a *AccessFile* parameter when you issue the **esscli** command, for example:

```
esscli list volume -a test01.txt
```

You can further expand the access file to include a list of keys that are defined for specific sets of flags, parameters, and arguments for commonly-performed command operations. Begin the key list portion of the access file with the word ″!KEYLIST″, and follow it with a list of key names. The following shows the test01.txt file in extended format with a key list:

```
!VERSION 1.0

#-------------------------------------------------------------------------
# Command Options portion of access file (optional)
#-------------------------------------------------------------------------

-nohdr -nov

#-------------------------------------------------------------------------
# Key-list portions of access file (optional)
#-------------------------------------------------------------------------
# Note: Lines with CS are used for TASK and PPRCPATHS command categories
#       Lines with CFG are used for all other command categories.

!KEYLIST
 turbo5  CS  -s prime1.xyz.com -b second1.xyz.com  -u tester1 -p testcase1
 turbo5  CFG -s ess1c0.xyz.com -b ess1c1.xyz.com   -u porky   -p pig   -nossl
 gazelle CS  -s prime2.xyz.com -b second2.xyz.com  -u top     -p secret
 gazelle CFG -s x25b_3.xyz.com -b x2b_3c1.xyz.com  -u bush    -p broccoli -hdr
 silver1 CFG -s sil1c0.xyz.com         -u shrek    -p fiona  -d "ess=2105.12345"
 silver1 CS  -s sil1c0.xyz.com
```

You can then specify -a *AccessFile* and -key *KeyName* when you issue the **esscli** command as in

```
esscli list pav -a test01.txt -key gazelle -d "ess=2105.67890
lss=04"
```

**-b** *BackupAddr*
Specifies an alternate server IP address, DNS address, or host name of the requested service. The type of alternate server address must be either the ESS Specialist server or the Copy Services server according to what you defined using the -s flag. The -b flag is optional.

**-d “name=***value***”**
Specifies the name and value as part of the argument to the action-category parameters. The -d flag is required and its argument uses the name=*value* format.

You must specify a valid value for each of the name=*value* pairs in an argument. See “Argument names and values” on page 43 for a detailed description of all valid arguments and values.

**-fmt “***format***”**
Specifies the order of fields or columns you want to see in the output of the

**esscli** command. The -fmt flag is optional. You can specify the -fmt flag for any of the `list` parameters. You can enclose the format value in the optional double-quotation marks.

**-h** Provides brief online help about the **esscli** command. The -h flag is optional and is the same as the -help and -? flags. The command ignores all other flags and parameters when the -h flag is specified.

**-hdr**
Includes all header lines in the output of the **esscli** command. The -nohdr flag is optional, but it is on by default.

**-help**
Provides brief online help about the **esscli** command. The -help flag is optional and is the same as the -h and -? flags. The command ignores all other flags and parameters when the -help flag is specified.

**-key** *KeyName*
Specifies the name of the key that is associated with the predefined flags and parameters to be included in the access file. The -key flag is optional and applicable only when the access file is in extended format. If you specify a key name as part of your command instance, you must also include the access file that contains the key name. In this case, you do not need to specify the flags and parameters associated with that key entry on the command line. See "Extended format" on page 34 for more information.

**-nohdr**
Omits all header lines in the output of the **esscli** command. The -nohdr flag is optional.

**-nossl**
Specifies that the **esscli** command is sent in plain, unencrypted text. The -nossl flag is optional. To avoid possible security exposures, use this parameter only within a secure local or internal network environment.

**-nov**
Omits the progress status information when the **esscli** command is being executed. The -nov flag is optional.

**-p** *Password*
Specifies the password that is authorized to execute the **esscli** command. The -p flag, along with the -u flag, is required when you do not specify the -a flag. The -p flag, combined with the -u flag, is not required if you specify the -a flag.

Make sure to use your password for the ESS Copy Services server when you specify the `list task`, `show task`, and `list pprcpaths` parameters. Use your password for the ESS Specialist Server when you specify all other parameters.

**-s** *ServerAddr*
Specifies the server IP address, DNS address, or host name of the requested service. The -s flag is required.

As Table 1 on page 37 shows, you must specify the Copy Services server address when you use this name-value pair as part of the argument for the `list task`, `show task`, and `list pprcpaths` parameters. Specify the ESS Specialist server address when you use it for all other parameters.

**Note:** Make sure to use your user name and password for the ESS Copy Services server when you specify the `list task`, `show task`, and `list pprcpaths` parameters. Use your user name and password for the ESS Specialist server when you specify all other parameters.

*Table 1. ESS addresses and required accesses*

| Parameter Name | Required IP Address | Minimum Access | Minimum LIC level |
|---|---|---|---|
| list server | ESS Specialist server | View | 1.5.2.63 |
| list volumespace | ESS Specialist server | View | 1.5.2.63 |
| list diskgroup | ESS Specialist server | View | 1.5.2.63 |
| list port | ESS Specialist server | View | 1.5.2.63 |
| set port | ESS Specialist server | Configuration | 2.0.0.* |
| list volume | ESS Specialist server | View | 1.5.2.63 |
| create/set volume | ESS Specialist server | Configuration | 1.5.2.63 (fixed-block only) 2.2.0.* and 3380 in 2.3.0 |
| list pav | ESS Specialist server | View | 2.0.0.* |
| create/delete pav | ESS Specialist server | Configuration | 2.0.0.* |
| list volumeaccess | ESS Specialist server | View | 1.5.2.63 |
| create/delete/set volumeaccess | ESS Specialist server | Configuration | 1.5.2.63 |
| list hostconnection | ESS Specialist server | View | 1.5.2.63 |
| create/set/delete hostconnection | ESS Specialist server | Configuration | 1.5.2.63 |
| list log | ESS Specialist server | View | 2.0.0.* |
| list task | Copy Services server | Copy Services CLI | — |
| show task | Copy Services server | Copy Services CLI | — |
| list pprcpaths | Copy Services server | Copy Services CLI | — |
| list featurecode | ESS Specialist server | View | 2.1.0.* |
| list webuseraccount | ESS Specialist server | View | 2.0.0.* |
| create/set/delete webuseraccount | ESS Specialist server | Administration | 2.0.0.* |
| show remotesupport | ESS Specialist server | View | 2.0.0.* |
| set remotesupport | ESS Specialist server | Administration | 2.0.0.* |
| show email | ESS Specialist server | View | 2.0.0.* |
| create/set/delete email | ESS Specialist server | Administration | 2.0.0.* |
| show pager | ESS Specialist server | View | 2.0.0.* |
| create/set/delete pager | ESS Specialist server | Administration | 2.0.0.* |
| show snmp | ESS Specialist server | View | 2.0.0.* |
| create/set/delete snmp | ESS Specialist server | Administration | 2.0.0.* |
| list perfstats | ESS Specialist server | View | 2.0.0.* |
| create/delete perfstats | ESS Specialist server | Configuration | 2.3.0. |
| list/show problem | ESS Specialist server | View | 2.0.0.* |
| delete problem | ESS Specialist server | Configuration | 2.0.0.* |

*Table 1. ESS addresses and required accesses (continued)*

| Parameter Name | Required IP Address | Minimum Access | Minimum LIC level |
|---|---|---|---|
| create/delete volumespace | ESS Specialist server | Configuration | 2.0.0.* |
| * Indicates that this is the minimum required LIC level. More recent LIC levels are also supported for these parameters. | | | |

**-ssl**
Establishes a secure connection to the ESS Specialist server and indicates that the **esscli** command is encrypted. The -ssl flag is optional, but it is on by default.

**-debug**
Displays the stack trace of an exception only if the -v optional flag is specified. Under all other circumstances, the stack trace is not displayed unless a java error occurs.

**-nodebug**
Turns off the debug function if it has been defined in the access file. The default is nodebug.

**-u** *UserName*
Specifies the user name that is authorized to execute the **esscli** command. The -u flag, along with the -p flag, is required when you do not specify the -a flag. The -u flag, combined with the -p flag, is not required if you specify the -a flag.

**Note:** Make sure to specify your user name for the ESS Copy Services server when you specify the `list task`, `show task`, and `list pprcpaths` parameters. Specify your user name for the ESS Specialist Server for all other parameters.

**-v** Displays the progress status information when the **esscli** command is being executed. The entries in the output all start with ″trc″ for diagnosis and troubleshooting purposes. The -v flag is optional.

## Parameters with arguments

The following parameters are mutually exclusive. You can specify only one of them in a single instance of the **esscli** command. See “Syntax” on page 26 for information about specifying these parameters.

**list diskgroup**
Displays information about one or more disk groups. A disk group is a set of eight logically-associated disk drives that you can configure as a RAID array or as a set of non-RAID disks. A configured disk group produces one RAID volume space or multiple non-RAID volume spaces.

**create hostconnection**
Defines an initiator and then identifies the I/O ports on the ESS it is to use. You must define a host connection before you assign a volume to an initiator. Specify this parameter for fibre-channel attached host connections only.

**delete hostconnection**
Removes an initiator after you have successfully removed all volume access associations with it. Specify this parameter for fibre-channel attached host connections only.

**list hostconnection**
Displays all host initiators that are known to an ESS and assigned to SCSI-3 and fibre-channel host connections.

**set hostconnection**
Modifies one or more attributes of an existing initiator. The attributes include the worldwide name, the host name, or associated ports of an initiator. Specify this parameter for fibre-channel attached host connections only.

**list log**
Returns an audit log about all the configuration operations that were performed using the ESS Specialist in the past 10 days.

**create pav**
Configures one or more PAVs for a CKD base volume. The total number of PAVs and base volumes in an LSS cannot exceed 256.

**list pav**
Displays information about PAVs configured for a particular logical subsystem or logical volume in an ESS. You can configure one or more PAVs for each base (non-PAV) volume in a LSS, but the total number of base and PAV volumes in an LSS cannot exceed 256.

**delete PAV**
Removes one or more existing parallel access volumes (PAVs) for a CKD base volume.

**list pprcpaths**
Displays the status of each established PPRC path between a source and one or more target logical subsystems.

**list port**
Displays information about all host adapter ports installed in an ESS server. A host adapter port enables the attachment of a host to the ESS through a SCSI, ESCON®, or fibre-channel protocol.

**set port**
Modifies the configuration properties of a fibre-channel-only host adapter port, such as assigning a topology or protocol to an unconfigured port.

**list server**
Displays storage server information. You can specify the optional `ess=`*`EssId`* pair to filter the output list and display information about a specific server.

**list task**
Generates a report about all defined tasks in the Copy Services task repository.

**show task**
Displays all available information, such as source and target volumes, about one or all Copy Services tasks. You can specify the optional `name=`*`TaskName`* name-value pair to query a particular task or leave it out to query all tasks in the repository.

**create volume**
Allocates one or more logical volumes of the same size within the ESS. There must be one or more volume spaces defined in the ESS, with sufficient available (free) capacity to fit the volumes to be allocated. You can explicitly indicate the location of the volumes by specifying where the volume spaces are to be allocated, or you can implicitly indicate the location by specifying the logical subsystems where the volumes spaces are to be allocated (in which case, all volume spaces that are associated with the specified LSSs are eligible for the allocation). You can further determine the location of the volumes by

specifying the redundancy characteristics that are required for the volumes and by specifying a placement algorithm for allocating multiple volumes over multiple volume spaces.

**list volume**
Displays information about one or more fixed-block (FB) or count key data (CKD) volumes within an ESS server. You specify either the `voltype=`*`VolType`* name-value pair to query about volumes of a particular type, or the `lss=`*`LssId`* name-value pair to query the volume associated with a particular logical subsystem.

**set volume**
Modifies the label of an existing volume in an ESS server.

**create volumeaccess**
Assigns one or more volumes to an initiator. LUN IDs are automatically assigned by the ESS. Specify multiple volume IDs for the `vol=`*`VolId`* name-value pair to assign volumes to an initiator.

**delete volumeaccess**
Removes one or more volume access definitions. You can specify `vol=`*`all`* to remove all volume accesses to an initiator or `vol=`*`VolId`* to remove a particular volume access. You can specify multiple volume IDs to remove more than one volume access at a time. If you specify a volume access ID that is not assigned to an initiator, you will receive a warning message to that effect, but the command will still return with a successful status code.

**list volumeaccess**
Displays LUN assignments for a specific FB volume, initiator, or all volumes, including the unexposed ones that are associated with open-systems hosts. Volume size is reported in gigabytes. Volume and LUN identifiers are reported as hexadecimal characters (0 - 9 and A - F). You can specify this parameter to see the assignments of up to 256 LUNs or 4096 LUNs if your host system supports the **report LUNs** SCSI command.

**list volumespace**
Lists information about configured storage space. A volume space represents a contiguous space from which storage volumes are allocated. For the ESS, a volume space is a RAID array or a non-RAID (JBOD) disk. When a disk group is configured as a RAID array, one volume space is created. When a disk group is configured as non-RAID, up to eight volume spaces are created, one for each disk in the group. Disk groups are configured using the ESS Specialist.

**create volumespace**
Creates configured storage space. A volume space represents a contiguous space from which storage volumes are allocated. For the ESS, a volume space is a RAID array or a non-RAID (JBOD) disk. When a disk group is configured as a RAID array, one volume space is created. When a disk group is configured as non-RAID, up to eight volume spaces are created, one for each disk in the group. Disk groups are configured using the ESS Specialist.

**delete volumespace**
Deletes configured storage space. A volume space represents a contiguous space from which storage volumes are allocated. For the ESS, a volume space is a RAID array or a non-RAID (JBOD) disk. When a disk group is configured as a RAID array, one volume space is created. When a disk group is configured as non-RAID, up to eight volume spaces are created, one for each disk in the group. Disk groups are configured using the ESS Specialist. Because the command returns before the actual volume space is formatted, delete and

create operations cannot be run immediately in sequence on the same disk group. Users can check the ESS to verify that the volume space has finished formatting.

**create hostconnection**
Defines an initiator and identifies the set of I/O ports on the ESS that this initiator is allowed to use. Any volumes that are exposed to initiator WwName are seen through this set of I/O ports. Defining a host connection is a prerequisite for exposing volumes to an initiator.

Currently, Storage Management CLI supports only fibre-channel-attached host connections for this command, so parallel SCSI-3 initiators cannot be created.

**list featurecode**
Lists the active feature codes on the ESS. The Licensed Feature Codes table displays the licensed feature codes that you have purchased for this ESS. Feature codes enable the use of optional software components that provide additional or enhanced ESS functions.

**list webuseraccount**
Lists the user accounts that are active on the ESS. It allows you to view the settings of the currently defined user accounts that are permitted to access the ESS.

**create webuseraccount**
Creates user accounts that can access the ESS. Users with administration access can add ESS user accounts.

**set webuseraccount**
Modifies Web user accounts that have access to the ESS. Users with administration access can modify existing ESS web user accounts, including changing user names, passwords, access levels, IP ranges, and comments to the ESS.

**delete webuseraccount**
Deletes Web user accounts from the ESS. Users with administration access can delete existing ESS Web user accounts.

**list perfstats**
Displays the current settings of the data collector. These settings include the name of the machine that is to receive the collected statistics, the frequency at which statistics should be collected, the port number where the statistics should be sent, and the status of the data collection.

**create perfstats**
Sets up a particular client to receive performance statistics from an ESS. Enabling statistics collection allows you to retrieve cache and rank statistics from the ESS. When initializing the data collector, you must provide an output directory where the collected statistics can be stored in a file that is created by the Storage Management CLI. The command finishes when the data collector is notified that the entry has been deleted. This command does not stop until it is disabled. The ESS Storage Management CLI automatically assumes that if the host name and port information are not specified, it must automatically create one for you. If you attempt to set up performance statistics for another machine, performance statistics are automatically sent to the registered machine. The **create perfstats** command accepts multiple receivers. Multiple hosts can receive performance statistics at the same time.

**delete perfstats**
Notifies the host that the registration for receiving performance statistics has been deleted. You can perform this command on the same host system, but from a different DOS session.

**show remotesupport**
Displays the current settings set for the ESS remote support. These settings indicate whether incoming and outgoing calls are enabled.

**set remotesupport**
Modifies or sets the remote support properties that are available in the ESS. You can set the call home and remote access properties, as well as the service and PE passwords.

**show email**
Displays all the information regarding e-mail addresses that are configured for problem notification. This command produces the e-mail addresses and the corresponding error notification trigger value. That value indicates the types of problems for which the e-mail address is notified.

**create email**
Adds a new e-mail address to the problem notification configuration.

**delete email**
Removes an e-mail address from the current problem notification configuration.

**set email**
Modifies an existing e-mail address and its corresponding options. For example, you can change the trigger options on an existing e-mail address or can rename the existing e-mail address with a new address. You can also change the global settings of e-mails, such as the maximum number of e-mails that are sent per problem or test e-mails that are sent.

**show pager**
Displays a list of all pagers, along with all related information and global pager settings.

**create pager**
Adds a new pager number to the problem notification configuration. The phone field is required, as well as the pin number, if one exists. The pin is not required.

**delete pager**
Removes a pager from the current problem notification configuration.

**set pager**
Modifies existing pager information. The pager number and pin are required to locate the entry to be modified. Use this set command to update the global properties of pagers.

**show snmp**
Displays a list of all SNMP traps and the contact information that is currently configured for problem notification.

**create snmp**
Adds trap addresses to the existing problem notification configuration.

**set snmp**
Modifies existing SNMP information. This does not include the trap addresses. At least one of the name=value pairs must be specified. This does not include ess=EssId.

**delete snmp**
Deletes trap addresses from the SNMP problem notification configuration.

**list problem**
Lists all outstanding problems that are active on the ESS. The list problem parameter produces a table that displays the problem ID, cluster, and description of each active problem on the ESS.

**show problem**
Shows the active problems on the ESS. The ESS constantly monitors the operation of its internal components and logical resources. If it detects an abnormal condition, the ESS creates an entry in the problem log. The show problem parameter enables you to view the currently active problem log records.

**delete problem**
Cancels any outstanding problems that are active on the ESS. The delete problem parameter cancels the active problem on the ESS so that the ESS performs correctly for configuration changes or noncurrent code loads.

## Argument names and values

The following are the `name=value` pairs for the **esscli** command. You can specify one or more pairs immediately after the -d flag as arguments to the action-category parameters.

**async=on | off**
Indicates whether or not the asynchronous PPRC statistics are displayed. When this flag is specified, only asynchronous PPRC statistics are displayed. This argument automatically changes the frequency from minutes to seconds.

**cap=***Gigabytes*
Defines the size of a FB volume to be allocated. Specify the size, in gigabytes (GB), as a floating point value, with only a single digit after the decimal point, for example, `cap=27.9`.

Use this name-value pair as part of the argument for the `create volume` parameter only.

**cyls=***Cylinders*
Defines the size of a CKD volume to be allocated. Specify the size, in cylinders, as an integer value, for example, `cyls=3339`.

Use this name-value pair as part of the argument for the `create volume` parameter only.

**ess=***EssId*
Identifies the ESS. The ESS ID format is ″machine type.serial number″; that is, the machine type number is followed with a period delimiter and then by the machine serial number, for example, `ess=2105.FA123`.

**host=***HostName*
Specifies the name of a host system connected to an ESS. Each of the host names, up to 30 characters in length, must be unique. If a host name contains spaces, make sure to enclose it in single-quotation marks, for example, `host='ess test'`.

**init=***WwName*
Defines the worldwide port name (WWPN) for an initiator. The initiator name must be exactly 16 hexadecimal characters (0 - 9, a - f, A - F) in length and unique among all initiator names defined for an ESS.

**label=***VolLabel*
Identifies the label for a particular logical volume. Specify the volume label, up to eight characters in length, as part of the argument for the `set volume` parameter only.

**lss=***LssId1,...*
Specifies one or more ESS logical subsystem (LSS) identifiers. Each LSS ID contains one or two hexadecimal characters. The range of its valid value is 0 <= LssId <= 15 for CKD logical subsystems or 16 <= LssId <= 31 for FB logical subsystems.

**name=***LogName*
Identifies the log file that records userid-specific configuration activities. Use this name-value pair as part of the argument for the `list log` parameter only.

**name=***TaskName*
Identifies the Copy Services task to be displayed. Use this name-value pair as the argument for the `show task` parameter only.

**newhost=***HostName*
Assigns a new name to an existing host system for an ESS. Each of the host names, up to 30 characters in length, must be unique. If a host name contains spaces, make sure to enclose it in single-quotation marks, for example, `host='ess test'`.

Use this name-value pair as part of the argument for the `set hostconnection` parameter only.

**newinit=***WwName*
Assigns a new WWPN to an existing initiator for an ESS. The initiator name must be exactly 16 hexadecimal characters (0 - 9, a - f, A - F) in length and unique among all initiator names defined for an ESS.

Use this name-value pair as part of the argument for the `set hostconnection` parameter only.

**newport=all | *PortId1,...***
Defines new ports to an existing initiator. You can specify the default `ports=all` to turn off port assignment filtering and allow the initiator to access an ESS through any of the installed fibre-channel ports. You can also assign specific ports to an initiator by specifying their identifiers. Table 2 on page 45 lists the valid port identifiers for the host adapter ports of an ESS.

Use this name-value pair as part of the argument for the `set hostconnection` parameter only.

**pav=***VolId*
Specifies an ESS logical volume that is associated with a PAV. The *VolId* value is the same as that in the `volume=VolId` pair.

**placement=seq | spread**
Specifies the algorithm for organizing volumes if multiple volumes are being allocated and if multiple volume spaces are eligible for the allocation. If you specify `placement=seq`, the allocated volumes will be sequentially placed, filling up the first volume space before trying the next. If you specify the default `placement=spread`, the allocated volumes will be randomly placed, filling up any eligible volume spaces.

Use this name-value pair as part of the argument for the `create volume` parameter only.

**ports=all | *PortId1,...***

Assigns ports to an initiator. You can specify `ports=all` to turn off port assignment filtering and allow the initiator to access an ESS through any of the installed fibre-channel ports. You can also assign specific ports to an initiator by specifying their identifiers. Table 2 lists the valid port identifiers for the host adapter ports in an ESS.

*Table 2. Identifiers for ESS host adapter ports*

| Port ID (hex) | Bay | Adapter | Port |
|---|---|---|---|
| 00 | 1 | 1 | A |
| 01 | 1 | 1 | B |
| 04 | 1 | 2 | A |
| 05 | 1 | 2 | B |
| 08 | 1 | 3 | A |
| 09 | 1 | 3 | B |
| 0C | 1 | 4 | A |
| 0D | 1 | 4 | B |
| 20 | 2 | 1 | A |
| 21 | 2 | 1 | B |
| 24 | 2 | 2 | A |
| 25 | 2 | 2 | B |
| 28 | 2 | 3 | A |
| 29 | 2 | 3 | B |
| 2C | 2 | 4 | A |
| 2D | 2 | 4 | B |
| 80 | 3 | 1 | A |
| 81 | 3 | 1 | B |
| 84 | 3 | 2 | A |
| 85 | 3 | 2 | B |
| 88 | 3 | 3 | A |
| 89 | 3 | 3 | B |
| 8C | 3 | 4 | A |
| 8D | 3 | 4 | B |
| A0 | 4 | 1 | A |
| A1 | 4 | 1 | B |
| A4 | 4 | 2 | A |
| A5 | 4 | 2 | B |
| A8 | 4 | 3 | A |
| A9 | 4 | 3 | B |
| AC | 4 | 4 | A |
| AD | 4 | 4 | B |

**profile=*ProfileName***

Defines the platform (hardware) and operating system (software) of a host system. Table 3 on page 46 lists the valid profile names.

Use this name-value pair as part of the argument for the `create hostconnection` parameter only.

*Table 3. Profile names for host systems*

| Profile Name | Description |
|---|---|
| aix | IBM @server pSeries® with AIX 4.2.1 or later |
| dgux | Data General AViiON with DG/UX 4.2 or later |
| dynix | IBM Numa Server with DYNIX/ptx® 4.47 or later |
| hpux | Hewlett-Packard Server (HP-UX) 10.20 or later |
| irix | SGI with Irix 6.5.9 or later |
| iscsigate | Cisco iSCSI Storage Router |
| linux | IBM @server xSeries (x86) with Red Hat 7.2 |
| linuxppc | IBM @server iSeries with AS/400® and pSeries with RS/6000® |
| linux390 | IBM @server zSeries with S/390 |
| lodestone | IBM SAN Volume Controller |
| netware | x86 compatible PC with Novell Netware |
| newport_a | IBM SAN File System (AIX MDS) |
| newport_b | IBM SAN File System (Lnx MDS) |
| nt4 | x86 compatible PC with Microsoft® Windows 2000 or Windows NT 4.0 |
| openvms | Hewlett Packard Alpha with OpenVMS 6.2 or later |
| os400 | IBM @server iSeries V3R7 or later |
| solaris251 | Sun Sparc or Ultrasparc with Solaris 2.5.1 or later |
| solaris26 | Sun Sparc or Ultrasparc with Solaris 2.6, 7, 8 or later that includes 32-LUN and fibre-channel support |
| tru64 | Hewlett Packard Alpha with Tru64 UNIX® 4.0D or later |
| sunmpxio | Sun MPXIO |

**protocol=FCP | FICON**
Defines the configured protocol type. You can specify `protocol=FCP` for FB volumes attached to open-systems hosts or `protocol=FICON` for CKD volumes attached to zSeries hosts. The default type for a fibre-channel port is FCP.

**qty=max | *Quantity***
Specifies the number of volumes or parallel access volumes (PAVs) to create. If you specify `qty=max`, you must allocate PAVs for all remaining volume addresses in the LSS. If you specify `qty=Quantity`, the quantity must be an integer value.

Use this name-value pair as part of the argument for the `create volume` and `create pav` parameters only.

**redundancy=raid5 | raid10 | nonraid**
Specifies the storage type of a volume space, with RAID5 as the default type. Use this name-value pair as part of the argument for the `create volume` parameter only.

**srclss=*LssId***
Specifies the LSS about which you want to display information. Each LSS ID contains one or two hexadecimal characters. The range of its valid value is 0 <= LssId <= 15 for CKD logical subsystems or 16 <= LssId <= 31 for FB logical subsystems.

Use this name-value pair as part of the argument for the `list pprcpaths` parameter only.

**topology=P2P | FCAL | undefined**
Specifies the type of fibre connection to a particular fibre-channel port. Valid topology types are undefined, Point-to-Point (P2P), and fibre-channel arbitrated loop (FCAL), with P2P as the default value.

**voltype=***VolType*
Specifies the ESS logical volume type. Table 4 lists the valid ESS logical volume types.

*Table 4. ESS logical volume type identifiers*

| Volume Type | Description |
|---|---|
| AS400* | An AS/400-protected volume that can be mixed with other AS/400 and FB volumes in the same volume space |
| AS400U* | An AS/400-unprotected volume that can be mixed with other AS/400 and FB volumes in the same volume space |
| FB | A fixed-block volume, the default volume type, that can be mixed with both AS/400-protected and AS/400-unprotected volumes in the same volume space |
| 3380 | An IBM @server zSeries volume, with 3390 track format in 3380 track emulation mode, that does not tolerate mixed volume types in the same volume space |
| 3390 | An IBM @server zSeries volume, with 3390 track format, that does not tolerate mixed volume types in the same volume space |
| * AS400 and AS400U are only for the command **create volumes**. These volume types cannot be used with the **create volumespace** command. | |

**volume=all | assigned | unassigned |** *VolId1,...*
Identifies the ESS logical volumes. You can specify `volume=all` to select all volumes for a given ESS server, `volume=assigned` for assigned volumes, or `volume=unassigned` for unassigned volumes. You can also define `volume=VolId1,...` to select one or more particular volumes by specifying their identifiers. Valid volume identifiers contain four hexadecimal characters, with the first two representing the ID of the logical subsystem and the last two representing the volume address, for example, `volume=16AB`.

**vs=***VsId1,...*
Specifies volume space identifiers. Volume space identifiers use the format of the characters ″vs″ followed by an integer value, for example `vs15`. You can specify the `list volumespace` parameter for the **esscli** command to determine the exact volume space value for a particular ESS.

Use this name-value pair as part of the argument for the `create volume` parameter only.

**acclvl=admin | config | op |view**
Indicates the access level of the user that is being created.

**iprange=***filterIPAdress*
Indicates a login address filter that is applied to the user account for additional security. This is an optional entry.

**Comments=***'User Comments'*
Indicates user-created comments. This field must be enclosed in single quotation marks to be processed. This is an optional entry when you are creating a Web user account.

**acclvl=All | *VolId* | *VolId ...***
Indicates the ESS Logical Volume identifier. The *VolId* consists of exactly 4 hexadecimal characters. The first 2 characters represent the logical subsystem ID, and the last 2 characters represent the volume address (for example, 16AB).

**newiprange=*'IpRange'***
Defines the new login address filter that is applied to the specified Web user account for additional security. This is an optional entry for the set webuseraccount function. The syntax is newiprange='*XXX.XXX.XXX.XXX*', where, for example, *XXX.XXX.XXX.XXX* is the IP range.

**newacclvl=admin | config | op |view**
Indicates the access level of the user to be modified. This is an optional entry.

**newcomments=*'NewUserComments'***
Indicates new user-created comments. This field must be enclosed in single quotation marks to be processed. This is an optional entry when you modify a Web user account.

**newpwd=*NewUserPwd***
Defines the new password for the specified Web user account. This is an optional entry for the set webuseraccount function.

**newuser=*NewUsrName***
Defines the new user name for the specified Web user account. This is an optional entry for the set webuseraccount function.

**prodid=*ProblemID***
Indicates the ID of the problem to perform the specified function on. This is an optional entry for the show problem function, but it is a mandatory entry for the delete problem function.

**pwd=*NewUserPwd***
Defines the password for the specified Web user account that you are attempting to create. This is used for the create webuseraccount function.

**pwd=*pagerPwd***
Defines the password for the specified pager that you are attempting to create. This is used for the create pager command for remote support.

**user=*Username***
Indicates the user name of the Web user account that you want the specified functions performed on. User is used for the create, set, and delete webuseraccount functions.

**user=*Username***
Indicates the user name of the pager that you want the specified functions performed on. User is used for the create, set, and delete pager functions.

**callhome=enabled | disabled**
Indicates the ability to allow the ESS outgoing calls, for example, callhome=enabled.

**remoteacc=enabled | disabled**
Indicates the ability to allow the ESS incoming calls, for example, remoteacc=enabled.

**svcpwd=*ServicePwd***
Specifies the new service password.

**accfile=***Accessfile*
Allows the client to directly hide the password from the user. The user can use this entry in place of the following parameters: svcpwd, newpwd, newuser, pin, newpin, and pwd.

**pepwd=reset**
Generates and displays a new PE password.

**addr=***EmailAddress*
Indicates the e-mail address that is being used for the display.

**addr=***IpAddr1***,** *IpAddr2***,** *...*
Indicates the SNMP IP address. You can enter more than one IP address for an SNMP trap.

**trigger= info | err | all | none**
Indicates the level that the messages be sent to the specified e-mail address.

**newaddr=***EmailAddress*
Allows you to create a new address of this object.

**newtrigger= info | err | all | none**
Allows you to create a new trigger level to the specified e-mail.

**test=yes | no**
Indicates that you want to test the newly created information. You can test e-mail, pager, or SNMP traps.

**phone=***PhoneNum*
Indicates the pager number of the client pager.

**pin=***PinNum*
Indicates the specified pin number of the client pager.

**newuser=***Username*
Indicates the new user name of the pager number that you are specifying.

**newphone=***Phonenum*
Indicates the new pager number of the client pager.

**newpin=***PinNum*
Indicates the new pin number of the pager.

**newpwd=***PagerPwd*
Indicates the new pager password of the client pager. This is used with the pager user name.

**newtype=numeric | alphanum**
Indicates the new type of pager that is associated with the pager number that you are using.

**status=enabled | disabled**
Indicates the status of the specified pager.

**max=***MaxTraps*
Gives you the ability to change the number of SNMP traps that are sent per problem.

**max=***MaxEmails*
Gives you the ability to change the number of e-mails that are sent per problem.

**max=***MaxPager*
Gives you the ability to change the number of pager notifications that are sent per problem.

**comname=***CommunityName*
Indicates the contact information of the community that the ESS is located in.

**contact=***Contactname*
Indicates the contact information of the ESS.

**location=***SystemLocation*
Indicates the system location of the ESS.

**mibread=enabled | disabled**
Indicates the ability to have read access to the ESS. You can enable or disable read access to the Management Information Base.

**traps=enabled | disabled**
Indicates the ability to enable or disable generic SNMP traps.

**esstraps=enabled | disabled**
Indicates the ability to enable or disable SNMP traps.

**duration=***TimeInHours*
Indicates the duration that performance statistics are collected. The default is 24 hours.

## Examples

This section includes sample reports for each of the **esscli** command parameters. These samples are for reference only; the actual reports and contents vary based on your command specifications.

**esscli list diskgroup**
The following sample report is similar to what you see when you issue the `esscli list diskgroup -d "ess=2105.FA123"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

DG   Redundancy  Width  DCap(GB)  RPM    Members
---  ----------  -----  --------  -----  ------------------------------------------------
dg1  raid5         6        36.4  10000  dd0105,dd0106,dd0107,dd0108,dd0201,dd0202,dd0203,dd0204
dg2  raid10        3        72.8  10000  dd0101,dd0102,dd0103,dd0104,dd0205,dd0206,dd0207,dd0208
dg4  raid10        4       145.6  10000  dd1701,dd1702,dd1703,dd1704,dd2005,dd2006,dd2007,dd2008
dg5  undefined    ***       18.2   7200  dd1805,dd1806,dd1807,dd1808,dd1901,dd1902,dd1903,dd1904
dg6  raid5         7         9.1  15000  dd1705,dd1706,dd1707,dd1708,dd2001,dd2002,dd2003,dd2004
```

The fields in this output are described in Table 5. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "server,dg,loc,raid,width,cap,rpm,dd, status"
```

*Table 5. Output fields for the list diskgroup parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| DG | dg | char[1...4] | Disk group identifier for identifying a disk group within an ESS |
| Redundancy | raid | raid5 \| raid10 \| nonraid | Type of RAID associated with a particular disk group |

*Table 5. Output fields for the list diskgroup parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Width | width | 1 \| 3 \| 4 \| 6 \| 7 *** | Width of a configured disk group, with a number value indicating the number of disks, excluding parity, and with the *** value representing an undefined width |
| DCap | dcap | 9.1 \| 18.2 \| 36.4 \| 72.8 \| 145.6 | Minimum capacity, in gigabytes, for any disk in the group |
| RPM | rpm | 7200 \| 10000 \| 15000 | Minimum disk rotation speed for any disk in the group |
| Members | dd | char[1...64] | Identifiers for the eight disk drives associated with a disk group |
| Location | loc | char[1...6] (A*x*P*y*G*z*) | Physical location of the disk group, consisting of adapter pair *x*, port (loop) *y*, and disk group *z* (A*x*P*y*G*z*). **Note:** If you have installed the arrays across loops feature, the value for *y* will always be *X*. This feature also allows up to 7 characters. |
| Status | status | 10 characters | Status of the disk group |

### esscli create hostconnection

The following sample report is similar to what you see when you issue the `esscli create hostconnection -d "host=Sun1 init=3007ACF30A2399E0 profile=SOLARIS26 ess=2105.20288 ports=00,04,80"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful.
```

### esscli list hostconnection

The following sample report is similar to what you see when you issue the `esscli list hostconnection -d "ess=2105.FA123"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Host             Initiator         Profile    Ports
---------------  ----------------  ---------  ---------
Donkey           3007ACF30A2399E1  HPUX       00,80
Donkey2          ***               NOVELL     AD
Fiona            3007ACF30A2399E2  SOLARIS26  04,84
'Lord Farquaad'  3007ACF30A270012  LINUX      40,80,A0
Shrek            3007ACF30A260012  AIX        ALL
Shrek            3007ACF30A260013  AIX        ALL
Shrek2           3007ACF30A270014  NT4        04
```

The fields in this output are described in Table 6 on page 52. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt "host,profile,attach,init,ports"
```

*Table 6. Output fields for the list hostconnection parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Initiator | init | 16 hexadecimal characters | Worldwide node or port name for identifying an initiator associated with a particular host connection |
| Host | host | char[1..30] | Name of a host associated with a particular volume |
| Profile | profile | mixed characters | Identifier for the platform (hardware) and operating system (software) of a host system |
| Ports | ports | char[1..256] | List of ESS I/O port identifiers separated by a comma (as described in Table 2 on page 45) |
| Attachment | attach | FC \| SCSI | Host connection type: SCSI if it is a parallel SCSI-3 attachment or FC if it is a fibre-channel attachment. |

**esscli set hostconnection**

The following sample report is similar to what you see when you issue the `esscli set hostconnection -d "host=host1 ess=2105.20288 newhost=host2"` command to update the host name:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful.
```

**esscli delete hostconnection**

The following sample report is similar to what you see when you issue the `esscli delete hostconnection -d "init=3007ACF30A2399E0 ess=2105.20288"` command to delete the host connection:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8
Operation Successful.
```

**esscli list log**

The following sample report is similar to what you see when you issue the `esscli list log -d "ess=2105.FA123 name=audit"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Type Date       Time         User    ID     Msg
-------------------------------------------------------------------------------
I   2002/08/07  19:57:20:25  Maggie  3431   Action: Defining rank. SSA: ssa01, Loop...
I   2002/08/07  20:01:11:89  Maggie  3406   DefineRank RC=0 (Successful). New rank name...
I   2002/08/07  20:01:11:92  Drew    3431   Action: Defining rank.  SSA: ssa02, Loop...
I   2002/08/07  20:03:21:45  Drew    3406   DefineRank RC=0 (Successful).  New rank ...
```

The fields in this output are described in Table 7.

*Table 7. Output fields for the list log parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Type | type | 16 hexadecimal characters | Type of log entry |

*Table 7. Output fields for the list log parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Date | date | char[1..10] | Day during which the recorded activity occurred |
| Time | time | char[1..12] | Time at which the recorded activity occurred |
| User | usr | char[1..15] | Name or identifier of the authorized user who performed the recorded activity |
| ID | msgID | 4 characters | Unique identifier for the recorded activity |
| Msg | msg | char[1..256] | Brief message about the recorded activity |

**esscli create pav**

The following sample report is similar to what you see when you issue the `esscli create pav -d "ess=2105.FA123 volume=0645 qty=2"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful.
```

**esscli delete pav**

The following sample report is similar to what you see when you issue the `esscli delete pav -d "ess=2105.FA123 pav=06FF"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Operation Successful.
```

**esscli list pav**

The following sample report is similar to what you see when you issue the `esscli list pav -d "ess=2105.FA123 volume=0102"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

PAV    Lss   BaseVol
-----------------------------------------------
01fd   01    0102
01fe   01    0102
01ff   01    0102
```

The fields in this output are described in Table 8. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "server,pav,lss,basevol"
```

*Table 8. Output fields for the list pav parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| PAV | pav | 0000..1FFF | PAV identifier |

*Table 8. Output fields for the list pav parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Lss | lss | 00..0F | Logical subsystem identifier |
| BaseVol | basevol | 0000..0FFF | Base volume identifier |

### esscli list pprcpaths

The following sample report is similar to what you see when you issue the `esscli list pprcpaths -d "ess=2105.20288 srclss=16"` command to display information about a single LSS:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

SourceServer=2105.20288
TotalPaths=7
SrcLss  SrcPort  TgtServer   TgtLss  Conn     Status
-------------------------------------------------
16      80       2105.FA123  18      Fabric    01
16      00       2105.FA123  18      Fabric    01
16      80       2105.FA145  20      Fabric    01
16      00       2105.FA145  20      Fabric    01
16      01       2105.FA178  18      P2P       01
16      04       2105.FA178  18      P2P       01
16      05       2105.FA178  18      P2P       02
```

The fields in this output are described in Table 9. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt "srclss,srcport,tgtserver,tgtlss,tgtport,conn,status,swid,swport"
```

*Table 9. Output fields for the list pprcpaths parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| SrcLss | srclss | 00..1F | Logical subsystem on a primary storage server |
| SrcPort | srcport | 2 hexadecimal characters | Port identifier on the primary storage server |
| TgtServer | tgtserver | 10 characters | Same as the EssID value for identifying a secondary storage server (in ″type.serial″ format) |
| TgtLss | tgtlss | 00..1F | Logical subsystem on a secondary storage server |
| Conn | conn | Fabric \| P2P | PPRC (switch or direct) connection type |
| Status | status | 2 hexadecimal characters | PPRC connection status as defined in Table 10 on page 55 |
| TgtPort | tgtport | 2 hexadecimal characters | Port identifier on the secondary storage server |
| SwId | swid | Decimal number | Switch identifier |
| SwPort | swport | Decimal number | Identifier of the outgoing port on the switch |

Table 10 on page 55 lists and describes the pprcpath connection status indicators.

*Table 10. Indicators of pprcpath connection status*

| Status | Description |
|---|---|
| 1 | A path is established. |
| 2 | An initialization has failed. |
| 3 | A task timed-out for unknown reasons. |
| 4 | Resources are not available at the primary site for the logical path establishment. |
| 5 | Resources are not available at the secondary site for the logical path establishment. |
| 6 | A secondary site sequence number or logical subsystem number are mismatched. |
| 7 | A secondary site subsystem ID (SSID) does not match. |
| 8 | A path is offline due to lack of light detection from a host, peer, or switch. |
| 9 | An establishment failed but will try again as conditions improve. |
| 0A | The port at the primary storage server cannot be converted to channel mode because an inbound logical path is already established. |
| 10 | A configuration error has occurred. |
| 11 | A path connection error occurred while attempting to establish a path between fixed-block and CKD logical subsystems. |
| 12 | An error occurred when the path was being established. |
| 13 | A fibre channel path has been established. |
| 17 | The secondary fibre channel path is not available. |

**esscli list port**

The following sample report is similar to what you see when you issue the `esscli list port -d "ess=2105.FA123"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Port  Loc     Type   Speed  Protocol   Topology  WWN               Status
----  ------  -----  -----  ---------  --------  ----------------  ----------
00    B1A1PA  ESCON   20MB  ESCON      ***       ***               operational
04    B1A2PA  SCSI    40MB  SCSI       ***       ***               unconfigured
80    B2A3PA  FIBRE     1Gb  FCP        FCAL      3007ACF30A2399E1  quiesced
A0    B4A3PA  FIBRE     1Gb  FICON      P2P       3007ACF30A2399E4  failed
A4    B4A3PB  FIBRE     1Gb  FCP_FICON  P2P       3007ACF30A2399E1  operational
```

The fields in this output are described in Table 11. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "server,port,loc,type,speed,protocol,topology,wwn,status"
```

*Table 11. Output fields for the list port parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| Port | port | 2 hexadecimal characters | I/O port identifier (see Table 2 on page 45 for an explanation) |

*Table 11. Output fields for the list port parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Loc | loc | 6 characters | Physical location of an I/O port (in ″B*x*A*y*P*z*″ format, where B stands for the bay, A for the adapter, and P for the port) |
| Type | type | FIBRE \| SCSI \| ESCON | Adapter type |
| Speed | speed | *xx*MB \| *xx*GB | Data transfer rate in megabytes per second or gigabytes per second for the ESS |
| Protocol | protocol | FCP \| FICON® | Type of configured protocol for a port |
| Topology | topology | P2P \| FCAL \| undefined | Type of fibre connection to a particular fibre-channel port |
| WWN | wwn | 16 hexadecimal characters | Worldwide name for a fibre-channel port (or *** for ESCON and SCSI ports) |
| Status | status | operational \| rebuilding \| read-only \| failed | Last known status of an port |

**esscli set port**

The following sample report is similar to what you see when you issue the `esscli set port -d "ess=2105.FA123 port=84 topology=p2p protocol=fcp"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful.
```

**esscli list server**

The following sample report is similar to what you see when you issue the `esscli list server` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Server      Model  Mfg  WWN              CodeEc    Cache  NVS   Racks
----------  -----  ---  ---------------  --------  -----  ----  -----
2105.FA123  F10    075  1234567887654321  1.5.1.14   40GB  32MB    2
```

The fields in this output are described in Table 12. You can select specific fields and determine which order you want them displayed by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "server,model,mfg,wwn,codeec,cache,nvs,racks"
```

*Table 12. Output fields for the list server parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| Model | model | 3 characters | Any of the ESS model numbers (such as E10, E20, F10, F20, 750, 800) |

*Table 12. Output fields for the list server parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Mfg | mfg | 3 characters | Manufacturing code of an ESS, indicating where it was manufactured |
| WWN | wwn | 16 hexadecimal characters | Worldwide node name of an ESS |
| CodeEC | codeec | char[1..9] | ESS microcode release level (up to eight characters in the format ″version.release.maintenance.fix″) |
| Cache | cache | Decimal number | Amount of installed cache memory |
| Nvs | nvs | Decimal number | Amount of installed nonvolatile storage |
| Racks | racks | Decimal number | Number of installed (one or two) racks |

**esscli list task**

The following sample report is similar to what you see when you issue the `esscli list task` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

TaskName           Type                Status
-------------------------------------------------------
EstPath1          PPRCEstablishPaths       Successful
RemovePaths       PPRCRemovePaths          Successful
CharliesTask1     PPRCEstablishPair        NotRunning
CharliesTask2     PPRCSuspendPair          Failed
CharliesTask3     PPRCTerminatePair        NotRunning
CharliesTask4     PPRCFreezeGroup          Successful
CharliesTask5     ConsistencyCreated   Successful
MaggiesTask       FCWithdraw               Successful
RicksTask         FCEstablish              Successful
aGroupedTask      Group                    Successful
```

**esscli show task**

The following sample report is similar to what you see when you issue the `esscli -s primaryserver show task -d "name=MaggiesTask"` command to display information about a base task:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

TaskName=MaggiesTask
TaskType=FCEstablish
Options=InbandCommand
SourceServer=2105.FA123
TargetServer=2105.FA123
ConduitESS=2105.FA125 - ConduitLSS=11
 SourceVol     TargetVol
-------------------------------------------------------
1645          1690
1646          1691
1647          1692
```

The following sample report is similar to what you see when you issue the `esscli -s primary server show task -d nam=sdf` command to display information about all tasks:

```
Tue Mar 02 10:34:44 MST 2004 IBM ESSCLI 2.3.0.2
Taskname=sdf
Tasktype=ManageSessionMembers
Options=Addvolumetosession
Session Id: 222
Ess Sequence Number: 26866
LSS Number:  0x01
Session Volumes:
0x01
```

The following sample report is similar to what you see when you issue the `esscli -s primary server show task -d name=async1` command to display information about starting or resuming a task:

```
Tue Mar 02 10:34:44 MST 2004 IBM ESSCLI 2.3.0.2
Taskname=start1
Tasktype=AsyncPPRCPauseTerminate
Options=Master Donotmodify
Session Number: 101
Master ESS Sequence Number: 26866
Subordinate Count: 0
Consistency Group Interval Time: 0
Ext. Dist. Consis. Max Coord. Interval: 50
Max Consistency Group Drain Time: 240
Master SSID(s)
0
Subordinate ESS Sequence Number(s)
undefined
Subordinate SSID(s)
0
```

The fields in this output are described in Table 13. Additional fields might be displayed based on specific Copy Services task types.

*Table 13. Output fields for the show task*

| Name | Identifier | Value | Description |
|---|---|---|---|
| TaskName | TaskName | char[1...16] | Identifier of the Copy Services task within the Copy Services task repository |
| TaskType | TaskType | char[1...30] | Identifier for the Copy Services task types |
| Options | Options | mixed characters | Copy services task options as defined in Table 14 on page 59 |
| SourceServer | SourceServer | 10 characters | Same as the EssID value for identifying a primary storage server (in type.serial format) |
| TargetServer | TargetServer | 10 characters | Same as the EssID value for identifying a secondary storage server (in type.serial format) |
| SourceLSS | SourceLSS | 00...1F | Logical subsystem on a primary storage server |
| TargetLSS | TargetLSS | 00...1F | Logical subsystem on a secondary storage server |
| SourceVol | SourceVol | char[4] | Source volume identifier with the first two characters identifying the LSS and the next two identifying the volume |

*Table 13. Output fields for the show task (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| TargetVol | TargetVol | char[4] | Target volume identifier with the first two characters identifying the LSS and the next two identifying the volume |
| Session ID | Session ID | 1 - 255 | Asynchronous PPRC session identifier |
| ESS Sequence Number | ESS Sequence Number | char[5] | ESS that has the LSSs that you are adding to the specified session |
| LSS Number | LSS Number | hexidecimal | LSS that the start is issued from |
| Session Volumes | Session Volumes | hexidecimal | Volumes that are being added to a specifed session |
| Master ESS Sequence Number | Master ESS Sequence Number | char[5] | ESS that the start command is issued from |
| Subordinate Count | Subordinate Count | 0 - 16 | Number of path associations in start command |
| Consistency Group Interval Time | Consistency Group Interval Time | 0 - 32766 | Time delay between consistency group formation attempts |
| Extended Distance Consistency Max Coordinates Interval | Extended Distance Consistency Max Coordinates Interval | 50 - 32766 | The maximum time allowed for the master to coordinate with the subordinates to form a consistent data point |
| Max Consistency Group Drain Time | Max Consistency Group Drain Time | 240 - 32766 | Time allowed for the consistency group to form |
| Master SSID(s) | Master SSIDs | char[5] | LSSs that are specified for the master portion of the path association |
| Subordinate ESS Sequence Numbers | Subordinate ESS Sequence Numbers | char[5] | ESSs that the subordinate SSIDs are contained in |
| Subordinate SSID(s) | Subordinate SSIDs | char[5] | LSSs that are specified for the subordinate portion of the path association |

Table 14 lists and describes the available options of ESS Copy Services tasks.

*Table 14. Copy Services task options*

| Option value | Description |
|---|---|
| AcceleratedDestageMode | Accelerates the destage of tracks on the source FlashCopy volume |
| Addvolumetosession | Adds the given volume to the specified session |
| CascadingPPRC | Enables the cascading PPRC pair |
| CopyAllTracks | Copies all tracks from the source volume to the target volume during the PPRC-establish process |

*Table 14. Copy Services task options (continued)*

| Option value | Description |
|---|---|
| CopyOutOfSyncTracks | Copies out-of-sync tracks from the source volume to the target volume during the PPRC-establish process |
| Closesession | Closes a session on the LSS |
| CriticalVolumeMode | Prevents copying the primary PPRC volume if data cannot be copied to the secondary volume |
| DoNotCopyVol | Prevents an initial copy that is made from the source volume from being sent to the target volume during the PPRC-establish process |
| DoNotDestageModifiedData | Requires no data to be destaged to the source FlashCopy volume when a source track is modified |
| Donotmodify | Does not modify the timer values for start resume asynchronous PPRC |
| DoNotRemovePPRCPathIfPairsExist | Allows no removal of the PPRC path if PPRC pairs exist |
| FibreAdapter | Establish a PPRC Path over the Fibre Channel Protocol |
| FlashCopyWithdrawToTarget | Allows FlashCopy withdraw to the target volume |
| FlashCopyStartBackgroundCopy | Initiates a background copy on an existing FlashCopy pair |
| FlashCopyConsistencyGroup | Creates a FlashCopy consistency group |
| ForceRemovalOfPPRCPath | Forces the removal of the PPRC paths, even if PPRC pairs exist |
| FreezeFlashCopyConsistencyGroup | Freezes the FlashCopy consistency group |
| InbandCommand | Allows a command to be issued to one logical subsystem (usually local) but executed on a different logical subsystem (usually remote) |
| IncrementFlashCopy | Copies the the modified tracks from the source to the target |
| InhibitWritesToTarget | Prevents the target volume from being written |
| IssueToPrimaryDevice | Issues the PPRC command to the primary volume |
| IssueToSecondaryDevice | Issues the PPRC command to the secondary volume |
| Master | Issue the command to the master LSS |
| Modify | Modifies timer values for Asynchronous resume command only |
| NoBackgroundCopy | Denies a background copy for the FlashCopy pair |
| NoForceEstablish | Forces no establishment of PPRC paths if paths already exist |
| Opensession | Opens a session on the LSS |

*Table 14. Copy Services task options (continued)*

| Option value | Description |
|---|---|
| PersistentFlashCopy | Establishes a persistent FlashCopy pair |
| PPRCConsistencyGroup | Creates a PPRC consistency group |
| PPRCExtendedDistance | Establishes an extended distance PPRC pair |
| PPRCFailback | Performs a failback of the PPRC pair |
| PPRCFailover | Performs a failover of the PPRC pair |
| ReadFromSecondary | Allows a host to read from the secondary volume in a PPRC pair |
| Removevolumefromsession | Removes the given volume from the specified session |
| ReverseRestore | Copies the modified tracks from the target back to the source |
| SecondaryOnlineOk | Allows you to establish the FlashCopy pair even if the target volume is online to the host |
| SingleDeviceSpecified | Specifies a single (source or target) volume to the task |
| StartChangeRecording | Records changes of all the modified tracks |
| Subordinate | Issues the command to the subordinate LSS |
| SuspendAfterEstablish | Suspends the PPRC pair when the initial copy of tracks is complete |

**esscli create volume**

The following sample report is similar to what you see when you issue the `esscli create volume -d "ess=2105.FA123 cap=10.2 lss=17 redundancy=raid5 qty=2"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Volume 1703 created
Volume 1704 created
Operation Successful.
```

**Restriction:** If you are creating 3390 volumes, the maximum number of possible cylinders is 3339.

**Note:** The output of this command is dependent on the ESS microcode version that you are running. Recent versions (1.5.2.63 and later) indicate the volume IDs of the volumes that were created successfully. Earlier versions do not show this information.

**esscli list volume**

The following sample report is similar to what you see when you issue the `esscli list volume -d "ess=2105.FA123"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Volume  Cap   Units  VolType  LSS  VS   Serial    Label
------  ----  -----  -------  ---  ---  --------  -------
 0000   3339  Cyls    3390    00   vs1  DBA001    Anakin
 0A05   3339  Cyls    3380    0A   vs2  DBA002    Shmi
 1A2C   10.1  GB       FB     1A   vs3  A2CFA123  Qui-Gon
 1A01    8.6  GB      AS400   1A   vs3  A01FA123  Sebulba
```

The fields in this output are described in Table 15. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "server,vol,cap,units,voltype,lss,vs,label,  ssid"
```

*Table 15. Output fields for the list volume parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| Volume | vol | 0000...1FFF | Logical volume identifier |
| Cap | cap | Decimal number | Capacity of the specified volume space in gigabytes or cylinders |
| Units | units | GB \| Cyls | Units applicable to the capacity field |
| VolType | voltype | AS400 \| AS400U \| FB \| 3380 \| 3390 | Volume type (as defined in Table 4 on page 47) |
| VS | vs | char[1...5] | Same as the *VsId* value for identifying volume spaces within an ESS server |
| Lss | lss | 2 hexadecimal characters (00...1F) | Logical subsystem identifier |
| Label | label | char[1...8] | User-specified volume identifier |
| VolSer | volser | char[1...8] | Volume serial number |
| SSID | ssid | up to 4 hexadecimal characters | Storage subsystem identifier for fixed-block and CKD volumes |

### esscli set volume

The following sample report is similar to what you see when you issue the `esscli set volume -d "ess=2105.FA123 volume=1645 label=T32455"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful
```

### esscli create volumeaccess

The following sample report is similar to what you see when you issue the `esscli create  volumeaccess -d "ess=2105.FA123 volume=1045,1A3C,1f3b init=3007ACF30A2399E0"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful.
```

**Note:** The output of this command is dependent on the ESS version that you are running. Recent versions will indicate the volume IDs that were created successfully. Earlier versions will not show

**esscli list volumeaccess**

The following sample report is similar to what you see when you issue the `esscli list volumeaccess -d "init=3007ACF30A2399E1"` command (with the initiator option):

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

Volume  LUN   Size(GB)  Initiator         Host
------  ----  --------  ----------------  ----
 1A45   0000       4.0  3007ACF30A2399E1  Sun1
 1A46   0001       8.0  3007ACF30A2399E1  Sun1
 1A47   0002      16.0  3007ACF30A2399E1  Sun1
```

The fields in this output are described in Table 16. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "server,vol,target,lun,sz,host,init,ports"
```

*Table 16. Output fields for the list volumeaccess parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| Volume | vols | 0000...1FFF | Logical volume identifier |
| LUN | lun | 0000...5FFF | Logical unit number assigned to this volume connection (with the range of 5000 to 5FFF for Report-LUNs-capable hosts) |
| Size | size | Decimal number | Volume capacity (in gigabytes) |
| Initiator | init | 16 hexadecimal characters | Worldwide port name for identifying an initiator associated with a particular volume |
| Host | host | char[1...30] | Name of a host associated with a particular volume |
| Target | target | Decimal number | SCSI target identifier associated with a particular LUN (starting with 0 for fibre-channel attached volumes) |
| Ports | ports | char[1...256] | List of ESS I/O port identifiers separated by a comma (as described in Table 2 on page 45) |

**esscli delete volumeaccess**

The following sample report is similar to what you see when you issue the `esscli delete volumeaccess -d "ess=2105.FA123 volume=1045 init=3007ACF30A2399E0"` command to delete volume access:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8
Operation Successful.
```

**esscli list volumespace**

The following sample report is similar to what you see when you issue the `esscli list volumespace -d "ess=2105.FA123"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.8

VS   Redundancy  Cap(GB)  Free(GB)  Format  BasedOn      Vols  Lss  Status
---  ----------  -------  --------  ------  -----------  ----  ---  -----------
vs1  raid5        100.00     88.00    FB    dg6            10  1A   operational
vs2  raid5        100.00     50.00    FB    dg7            15  16   operational
vs3  raid5        200.00    100.00   3390   dg14           80  0C   rebuilding
vs4  raid10       200.00    200.00   3380   dg16           75  02   read_only
vs5  non_raid     200.00    150.00    FB    dg22-dd0702    45  1F   failed
```

The fields in this output are described in Table 17. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "server,vs,raid,cap,free,fmt,on,vols,lss,status, ssid"
```

*Table 17. Output fields for the list volumespace parameter*

| Name | Identifier | Value | Description |
|---|---|---|---|
| Server | server | 10 characters | Same as the EssID value for identifying an ESS (in ″type.serial″ format) |
| ESS | ESS | 10 characters | Represents the ESS to which the command will be sent. It may be on a different machine that the pair of volumes being established and withdrawn. |
| LSS | LSS | 00...1F | Represents the LSS to which the command will be sent. It may be on a different machine that the pair of volumes being established and withdrawn. |
| VS | vs | char[1...5] | Same as the VsId value for identifying volume spaces within an ESS |
| Redundancy | raid | raid5 \| raid10 \| nonraid | Type of RAID for the specified volume space |
| Cap | cap | Decimal number | Capacity of the specified volume space in gigabytes |
| Free | free | Decimal number | Nonallocated capacity in gigabytes within the specified volume space |
| Format | fmt | FB \| 3390 \| 3380 | Track format of the specified volume space |
| BasedOn | on | char[1...6] | Disk or disk group on which the specified volume space is based |
| Vols | vols | Decimal number (0..255) | Number of logical volumes allocated for the specified volume space |
| Lss | lss | 2 hexadecimal characters (00...1F) | Logical subsystem associated with the specified volume space |
| Status | status | operational \| rebuilding \| read-only \| failed | Last known status of the specified volume space |

*Table 17. Output fields for the list volumespace parameter (continued)*

| Name | Identifier | Value | Description |
|---|---|---|---|
| SSID | ssid | 4 hexidecimal characters | Identified subsystem is a user-specified option available using the Specialist |

**esscli create volumespace**

The following sample report is similar to what you see when you issue the `esscli create volumespace -d "ess=2105.12345 lss= 01 dg=1"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.1
Operation Successful!
```

**esscli delete volumespace**

The following sample report is similar to what you see when you issue the `esscli delete volumespace -d "ess=2105.12345 vs=VS1, VS1"` command:

```
Sun Aug 11 02:23:49 PST 2002 IBM ESSCLI 2.1.0.1
Operation Successful!
```

**esscli list featurecode**

The following sample report is similar to what you see when you issue the `esscli list FeatureCode -d "ess=EssId"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Feature         Description                    Serial Number      Cap Limit      Cap Used    Cap Types
1800            Peer-to-Peer Remote Copy (PPRC)    23456            12TB         1.8765TB    S/390
1815            FlashCopy                          23454            12TB         1.2345TB    S/390
1820            Peer-to-Peer Remote Copy(PPRC)     23456            12TB         1.8765TB    ESS
1825            FlashCopy                          23454            12TB         1.2345TB    ESS
```

The fields in this output are described in Table 18. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "code,desc,sn,cap,used,type"
```

*Table 18. Output fields for the list featurecode parameter*

| Name | Description |
|---|---|
| Feature Code | Identifies the actual feature code number to the user |
| Description | Describes the feature codes |
| Serial Number | Identifies the serial number of the installed feature code |
| Cap Limit | Identifies the maximum storage capacity, in terabytes, that is supported by this particular feature code. Note: A terabyte is 1000 gigabytes, in other words, 1 000 000 000 000 bytes. Some feature codes apply only to storage configured for S/390 and zSeries servers. Other feature codes apply to all configured storage in the ESS. The level of available capacity is indicated by S/390 or ESS, respectively. |

*Table 18. Output fields for the list featurecode parameter (continued)*

| Name | Description |
|---|---|
| Cap Used | Identifies the total capacity, in terabytes, that is currently configured in both clusters of the ESS for this particular feature code. The feature code capacity values affect the configuration of disk groups in the ESS. If the definition of an additional disk group causes the total used capacity to exceed the capacity limit of any installed feature code, the configuration of the added disk group fails. |
| Cap Types | Indicates the following capacity types: S/390 and ESS. |

### esscli list webuseraccount

The following sample report is similar to what you see when you issue the `esscli list webuseraccount -d "ess=EssId"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Username   Access level   IP Range     Comments
Curly         View         9.95.*
Moe           Admin
Larry         Config       9.95.*        Hello
```

The fields in this output are described in Table 19. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "user,acclvl,iprange,comments"
```

*Table 19. Output fields for the list webuseraccount parameter*

| Name | Description |
|---|---|
| User Name | This field contains the user ID that you must enter in the user authentication dialog box when you access the ESS through ESS Specialist. The log appears in your Web browser after you enter the address of the ESS and then click ESS Specialist in the ESS Launch page. The case-sensitive name uniquely identifies a particular user account. |
| Access Level | This field displays the following four levels of access to the ESS:<br>**View Only**<br>Allows you to view the operational status and configuration information of the ESS.<br>**Operation**<br>Allows you to modify the remote service and PE password settings on the ESS, in addition to the permissions of the View Only access level.<br>**Configuration**<br>Allows you to make changes to the entire configuration (including the remote service and PE password settings) of the ESS, in addition to the permissions of the Operation access level.<br>**Administration**<br>Allows you to administer user accounts, including defining new user IDs, deleting old user IDs, and changing passwords, in addition to the the permissions of the Configuration access level. |

*Table 19. Output fields for the list webuseraccount parameter (continued)*

| Name | Description |
|---|---|
| IP Range | This field contains a log in address filter that is applied to the user account for additional security. ESS CLI rejects any attempt by the specified user to log in from a host outside of the assigned IP address range. |
| Comments | This field contains an optional free-form field that can help identify the person who is assigned the user account. |

**esscli create webuseraccount**

The following sample report is similar to what you see when you issue the `esscli create WebUserAccount -d "ess=1234.56789 user=gman99 pwd=password acclvl=admin comment='I am here'iprange='' "` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Operation successful!
```

**esscli set webuseraccount**

The following sample report is similar to what you see when you issue the `esscli set WebUserAccount -d "ess=1234.56789 user=gman99 newuser=pman99 newcomments='I was formerly gman99'"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Operation successful!
```

**esscli delete webuseraccount**

The following sample report is similar to what you see when you issue the `esscli delete WebUserAccount -d "ess=1234.56789 user=pman99"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Operation successful!
```

**esscli list perfstats**

The following sample report is similar to what you see when you issue the `esscli list PerfStats` command:

```
The output is:
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.2.0.
Hostname    Port    Frequency    Status
-----------------------------------------
9.12.23.345 443           15    Enabled
```

The fields in this output are described in Table 20 on page 68. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "hostname, port, staus, and frequency"
```

*Table 20. Output fields for the list perfstats parameter*

| Name | Description |
|---|---|
| Host Name | Identifies the host name (IP address) of the host that is receiving performance statistics |
| Port | Identifies the port number of the host where the incoming data is sent |
| Status | Identifies the host status as either enabled or disabled |
| Frequency | Identifies the interval that data collection uses for gathering data and sending it to the host system |

**esscli create perfstats**

Figure 1 on page 69 shows a sample report that is similar to what you see when you issue the `esscli create PerfStats -d "ess=EssId outputdir='c:\data\stats' hostname=xxxx.xxxx.xxxx.xxxx port=32455 frequency=5"` command.

**Note:** The frequency cannot be less than 5. If you specify a number less than 5, esscli returns an error stating that the specified value is invalid.

```
Filename:   PStats_2105.22232_2003-07-29_13-50-MST_0.txt
                                        ESSID           DATE          TIMEZONE   Cluster
 Disk Group Statistics: 4
   ========================

      Disk Group Performance Data #0:
      -------------------------------
      Stats Avaliable     yes
      TimeStamp:          Tue Jul 29 14:25:00 MST 2003
      Rank:               rank0
      LSS address:        16
      Rank ID:            4096
      Number of DDMs:     7
      Sector Size:        524
      Rank Type:          0
      I/O requests:
         Read Count:      1493582
         Write Count:     1250
      FixedBlockSec ops:
         Read Count:      95579522
         Write Count:     16118
      Response Time:
         Read Count:      68497276
         Write Count:     73715

      Disk Group Performance Data #1:
      -------------------------------
      Stats Avaliable     yes
      TimeStamp:          Tue Jul 29 14:25:00 MST 2003
      Rank:               rank2
      LSS address:        16
      Rank ID:            4097
      Number of DDMs:     7
      Sector Size:        524
      Rank Type:          0
      I/O requests:
         Read Count:      1
         Write Count:     420
      FixedBlockSec ops:
         Read Count:      1
         Write Count:     2868
      Response Time:
         Read Count:      12
         Write Count:     44053
```

*Figure 1. Create PerfStats sample output (Part 1 of 4)*

```
Disk Group Performance Data #2:
     -------------------------------
     Stats Avaliable     no
     TimeStamp:          Tue Jul 29 14:25:00 MST 2003
     Rank:               rank5
     LSS address:        4
     Rank ID:            0
     Number of DDMs:     0
     Sector Size:        0
     Rank Type:          0
     I/O requests:
        Read Count:      0
        Write Count:     0
     FixedBlockSec ops:
        Read Count:      0
        Write Count:     0
     Response Time:
        Read Count:      0
        Write Count:     0

     Disk Group Performance Data #3:
     -------------------------------
     Stats Avaliable     no
     TimeStamp:          Tue Jul 29 14:25:00 MST 2003
     Rank:               rank9
     LSS address:        4
     Rank ID:            0
     Number of DDMs:     0
     Sector Size:        0
     Rank Type:          0
     I/O requests:
        Read Count:      0
        Write Count:     0
     FixedBlockSec ops:
        Read Count:      0
        Write Count:     0
     Response Time:
        Read Count:      0
        Write Count:     0

  Volume Statistics:     1
  ======================
```

*Figure 1. Create PerfStats sample output (Part 2 of 4)*

```
Volume Performance Data #0:
     ---------------------------
     TimeStamp:          Tue Jul 29 14:25:00 MST 2003
     LSS address:        16
     Volume number:      0
     Rank name:          rank0
     Rank ID:            4096
     Cache Available:    yes
     Byte Increment:     128k bytes
     Time Increment:     16 milliseconds
  Normal I/O:
        I/O requests:
           Read Count:   0
           Write Count:  0
        Cache hits:
           Read Count:   0
           Write Count:  0
     Sequential I/O:
        I/O requests:
           Read Count:   0
           Write Count:  0
        Cache hits:
           Read Count:   0
           Write Count:  0
     Disk->Cache ops:    196
     Disk->Cache seq:    730152
     Cache->Disk ops:    102
     DasdFastWrite ops:  0
     DasdFastWrite seq:  0
     DasdFastWrite del:  0
     RecCacheRead Misses:0
     TrackProm. Failures:0
     RecMode reads:      0
     NVS Allocations:    0
     CC/XRC ops:
        Read Count:      0
        Write Count:     0
     PPRC Transfers:     733060
     CSC Delayed ops:    0
     Cache Fast Write I/O
        Read Count:      0
        Write Count:     0
     Quick write promotes:  0
     Irregular track access:   0
     Irregular track access hits:   0
     Read Byte Count:    0
     Write Byte Count:   0
     Read Time:          0
     Write Time:         0
```

*Figure 1. Create PerfStats sample output (Part 3 of 4)*

```
PPRC Statistics:  1
================

     PPRC Link Performance Data: #0:
     -------------------------------
     Stats Available         yes
     TimeStamp:              Tue Jul 29 14:25:00 MST 2003
     Interface ID:           0020
     Link Type:              Fibre Channel 1 Gb/s
     Byte Increment:         128K bytes
     Time Increment:         16 milliseconds
     ECKD Requests:
        Read Byte Count:     2649
        Write Byte Count:    1824
        Read Operations:     47
        Write Operations:    25
        Read Time:           27492
        Write Time:          48347
     PPRC Requests:
        Send Byte Count:     38932
        Receive Byte Count:  28492
        Send Operations:     3829
        Receive Operations:  1948
        Send Time:           28395
        Receive Time:        27829
     SCSI Requests:
        Read Byte Count:     83728
        Write Byte Count:    57386
        Read Operations:     9382
        Write Operations:    4839
        Read Time:           4713
        Write Time:          2782
```

*Figure 1. Create PerfStats sample output (Part 4 of 4)*

Table 21 describes the fields in this output. You can select specific fields and determine their display order by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "ess, outputdir, hostname, port, frequency, duration"
```

*Table 21. Output fields for the create perfstats parameter*

| Name | Description |
|---|---|
| ess | Identifies the Enterprise Storage Server (ESS). The format is type.sequence. For example: 2105.FA123 |
| outputdir | Identifies the directory where the collected statistics are stored. The files are created automatically by the Storage Management CLI. |
| hostname | Identifies the host name of the client that receives the statistics that are sent by the ESS. This is typically the IP address of the machine that enables the data collector. |
| port | Identifies the port number from where the statistics are received. The port number must be greater than 0. |
| frequency | Identifies the interval (in minutes) that the ESS sends statistics data to the client machine. |
| duration | Identifies the range of time that you want the application to receive performance statistics from an assigned ESS. |

The following sample report is similar to what you see when you issue the `esscli -u user -p password create PerfStats -d "ess=serial hostname=name port=1234 frequency=10 duration=1 async=on"` command to view asynchronous PPRC statistics:

```
Date/Time                       Machine         Fail    Success % Success
Tue Apr-6-04 15:08:22   delta:  name            0       0       0
                        cum:    name            0       0       0
                        Coord. Time     Interval Time   Max Drain Time
                        0 (ms)          0 (sec)         0 (sec),
```

Table 22 describes the fields in this output. You can select specific fields and determine their display order by specifying field identifiers in the optional `-fmt "Format"` parameter. The default format is as follows:

```
-fmt  "Date, Machine, Coord Time (ms), Interval (sec), Drain (sec), Failed CGs,
Successful CGs, Percent Successful"
```

*Table 22. Output fields for the create perfstats parameter*

| Name | Description |
|---|---|
| Date/Time | Date and time the statistics were created. |
| Machine | The ESS that the statistics describe. |
| Coord Time (ms) | Maximum coordination value in milliseconds that indicates the amount of time the asynchronous PPRC will pause the primary or host I/O to start forming consistency group. The default time is 50 milliseconds. |
| Interval (sec | Consistency group interval time in seconds that indicates how long to wait between the formation of consistency groups. |
| Drain (sec) | Maximum consistency group drain time in seconds that indicates the maximum amount of time that the extended distance copy will drain out of sync tracks to the remote location. The minimum time is 4 minutes, or 2 times the consistency group interval time, whichever is greater. |
| Failed CGs | Number of failed consistency groups. |
| Successful CGs | Number of successful consistency groups. |
| Percent Successful | Percentage of consistency groups that are successful. |
| Delta | Change in statistics from previous query to the current query. |
| Cum | Total of all of the queries for the fail, success, and percent success statistics. |

**esscli delete perfstats**

The following sample report is similar to what you see when you issue the `esscli delete PerfStats -d "ess=EssId hostname=xxx.xxx.xxx.xxx port=32455"` command:

```
The output is:
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.3.0
Operation Successful!
```

**esscli show remotesupport**

The following sample report is similar to what you see when you issue the `esscli show RemoteSupport -d "ess=EssId"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0

Incoming calls are enabled.
Outgoing calls are disabled.
```

**esscli set remotesupport**

The following sample report is similar to what you see when you issue the `esscli set RemoteSupport -d "ess=EssId  pepwd=reset"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
New PE Password:  fLXi342
Operation Successful!
```

**esscli show email**

The following sample report is similar to what you see when you issue the `esscli show Email -d "ess=EssId"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0

Maximum emails sent per problem: 1
Email address  Trigger
-------------- -------
doe@us.ibm.com  all
```

The fields in this output are described in Table 23. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "addr, trigger"
```

*Table 23. Output fields for the show email parameter*

| Name | Description |
|---|---|
| Address | Identifies the e-mail addresses |
| Trigger | Identifies the actions that trigger notification to the corresponding e-mail address. The valid triggers are info, err, all, and none. |

**esscli create email**

The following sample report is similar to what you see when you issue the `esscli create Email -d "ess=EssId  addr=jdoe1@us.ibm.com  trigger=err"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli delete email**

The following sample report is similar to what you see when you issue the `esscli delete Email -d "ess=EssId  addr=jdoe1@us.ibm.com"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli set email**

The following sample report is similar to what you see when you issue the `esscli set Email -d "ess=EssId addr=jdoe1@us.ibm.com newaddr=djohn@us.ibm.com newtrigger=err"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli show pager**

The following sample report is similar to what you see when you issue the `esscli show Pager -d "ess=EssId"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Maximum pages sent per problem: 5
UserName Phone  Pin  Status  Type
John Doe    123-456-7890  1234567    Enabled Alphanum
Betty Boo 234-456-0987 9876543    Disabled Num
```

The fields in this output are described in Table 24. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "user, phone, pin, status, type"
```

*Table 24. Output fields for the show pager parameter*

| Name | Description |
|---|---|
| UserName | Identifies the user name for the pager. This is an alphanumeric ID and should contain no spaces. |
| Phone | Identifies the pager phone number |
| Pin | Identifies the pager pin number |
| Status | Identifies the pager as enabled/disabled for problem notification |
| Type | Identifies the pager type. Choices are numeric and alphanumeric. |

**esscli create pager**

The following sample report is similar to what you see when you issue the `esscli create Pager -d "ess=EssId user=JohnDoe phone=5551234 pin=1234 status=enabled type=numeric"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli delete pager**

The following sample report is similar to what you see when you issue the `esscli delete Pager -d "ess=EssId phone=9871234567 pin=1234"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli set pager**

The following sample report is similar to what you see when you issue the `esscli set Pager -d "ess=EssId phone=5209871334 pin=9874 newpin=1234 newphone=5201234567 newuser=JohnDoe max=3 test=yes"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful!
```

**esscli show snmp**

The following sample report is similar to what you see when you issue the `esscli show SNMP -d "ess=EssId "` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0

System Community Name:   Admin
System Contact:    John Doe
System Location:    USA
MIB Read Access:   Enabled
Generic Traps:    Disabled
ESS Traps:    Enabled
Max traps sent per problem:  2
Trap Addresses
 support.us.ibm.com
 9.108.76.89
```

The fields in this output are described in Table 25. You can select specific fields and determine their order for display by specifying field identifiers in the optional `-fmt "`*`Format`*`"` parameter. The default format is as follows:

```
-fmt  "addr, comname, contact, location, mibread, traps, esstraps, maxtraps"
```

*Table 25. Output fields for the show snmp parameter*

| Name | Description |
|---|---|
| Trap Addresses | Identifies the trap addresses configured to be notified |
| System Community Name | Identifies the name of the community |
| System Contact | Identifies the name of the person to be contacted |
| System Location | Identifies the location of the machine |
| MIB Read Access | Identifies whether MIB read access is enabled/disabled |
| Generic Traps | Identifies whether Generic Traps is enabled/disabled |
| ESS Traps | Identifies whether ESS traps is enabled/disabled |
| Max Traps Sent Per Problem | Identifies the maximum number of traps sent per problem. The maximum traps is 5 and the lowest is 1 to be sent. |

**esscli create snmp**

The following sample report is similar to what you see when you issue the following command:

```
esscli create Snmp -d "ess=EssId  addr=support.us.ibm.com,128.165.123.1"
```

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli set snmp**

The following sample report is similar to what you see when you issue the `esscli set SNMP -d "ess=EssId  location=Tucson esstraps=enabled traps=disabled max=3 test=yes"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0
Operation Successful!
```

**esscli delete snmp**

The following sample report is similar to what you see when you issue the `esscli delete Snmp -d "ess=EssId  addr=123.1.234.1,128..165.1"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.0

Operation Successful!
```

**esscli list problem**

The following sample report is similar to what you see when you issue the `esscli list Problem -d "ess=1234.56789"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
ProbId  Clust  Description
10        0    SSA subsystem detected error
25        0    FURTHER ISOLATION NEEDED
```

The fields in this output are described in Table 26.

*Table 26. Output fields for the list problem parameter*

| Name | Description |
|---|---|
| ProbId | Identifies the ID of the problem |
| Clust | Identifies the cluster that the problem is associated with |
| Description | Identifies the string that contains a brief description of the problem |

**esscli show problem**

The following sample report is similar to what you see when you issue the `esscli show Problem -d "ess=2105.56789 probid=10"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Problem ID:  10
Reporting Cluster: 1
Problem Description: SSA subsystem detected error
```

The fields in this output are described in Table 27.

*Table 27. Output fields for the show problem parameter*

| Name | Description |
|---|---|
| ProbId | Identifies the ID of the problem |
| Reporting Cluster | Identifies cluster 1 or 2. Problem records for Cluster 1 are usually listed before those of Cluster 2. |
| Problem Description | Provides a brief description of the problem |
| Problem Age | Identifies the date and time of the first and last occurrence of this problem, provides an indication of how often it occurred, and if it occurred more than once. |
| Problem Status | Identifies the severity of this problem. The content of this field corresponds to the highlight color that is used for this problem |
| Service Status | Identifies the status of the problem resolution. After a problem has been resolved, meaning the problem has been canceled or closed, that problem record is no longer displayed on the panel. |
| User Action | Identifies the corrective action, if any, that you can perform |
| Probably Cause | Identifies a list of the probable causes of the problem, if known |
| Additional Info | Provides any additional information about the problem. This field is displayed only if additional information about the problem exists. |

**esscli delete problem**

The following sample report is similar to what you see when you issue the `esscli delete Problem -d "ess=2105.FA123 probId=10"` command:

```
Sun, Sept 6 03:11:23 PST 2002 IBM ESSCLI 2.1.0.1
Operation Successful!
```

## Modifying the ESS using multiple clients (Specialist, Web Copy Services, CLI)

When you configure a component of the ESS, that resource will be locked so another client (CLI or Specialist) cannot modify it at the same time. Having two clusters allows you to use the other cluster to configure the ESS if the first cluster fails.

**Notes:**

1. The second cluster (and its Specialist) exists *for failover purposes only*. Do not concurrently use Specialist and other clients (CLI, Expert, and so forth.) against both clusters. Use only one cluster for all configuration activity. Switch over to the second cluster only if the first cluster becomes unavailable.
2. Coordinate your configuration activity to avoid conflicting and overlapping updates. For maximum efficiency and to ensure no conflicts, make sure that only one configuration change request is in progress at a time.

Although the resource is locked while it is being modified (which prohibits any other client from using that resource at the same time), you can configure Copy Services using one Web browser and concurrently configure other ESS components as long as they are not associated with the Copy Services function being modified.

# Chapter 3. Understanding Storage Management CLI messages

This chapter describes the messages and codes for the Storage Management CLI. After identifying each message, it provides a detailed explanation and suggests actions that you can take to correct the reported situation.

## Storage Management CLI return codes

Whenever you invoke the **esscli** command, you receive a return code about the status of your command request. Each return code indicates a different type of processing status or condition.

The Storage Management CLI return codes contain three numeric characters, with the first identifying condition categories and the remaining two characters indicating condition number. Check against Table 28 for detailed information before interpreting an output of the **esscli** command.

*Table 28. Storage Management CLI return code categories*

| Code | Category | Description |
|---|---|---|
| 0 | Success | Successful completion of commands or other operations |
| 1 | Parameter error | Errors caused by invalid or missing command parameters, arguments, or flags |
| 2 | Communication error | Errors caused by communication, connection, or network problems |
| 3 | Timeout | Errors caused by server or host time-outs |
| 4 | Version mismatch | Errors caused by software version mismatches on servers and hosts |
| 5 | User error | User-specific errors |
| 6 | Server exception | Errors that originated on the server |
| 7 | Client-side error | Errors that originated on the host system |

## Storage Management CLI messages

The Storage Management CLI generates and reports the following messages:

**0 The operation completed successfully.**

**Explanation:** The command or operation completed successfully.

**Action:** None

**001 Volume ″{0}″ is already assigned.**

**Explanation:** You attempted to assign volume ({0}) to a host initiator. However, volume ({0}) is already assigned to another initiator associated with the same ESS. The CLI ignores this assignment request and continues processing the rest of your **create Volumes** command.

**Action:** Remove volume ({0}) connection to the specified host initiator and assign another volume in its place.

**002 Volume ″{0}″ is not assigned.**

**Explanation:** You specified volume ({0}) in the `volume=`*`VolId`* pair for the `create Volume` or `set Volume` parameter. However, volume ({0}) was not assigned to the specified host initiator. The CLI ignores this request and continues processing the remaining requests of the command.

**Action:** Specify the correct volume identifier and issue the command again.

**003** **The system default language is not supported for printing CLI messages.**

**Explanation:** You tried to print an output report or message in your system's default language that is currently not supported. The CLI prints all output reports and messages in English.

**Action:** None

**004** **The specified topology type ″{0}″ is already configured for this port.**

**Explanation:** You tried to change the current topology configuration of a port by specifying `topology=P2P`, `topology=FCAL`, or `topology=undefined`, but the specified type is already defined for the port.

**Action:** Specify a different or valid topology type and issue the command again.

**005** **Some tasks from the server are not displayed because the CLI version does not match the server version.**

**Explanation:** Some of the tasks from the server are not displayed because the CLI version is down level.

**Action:** Some of the tasks from the server are not displayed because the CLI version is down level.

**006** **Deleting PAVs failed because the specified volume ″{0}″ does not have PAVs.**

**Explanation:** You requested to delete PAVs, but the specified volume does not exist or is not enabled to have any PAVs.

**Action:** Use the `list pav` parameter to verify the volumes with PAVs, specify a valid volume, and try the command again.

**007** **Deleting PAVs failed because the specified LSS ″{0}″ does not have PAVs.**

**Explanation:** You requested to delete PAVs, but the specified LSS does not exist or is not enabled to have any PAVs.

**Action:** Use the `list pav` parameter to verify the logical subsystems that have PAVs, specify a valid LSS, and try the command again.

**008** **Creating PAVs failed because the specified LSS ″{0}″ does not have base volumes.**

**Explanation:** The PAV is being created and the LSS associated with the create action does not have base volumes.

**Action:** Use a LSS in the current configuration which allows base volumes. For more information, list the current configured volume spaces.

**009** **The ESS will send any collected performance data to {0}:{1}.**

**Explanation:** The configured host name ({0}) is not the current host that is starting the performance data collection.

**Action:** Change the configured host name ({0}) to the current host where you are issuing the command.

**010** **The performance data collection ended prematurely due to a configuration reset on the ESS.**

**Explanation:** Your performance data collection was not completed because a configuration reset was performed on your ESS.

**Action:** Wait for the configuration reset to complete and perform a new performance data collection.

**101** **The required command action is missing.**

**Explanation:** You specified a parameter that consists of action-category keywords, but you did not specify the required action keyword for the parameter category. See Chapter 2, "Using the Storage Management CLI command," on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required action keyword and issue the command again.

**102** **The required command category is missing.**

**Explanation:** You specified a parameter that consists of action-category keywords, but you did not specify the required category keyword for the parameter action. See Chapter 2, "Using the Storage Management CLI command," on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required category keyword and issue the command again.

**103** **The required command flag ″{0}″ is missing**

**Explanation:** You did not specify flag ({0}), which is required for the specified parameter. See Chapter 2, "Using the Storage Management CLI command," on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required flag and issue the command again.

**104** **The required parameter for command flag ″{0}″ is missing.**

**Explanation:** You did not specify a valid parameter as a required argument to command flag ({0}). See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required parameter and issue the command again.

**105** **The specified command action ″{0}″ is invalid.**

**Explanation:** You specified an invalid action keyword for the action-category parameter. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the correct action keyword and issue the command again.

**106** **The specified command category ″{0}″ is invalid.**

**Explanation:** You specified an invalid category keyword for the action-category parameter. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the correct category keyword and issue the command again.

**107** **The specified command flag ″{0}″ is invalid.**

**Explanation:** You specified an invalid flag for the specified parameter. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a valid flag and issue the command again.

**108** **The specified parameter ″{0}″ for command flag ″{1}″ is invalid.**

**Explanation:** You specified an invalid parameter for the specified flag. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a valid parameter for the flag and issue the command again.

**109** **More than one command action was specified (″{0}″).**

**Explanation:** You specified more than one action keywords in the action-category parameter. You can specify one action keyword for each category keyword at one time. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify one valid action keyword for the specified parameter category and issue the command again.

**110** **More than one command category was specified (″{0}″).**

**Explanation:** You specified more than one category keyword in the action-category parameter. You can specify one category keyword for each action keyword at one time. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify one valid category keyword for the specified parameter action and issue the command again.

**111** **Command flag ″{0}″ was specified more than once.**

**Explanation:** You specified command flag ({0}) more than once. You can only specify a flag once in a single instance of the **esscli** command.

**Action:** Remove the duplicate flags and issue the command again.

**112** **The specified command flag ″{0}″ and parameter ″{1}″ do not match.**

**Explanation:** You specified a flag and a parameter that do not match. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a flag and a parameter that are compatible and issue the command again.

**120** **The argument name is missing at position ″{0}″ of parameter ″{1}″.**

**Explanation:** You did not specify the required argument name at position ({0}) for parameter ({1}).

**Action:** Specify the required argument name and issue the command again.

**121 The argument value is missing at position ″{0}″ of parameter ″{1}″.**

**Explanation:** You did not specify a valid value for the specified argument name at position ({0}) of parameter ({1}).

**Action:** Specify a valid value for the specified argument name and issue the command again.

**122 The equal sign (=) is missing at position ″{0}″ of argument name-value pair ″{1}″.**

**Explanation:** You did not specify the required operator, the equal sign (=), between the specified name-value argument pair. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required equal sign and issue the command again.

**123 Quotation marks are missing at position ″{0}″ of parameter ″{1}″.**

**Explanation:** You did not include the required starting or closing quotation marks at position ({0}) for parameter ({1}).

**Action:** Specify the required quotation marks and issue the command again.

**124 The required argument name-value pair ″{0}″ is missing.**

**Explanation:** You did not specify the name-value argument pair required for the command request. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the required argument name-value pair and issue the command again.

**125 The specified argument name ″{0}″ is invalid.**

**Explanation:** You specified an invalid name for the specified argument value or name-value argument pair. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify the correct argument name and issue the command again.

**126 The specified argument value ″{0}″ for argument name ″{1}″ is invalid.**

**Explanation:** You specified an invalid value ({0}) for the specified argument name ({1}). See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a valid argument value and issue the command again.

**127 The specified argument name ″{0}″ is invalid for the command action.**

**Explanation:** You specified an invalid argument name for the specified command action. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a valid argument name and issue the command again.

**129 Argument name ″{0}″ was specified more than once.**

**Explanation:** You specified argument name ({0}) more than once. You can only specify it once in a single instance of the **esscli** command.

**Action:** Delete the duplicate argument name and issue the command again.

**130 Argument names ″{0}″ and ″{1}″ are mutually exclusive.**

**Explanation:** You specified argument names ({0}) and ({1}) that are mutually exclusive. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Remove one of the mutually exclusive argument names and issue the command again.

**140 The format of the specified access file is not supported.**

**Explanation:** The specified access file is in simple format, which is not supported by the **esscli** command.

**Action:** Change the access file to the extended format or enter all command parameters directly on the command line and issue the command again.

**141 The specified flag ″{0}″ is not supported within the specified access file.**

**Explanation:** You specified a command flag or parameter, such as `list server`, that is not allowed in the access file. See “Parameters without arguments” on page 34

page 34 for detailed information about the extended format of the access file.

**Action:** Specify valid command flags, parameters, and arguments in the access file or enter all command flags and parameters directly on the command line.

---

**142 The required quotation marks are missing on line ″{0}″ of the specified access file.**

**Explanation:** You did not enclose the values for the arguments to the -d and -fmt flags on line ({0}) in the access file. See “Parameters without arguments” on page 34 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Add the missing quotation marks and try the command again.

---

**143 Line ″{0}″ of the access file is not a valid keylist entry.**

**Explanation:** You specified an invalid entry in the key list of the access file. See “Parameters without arguments” on page 34 for detailed information about the extended format of the access file.

**Action:** Correct the entry or enter all command flags and parameters directly on the command line, and try the command again.

---

**144 The specified key ″{0}″ for type ″{1}″ does not exist in the access file.**

**Explanation:** You specified an valid key name ({0}) for type ({1}). See “Parameters without arguments” on page 34 for detailed information about the extended format of the access file.

**Action:** Specify a valid key name or enter all command flags and parameters directly on the command line.

---

**145 Line ″{0}″ of the specified access file contains a duplicate key ″{1}″ for type ″{2}″.**

**Explanation:** You specified a duplicate key name ({1}) for type ({2}) on line ({0}). See “Parameters without arguments” on page 34 for detailed information about the extended format of the access file.

**Action:** Rename the key or enter all command flags and parameters directly on the command line, and try the command again.

---

**146 The format of the specified access file ″{0}″ does not support the -key command flag.**

**Explanation:** You specified a key list in the access file in simple format. You can only specify a key list when the access file is in extended format. See “Parameters without arguments” on page 34 for detailed information about the extended format of the access file.

**Action:** Remove the key list and associated entries and enter all flags and parameters directly on the command line and try the command again.

---

**201 An unspecified communication error occurred.**

**Explanation:** An unspecified communication error occurred. It might be a temporary network problem or connection problem between your host system and the server.

**Action:** Check the connection between your host and the server or make sure that the requested server is operational, and issue the command again.

---

**202 The specified server address is unknown to the network.**

**Explanation:** You specified an invalid server IP address or server name. You must specify the Copy Services server address for the `list Task`, `show Task`, and `list PPRCPaths` parameters and the ESS Specialist server address for all other action-category parameters. See Table 1 on page 37 for more information.

**Action:** Specify a valid server IP address or server name and issue the command again.

---

**203 The specified server address was not available.**

**Explanation:** You specified a valid server IP address or server name, but the server was not available at the time of your request because one or more of the following problems occurred:

- The requested server is not within the specified network.
- The network was down.
- You are not properly authorized to access the server.

**Action:** Check to see if the specified server is in the correct network, the network is working properly, and you have the required access to the specified server. Then, issue the command again.

---

**204 The connection to the specified server was not established.**

**Explanation:** You specified a server IP address or server name, but the connection was not successful because one or more of the following problems occurred:

- The specified server address was invalid.
- The requested server is not within the specified network.
- The network was down.

- You are not properly authorized to access the server.

**Action:** Check to see if the specified server address was correct, the server is in the correct network, the network is working properly, and you have the required access to the specified server. Then, issue the command again.

---

**205** **The specified server is currently not available for client requests.**

**Explanation:** You specified a valid server IP address or server name, but the server was not available at the time of your request.

**Action:** Wait until the server is available for your request and issue the command again.

---

**206** **The communication to the specified server was not completed.**

**Explanation:** Your command request did not successfully complete because the connection dropped unexpectedly. The connectivity problem might be due to a temporary network outage or disabled server.

**Action:** Wait a few seconds and retry the command. If the problem persists, contact the system administrator to determine if the infoserver is operational. If the infoserver is up and running, issue the command again.

---

**208** **The server response was not successfully processed.**

**Explanation:** The server response was not successfully processed because the response was null or corrupted.

**Action:** Check the network connectivity and operational status of the infoserver and issue the command again.

---

**209** **The communication to the specified server was terminated prematurely.**

**Explanation:** The connection to the server was unexpectedly lost because one of the following problems occurred:

- An internal error occurred.
- The server was not accepting client requests at the time.
- The network was temporarily down.

**Action:** Check the network connectivity and the operational status of the requested server and issue the command again.

---

**301** **Information from the server is not current.**

**Explanation:** The configuration information in the server response is down-level.

**Action:** Wait a few minutes for the server to refresh the report with the latest configuration information, and issue the command again.

---

**302** **The server did not respond in time.**

**Explanation:** The connection to the server was lost because the server did not respond within the given time. This problem occurred because one or more of the following problems occurred:

- The server was being configured at the time of your command request.
- The network is busy.
- You lost connectivity to the server before receiving a response.

**Action:** Check the network connectivity and the server operational status and issue the command again.

---

**401** **This version of the CLI is incompatible with the version of the specified server ″{0}″.**

**Explanation:** Each version of the Storage Management CLI is designed to be compatible with a particular level of the licensed internal code (LIC) of the ESS. Your command request failed because the levels do not match between your CLI program version and the LIC level of your ESS.

**Action:** Make sure that your CLI version matches your ESS LIC level and issue the command again.

---

**402** **The versions of the CLI and the Copy Services server do not match.**

**Explanation:** Each version of the Storage Management CLI is designed to be compatible with a particular level of the licensed internal code (LIC) of the ESS. Your command request failed because the levels do not match between your CLI program version and the LIC level of your ESS.

**Action:** Make sure that your CLI version matches your ESS LIC level and issue the command again.

---

**403** **The requested function is not supported by the specified server ″{0}″.**

**Explanation:** You requested the **esscli** command to perform a specified task, but the specified server is down level and does not support the requested function.

**Action:** Upgrade the LIC on the server, and try the command again.

**501 The specified host initiator ″{0}″ is not defined on the server.**

**Explanation:** You defined a host initiator that is not associated with the specified server.

**Action:** Specify a valid host initiator and issue the command again.

**502 The specified host name ″{0}″ is not defined on the specified server.**

**Explanation:** You specified a host name that is not assigned to the specified server.

**Action:** Specify a valid host name and issue the command again.

**503 The specified host name ″{0}″ is SCSI but is not supported.**

**Explanation:** You specified a host name that uses SCSI host connections. You must specify a host name with fibre-channel attached connections for your command request.

**Action:** Specify a host name with fibre-channel attached connections and issue the command again.

**504 The specified host name ″{0}″ is already defined on the server.**

**Explanation:** You specified a host name that is already defined on the server. Host names for a particular server must be unique; you cannot specify a duplicate host name. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a different host name and issue the command again.

**505 The specified host initiator ″{0}″ is already defined on the server.**

**Explanation:** You specified a host initiator that is already defined on the server. Host initiators for a particular server must be unique; you cannot specify a duplicate host initiator. See Chapter 2, “Using the Storage Management CLI command,” on page 25 for detailed information about the **esscli** command syntax and usage guidelines.

**Action:** Specify a different host initiator and issue the command again.

**506 The specified volume ″{0}″ is not found on the server.**

**Explanation:** You specified a volume identifier that does not exist on the server.

**Action:** Specify a valid volume identifier and issue the command again.

**507 The specified ESS machine type ″{0}″ does not match that of the server.**

**Explanation:** You specified an invalid ESS type in the `ess=EssId` pair. The EssID value must be in the machine ″type.serial″ format.

**Action:** Specify a valid machine type and issue the command again.

**508 The specified ESS machine serial number ″{0}″ does not match that of the server.**

**Explanation:** You specified an invalid ESS serial number in the `ess=EssId` pair. The EssID value must be in the machine ″type.serial″ format.

**Action:** Specify a valid machine serial number and issue the command again.

**509 The specified server address is invalid.**

**Explanation:** You specified an invalid server IP address or server name. You must specify the Copy Services server address for the `list Task`, `show Task`, and `list PPRCPaths` parameters and the ESS Specialist server address for all other action-category parameters. See Table 1 on page 37 for more information.

**Action:** Specify a valid server IP address or server name and issue the command again.

**510 Access was denied by the server.**

**Explanation:** You were denied access to the server for one or more of the following reasons:

- You specified an invalid user name or password.
- You specified an invalid access file name.
- You are not authorized to perform the command request.

**Action:** Specify a valid user name, password, or access file name, or contact your system administrator for access authorization. Then, issue the command again.

**511 The specified port (bay = ″{0}″ card = ″{1}″ and port = ″{2}″) was not found.**

**Explanation:** You specified a port that does not exist on the server.

**Action:** Specify a valid port name and issue the command again.

**512** **The specified number of PAV volumes ″{0}″ exceeded the maximum for the base volume ″{1}″.**

**Explanation:** You specified more than 256 PAVs for the specified base volume. You can define one or more PAVs for each base (non-PAV) volume in an LSS, but the total number of base and PAV volumes in an LSS cannot exceed 256.

**Action:** Make sure that the total number of PAVs does not exceed the maximum allowed and issue the command again.

**513** **The specified LSS ″{0}″ is not defined on the server.**

**Explanation:** You specified an LSS that does not exist on the specified server.

**Action:** Specify a valid LSS and issue the command again.

**514** **The specified volume space ″{0}″ is not defined on the server.**

**Explanation:** You specified a volume space that is not defined on the specified server. You can check the assigned volume spaces for the server by specifying the `list volumespace` parameter.

**Action:** Specify a valid volume space and issue the command again.

**515** **The specified volume type ″{0}″ is not compatible with volume space ″{1}″.**

**Explanation:** You specified an invalid volume type for the specified volume space. See Table 4 on page 47 for more information about volume types.

**Action:** Specify a valid volume type and issue the command again.

**516** **The request for creating PAVs failed.**

**Explanation:** You specified the `create pav` parameter, but the PAV feature is not installed or enabled on your ESS.

**Action:** Install or enable the feature code for PAVs and issue the command again.

**517** **More than one CKD LSS was specified.**

**Explanation:** You specified more than one CKD on the specified server.

**Action:** Specify a valid CKD LSS and issue the command again.

**518** **The specified redundancy ″{0}″ is not compatible with volume space ″{1}″.**

**Explanation:** You specified an invalid redundancy type for the specified volume space. You can only specify `redundancy=raid5` or `redundancy=raid10` for the `create volume` parameter.

**Action:** Specify a valid redundancy type and issue the command again.

**519** **No volume space matches the specified volume type ″{0}″ and redundancy ″{1}″.**

**Explanation:** You specified an invalid volume space for the specified volume type and redundancy type. You can specify the `list VolumeSpace` parameter for the **esscli** command to determine the exact volume space value for a particular ESS.

**Action:** Specify a valid volume space and issue the command again.

**520** **The specified volume size ″{0}″ GB is invalid.**

**Explanation:** You specified an invalid volume size for the volume you wanted to create. Specify the volume size, in gigabytes (GB), as a floating point value, with only a single digit after the decimal point, for example, cap=27.9.

**Action:** Specify a valid volume size in gigabytes and issue the command again.

**521** **The specified AS/400 volume size ″{0}″ GB is invalid.**

**Explanation:** You specified an invalid volume size for the volume you wanted to create. Valid volume sizes for AS/400 are 4.2, 8.6, 17.5, 35.1, 36.0, and 70.5 gigabytes (GB).

**Action:** Specify a valid volume size for the AS/400 in gigabytes and issue the command again.

**522** **Creating volumes failed because the requested number exceeded the maximum of ″{0}″ volumes.**

**Explanation:** You requested to create ({1}) volumes, but only ({0}) were created because of insufficient storage capacity.

**Action:** Allocate sufficient free storage capacity and issue the command again.

**523** **The specified topology or protocol is incompatible with the current state of the port.**

**Explanation:** You specified an invalid topology type for the specified port. Valid topology types are undefined, point-to-point (P2P), and fibre-channel arbitrated loop (FC-AL), with P2P as the default value.

**Action:** Specify a valid topology type and issue the command again.

**524** **The specified profile ″{0}″ is not supported by the specified server.**

**Explanation:** You specified a host profile that is not supported by the specified server. See Table 3 on page 46 for a list of valid host profiles and supported servers.

**Action:** Specify a valid host profile and issue the command again.

**525** **The specified PAV ″{0}″ does not exist on the specified server.**

**Explanation:** You specified an invalid PAV or the specified volume PAV does not exist on the specified server.

**Action:** Verify all PAVs associated with the specified server with the `list pav` parameter, specify a valid PAV, and try the command again.

**526** **The number of PAVs for LSS ″{0}″ exceeded the maximum ″{1}″ per volume.**

**Explanation:** You requested to create PAVs but the specified number of new PAVs exceeded the maximum number of PAVs allowed for a based volume.

**Action:** Specified a valid number for the new PAVs to be created and try the command again.

**527** **The specified volume size of ″{0}″ cylinders exceeded for ″{1}″ volumes.**

**Explanation:** You specified an invalid volume size. The maximum size for 3380 volumes is 3339 cylinders and 32760 cylinders for 3390 volumes.

**Action:** Specified a valid volume size and try the command again.

**528** **The specified volume size exceeded the maximum of ″{0}″ GB available free space.**

**Explanation:** You specified a volume size (GB) that is larger than the maximum free space ({0}) in the specified volume space.

**Action:** Allocate the remaining volume to another volume space or specify a valid volume size and issue the command again.

**529** **The specified volume size exceeded the maximum of ″{0}″ cylinders of available free space.**

**Explanation:** You specified a volume size (cylinder) that is larger than the maximum free space ({0}) in the specified volume space.

**Action:** Allocate the remaining volume to another volume space or specify a valid volume size and issue the command again.

**530** **The specified LSS ″{0}″ already contains the maximum number of volumes ″{1}″.**

**Explanation:** You specified to create new volumes in the LSS ({0}), but LSS ({0}) already contains the maximum number of volumes ({1}).

**Action:** Specify another LSS and issue the command again.

**531** **The specified number of volume addresses exceeded the maximum of ″{0}″ volumes available in the specified LSS.**

**Explanation:** You requested to allocate volume addresses in the specified LSS, but the specified number of volume addresses exceeded the maximum number of volumes ({0}) for the specified LSS.

**Action:** Specify a valid number of volume addresses for the specified LSS or specify another LSS, and issue the command again.

**532** **The specified host is not compatible with the volume type ″{0}″.**

**Explanation:** You specified a host name and volume type ({0}) that are not compatible. See Table 4 on page 47 for a list of volume types and compatible hosts.

**Action:** Specify a valid host name or volume type and issue the command again.

**533** **Volume sharing by SCSI attached OS/400® hosts is not permitted (volume ″{0}″).**

**Explanation:** The OS/400 host attached to SCSI is not permitted for volume sharing.

**Action:** Review the document and then run the command with the volumes not shared.

**534 Disk group {0} is not found.**

**Explanation:** The current disk group that you specified is not known in the current configuration of the ESS you are trying to access.

**Action:** Specify a valid host name or volume type and issue the command again.

**535 Invalid configuration of disk group {0}.**

**Explanation:** You specified an invalid configuration option that can not be performed for this in particular disk group. It may be valid in other cases depending on how the disk group is configured.

**Action:** Use the application help option (esscli -help) to determine the proper configuration options for a diskgroup when using it for the create or delete volumespace command.

**536 Disk group {1} is not available.**

**Explanation:** The current disk group is not accessible because it is formatting and is locked due to other configurations.

**Action:** Perform a list disk group to see if another disk group known to the Storage Management CLI application can be used to process the action. If not, enable the disk group using ESS Specialist to configure it according to your needs.

**537 Potential reconfiguration failure will occur for disk group {0}.**

**Explanation:** The potential reconfiguration failure happens in the process of reconfiguring a disk group.

**Action:** Reexecute the command. If that approach is still failing, remove all access to the ESS to avoid conflicts based on what other users may be doing.

**538 Cannot reconfigurate the disk group, {0}.**

**Explanation:** The disk group cannot be reconfigurated because you do not have access or the disk group is doing a service operations which disable any configuration action.

**Action:** Reissue the command, but wait until the disk group reconfiguration is back online for that kind of operation.

**539 No configuration change is necessary for the command.**

**Explanation:** Based on the parameters, the create or delete action has no configuration changes that you need to perform.

**Action:** None

**540 Email address ({0}) has already been defined, so it cannot be created.**

**Explanation:** This message is displayed on a CREATE EMAIL command when the e-mail address that you specified already exists in the list of e-mail addresses. You cannot add duplicate e-mail addresses.

**Action:** Change the e-mail address to something that is not already defined. The e-mail address is case insensitive, which means that USER1@us.ibm.com and user1@US.IBM.COM are the same addresses.

**541 Email address ({0}) does not exist, so it cannot deleted or modified.**

**Explanation:** This message is displayed on either SET™ EMAIL or DELETE EMAIL. On SET/DELETE EMAIL, you are trying to modify or delete information about an e-mail address that exists in an e-mail list. For example, if our list contains user1@us.ibm.com and user2@us.ibm.com, and you want to modify or delete user3@us.ibm.com, then this message is displayed because the specified e-mail is not in our list. Another scenario is if you want to modify user1@us.ibm.com to user2@us.ibm.com. The message is displayed because user2@us.ibm.com exists and changing user1 to user2 would cause a duplicate to be inserted.

**Action:** Change to an e-mail address that is not already defined. The e-mail address is case insensitive, which means that USER1@us.ibm.com and user1@US.IBM.COM are the same addresses.

**542 Pager number ({0}) and pin ({1}) has already been defined, so it cannot be created.**

**Explanation:** This message is displayed on a CREATE PAGER command when the pager number and pin combination that is specified by the user already exists in the list of pagers. You cannot add duplicate pagers.

**Action:** Change the pager number to something that is not already defined.

**543 Pager number ({0}) and pin ({1}) does not exist, so it cannot be deleted or modified.**

**Explanation:** This message is displayed on either SET PAGER or DELETE PAGER. On SET/DELETE PAGER, you are trying to modify or delete information about a pager number that exists in an pager list. For example, if a possible list contains:

```
Pager# Pin
111   (no pin for this pager;pin is not required)
111    1
222    2
```

If you want to modify or delete 333, this message is displayed because the specified pager is not in the list. Another scenario is if you want to modify or delete 222, then the same message is displayed. This is because you must specify pin=2, and in this case the pin was omitted. Another possible scenario is if you want to modify pager=222 with pin=2 (which is valid) to become pager=111 with pin=1. The message is displayed because pager=111 with pin=1 exists and making the change causes duplicates to be inserted.

**Action:** Make sure that the pager number and pin being specified exist. In the case of SET, the new pager number and pin combination cannot be duplicated in the list.

---

**544** **Unable to create the file ″{0}″. Please make sure that sufficient space is available.**

**Explanation:** This occurs during a SET PERFSTATS command. If the file cannot be created when it is time to output the data, this message is displayed. This most likely happens if there is not sufficient space available on your machine to create the new file.

**Action:** Make sure that there is sufficient space to create files in that directory.

---

**545** **The trigger ({0}) specified is invalid.**

**Explanation:** The trigger ID or e-mail address for SNMP is invalid.

**Action:** Review the documentation on the correct way to create a trigger ID and e-mail address.

---

**546** **The specified directory ({0}) does not exist, or it does not have write permissions.**

**Explanation:** This occurs during a SET/Create PERFSTATS command. If the path of the directory that you used does not exist, it is not possible to create the file.

**Action:** Ensure that the given path has the correct permissions to create files and that the path is valid.

---

**547** **The user specified diskgroup, ″{0}″ has already been configured.**

**Explanation:** This occurs when the data collection is turned on. The Storage Management CLI is waiting to receive data from the ESS, and an error occurs while either reading the ESS's request or writing the response. A possible cause may be that the connection was lost.

**Action:** Make sure that there is an active TCP/IP connection to the ESS. If this problem happens frequently, disable data collector, then enable again.

---

**548** **The specified userid to be created, ″{0}″, already exists on the specified server.**

**Explanation:** The user ID that you are attempting to create cannot be created. There is already a user account with that ID and user IDs must be unique.

**Action:** List the user accounts on the ESS and select a user ID that is not on that list.

---

**549** **The specified userid to be deleted, ″{0}″, does not exist on the specified server.**

**Explanation:** You attempted to delete a user ID that does not exist on the ESS.

**Action:** List the user accounts on the ESS and find the entry for the user account that you are attempting to delete. Correct any spelling errors in the user ID when you attempt to perform the deletion.

---

**550** **Cannot create admin with an IP range until an admin without an IP range exists.**

**Explanation:** You attempted to create an administrative user account with an IP range but an administrative user account (other than storwatch) without an IP range does not exist. It is also possible that you attempted to set an IP range to the only existing administrative user account. These two actions have been disallowed as a safeguard so that you cannot create an administrative user account. This account cannot be accessed if you accidentally specify an IP range that you do not have access to.

**Action:** Create an administrative user account without an IP range and then use that account to create the desired administrative user account with the desired IP range. You can use the administrative user account with the IP range to delete the administrative user account without an IP range, if necessary.

---

**551** **An admin ID cannot delete itself until all other admin IDs have been deleted.**

**Explanation:** You have attempted to delete your own administrative user account while logged in with that account on an ESS that contains other administrative user accounts. This action has been disabled as a safeguard so that you cannot delete your own account and find out later that no one has access to the other administrative user accounts. You can delete your own administrative user account if there are no other administrative user accounts on the ESS. The default storwatch user ID will automatically be recreated.

**Action:** Log in with a different administrative user account to delete the desired account.

**552** **The specified problem, ″{0}″, does not exist on the specified server.**

**Explanation:** You have attempted to delete a problem that does not exist on the ESS.

**Action:** You can list the problems on the ESS and find the entry for the problem you are attempting to delete. You can then use the corresponding problem ID to specify the problem to be deleted.

**553** **Cannot create the default ″storwatch″ id.**

**Explanation:** You have attempted to create the default user account. For example, the user ID is ″storwatch″ and the password is the default password.

**Action:** You must specify either a different user ID or password.

**554** **SNMP address ({0}) has already been defined, so it cannot be created.**

**Explanation:** This occurs when you try to add a new SNMP address that already exists. Duplicate addresses are not allowed.

**Action:** Make sure that new address does not already exist.

**555** **SNMP address ({0}) does not exist, so it cannot deleted.**

**Explanation:** This occurs when you try to delete an SNMP address that does not exist.

**Action:** Verify the SNMP address and make sure it exists.

**556** **Cannot send test traps if ESS traps are disabled or no trap addresses are defined.**

**Explanation:** You have attempted to create the default user account. For example, the user ID is ″storwatch″ and the password is the default password.

**Action:** Specify either a different user ID or password.

**557** **The specified receiver to be created, ″{0}:{1}″, already exists on the specified server.**

**Explanation:** The application does a check to see if the host you are configuring for performance statistics are the same. In this case, the system can not determine the IP address for the host system.

**Action:** Reboot the host and try the command again.

**558** **The specified receiver to be deleted, ″{0}:{1}″, does not exist on the specified server.**

**Explanation:** The user has specified that the receiver be deleted. Therefore, the storage system cannot send performance statistics.

**Action:** To delete the receiver from the storage system, create the receiver entry using the create perfstats command.

**559** **The maximum number of receivers are already configured on the specified server.**

**Explanation:** The maximum number of receivers are already configured on the specified server. Additional receivers cannot be added at this time.

**Action:** Remove unnecessary receivers from the current specified server to create a new receiver.

**560** **The specified topology or protocol is incompatible with the specified port.**

**Explanation:** You cannot use the topology or protocol with the port that you have specified.

**Action:** Select another port to use the topology or protocol that you have specified.

**561** **The lss name-value pair is incompatible with the fixed-block volume type.**

**Explanation:** You cannot use the LSS name-value pair with the fixed-block volume type that you selected.

**Action:** Select another name-value pair to use or select a different fixed-block volume type.

**601** **An internal error was detected on the server.**

**Explanation:** The server detected an unknown error that might be caused by a temporary network connectivity problem or a malfunctioning infoserver.

**Action:** Check your network connectivity and the operational status of your ESS, and issue the command again.

**602** **The esscli application failed to register with the CopyServices server.**

**Explanation:** Your host system was unable to register itself with the ESS Copy Services server.

**Action:** Make sure that your ESS Copy Services server is operational and issue the command again.

**603 Physical control unit ″{0}″ was not found.**

**Explanation:** You specified a physical control unit that does not exist within the specified Copy Services server domain.

**Action:** Make sure that all clusters within the Copy Services server domain are operational and issue the command again.

**604 Failed to get data from the CopyServices server.**

**Explanation:** Your host system did not receive any information it requested from the ESS Copy Services server due to a temporary network problem or unexpected server error.

**Action:** Verify your network connection to the Copy Services server, check the server operation status, and issue the command again. If the problem persists, contact your system administrator for assistance.

**605 Failed to establish server connection. Please make sure {0} is up and running.**

**Explanation:** Your host system could not establish a connection with the server for one or more of the following reasons:

- You specified an invalid server IP address or server name.
- You do not have sufficient access authority to the server.
- The server was not operational or experienced an unspecified error.
- Your network was temporarily busy or down.
- The physical connection between your host system and the network was not properly established.

**Action:** Verify your network connectivity and server operation status and issue the command again.

**606 Applet status failed to connect to the server.**

**Explanation:** Your host system was not able to connect to the ESS applet status server for one or more of the following reasons:

- You specified an invalid server IP address or server name.
- You do not have sufficient access authority to the server.
- The server was not operational or experienced an unspecified error.
- Your network was temporarily busy or down.
- The physical connection between your host system and the network was not properly established.

**Action:** Verify your network connectivity and server operation status and issue the command again.

**607 Failed while disconnecting from the CopyServices server.**

**Explanation:** Your host system was not able to disconnect from the ESS Copy Services server. It might have lost the network connection before the requested disconnection method was called and run.

**Action:** None.

**608 Server error, failed to get path info.**

**Explanation:** You requested path information from the specified server, but the server did not return the requested information. This problem might be caused by a temporary network problem or server malfunction.

**Action:** Verify your network connection and server operation status and issue the command again.

**609 Server error, wrong connection type = {0} for the PPRC path.**

**Explanation:** You specified an invalid connection type for the assigned PPRC path.

**Action:** Specify a valid PPRC path and issue the command again.

**610 Server Response is not successful, response = {0}.**

**Explanation:** The response from the server was not successfully processed because of a temporary network connectivity problem or a busy or malfunctioning infoserver.

**Action:** Wait for a few minutes and issue the command again. If the problem persists, contact your system administrator for assistance.

**611 Registration failed.**

**Explanation:** Your host system attempted to communicate with the specified server, but failed because:

- Your network was temporarily down or busy.
- You specified an invalid user name, password, or access file name.
- You are not authorized to access the specified server.
- The CLI version is not compatible with the ESS LIC level.

**Action:** Make sure that you have adequate access authority, your network is properly functioning, and your CLI version matches the ESS LIC level. Then, issue the command again.

**612** **A username or password was not specified, but the administrative user has enabled the password protection for host commands on the ESS CopyServices Web configuration panel.**

**Explanation:** You did not specify the required user name or password.

**Action:** Specify a valid user name and password and issue the command again.

**613** **The performance data received from the ESS is invalid ({0}).**

**Explanation:** The statistics sent by the data collector have a specific format. This error is displayed if the Storage Management CLI receives an object that does not conform to the required format. This may happen if a source (other than ESS) writes data to the client (esscli) on the specified port.

**Action:** If the problem repeats, restart data collection.

**614** **No performance data was received during the specified time interval.**

**Explanation:** You have configured the frequency at which the ESS will send data (for example, every 5 minutes). This error occurs if the Storage Management CLI does not receive data from the ESS after that next interval of time expires (5 minutes in this example). This can occur if someone else changed the data collection parameters (for example, Hostname or Port number). This error does not allow the ESS to communicate with the Storage Management CLI.

**Action:** After this error, the esscli automatically shuts down the data receiver. Verify that the configuration has not been changed. Change those parameters, if necessary.

**615** **The server is currently downlevel. Please retry in 5 - 10 minutes.**

**Explanation:** Your server is down level.

**Action:** Wait 5 to 10 minutes and perform the action again.

**616** **The server is currently obtaining service maintenance. Retry again in 5 - 10 minutes.**

**Explanation:** This error message occurs when the server is performing maintenance on the ESS.

**Action:** Wait at least 5 minutes and then return the command.

**701** **An internal error was detected by esscli.**

**Explanation:** Your command request was not processed because an unknown internal error occurred.

**Action:** Specify the -v flag to determine if the CLI is working properly and issue the command again. If the problem still exists, restart your host system and issue the command again. If the problem still persists, contact your system administrator for assistance.

**702** **The communication sender is not initialized.**

**Explanation:** You did not receive the configuration information from the server because the communication classes of the Java code were not successfully initialized.

**Action:** Restart the CLI to clear cache memory and issue the command again.

**703** **No information was returned in the response message from the server.**

**Explanation:** The expected response from the server was incomplete. This problem might be caused by a premature disconnection of your host from the server due to temporary network problems or a malfunctioning server.

**Action:** Make sure that your network connectivity is normal and the specified server is operational and issue the command again.

**704** **The message text resources are unavailable. The esscli installation may be invalid or corrupted.**

**Explanation:** The CLI detected a warning or error condition, but it could not locate the message properties file to issue an appropriate message text key.

**Action:** Make sure that the CLI installation path and the Java classpath are correct and that the rsCliTextBundle.properties file is in the *your_cli_install*/rsCliSeascape/ directory. Then, issue the command again.

**705** **Text resource ID {0} is missing.**

**Explanation:** The CLI detected a warning or error condition, but it could not find the required text resource ID to report the problem.

**Action:** Make sure that the rsCliTextBundle.properties file is in the your_cli_install/rsCliSeascape/ directoryand is not corrupted.

**706** **Unable to start a local monitor for receiving the ESS performance data. The specified data collection is cancelled.**

**Explanation:** This problem happens when their is a problem opening a socket port for the host to listen to in order to received data.

**Action:** Do not specify a port the code should be able to do it dynamically or specify another port which can be listened too.

---

**707** **An error was detected while receiving the collected performance data (code={0}).**

**Explanation:** The port that is receiving the performance data received something other than performance data.

**Action:** None. It is an interrupt error that should not bring down your connection. If it does bring down your connection, open another command-line shell, delete the receiver entry, and start another entry.

---

**708** **Unable to determine the IP address of the local machine. This may indicate a problem with the network or local operating system.**

**Explanation:** The IP address of the local machine that you are running the command on is not accessible.

**Action:** Check your network connection to determine if the host machine is connected to a LAN. Check the user assistance on the host for instructions on how to set up a LAN for your host.

# Chapter 4. Using Copy Services CLI commands

This chapter describes the Copy Services CLI commands that you can use from your host system. It also presents the full syntax, flags, parameters, and usage examples of each command.

## Overview of Copy Services CLI commands

This section briefly introduces the Copy Services CLI commands and provides general guidelines for using the commands.

### Description

The Copy Services CLI provides six commands for you to monitor and manage predefined ESS Copy Services tasks. Table 29 briefly lists the commands and describes the name variations of each command.

*Table 29. Summary of Copy Services CLI commands*

| Name | Description | Details (Page) |
|---|---|---|
| **rsExecuteTask** **rsExTask** (See "Note") | Executes one or more ESS Copy services tasks, as defined using the ESS Copy Services Web-based interface, and waits for the given tasks to complete execution | 97 |
| **rsList2105s** **rsL2105s** (See "Note") | Displays the mapping of a host disk name to a 2105 volume serial number | 102 |
| **rsPrimeServer** **rsPSrv** (See "Note") | Creates, updates, or removes a list view of volumes associated with a particular host in the ESS Copy Services server. You can see the same view in the Volumes panel of the ESS Copy Services Web-based interface. | 103 |
| **rsQuery** **rsQ** (See "Note") | Queries the status of one or more volumes | 105 |
| **rsQueryComplete** **rsQComp** (See "Note") | Accepts the ESS Copy Services server tasks, as defined and saved with the ESS Copy Services Web-based interface, and determines whether all volumes that are defined in the given tasks have completed the initial PPRC synchronization FlashCopy® background copying | 109 |
| **rsTestConnection** **rsTConn** (See "Note") | Determines whether you can successfully connect to the ESS Copy Services server | 111 |
| **rsFlashCopyQuery** | Synchronously queries the user-specified volume or group of volumes to retrieve FlashCopy data | 99 |
| **Note:** This command applies to a Novell Netware 4.2 host system only. | | |

### General guidelines

Follow these general guidelines when you use the Copy Services CLI commands:

- To use the commands on all but OpenVMS Alpha host system, open a Shell or DOS command prompt and change to the directory where you have installed the Copy Services CLI. On an OpenVMS Alpha host system, you can invoke the commands from any directory.

- Issue the commands exactly the way as they are shown in the syntax diagrams. The Copy Services CLI commands and parameters are case-sensitive on all but the OpenVMS Alpha and Windows host systems. You can issue the commands in lower, upper, or mixed cases on an OpenVMS Alpha or Windows host system.
- Use the name of each command appropriate to your host system as described in Table 29 on page 95 and Table 30. The names of all the Copy Services CLI commands for a Novell Netware 4.2 system differ slightly from those for other supported host systems. For example, use **rsExTask**, instead of **rsExecuteTask** on a Novell Netware 4.2 system.

*Table 30. Platform-based notation conventions for Copy Services CLI commands*

| Commands | File ext. | Flag | Para-meter | Host systems | Example |
|---|---|---|---|---|---|
| **rsExecuteTask**<br>**rsList2105s**<br>**rsPrimeServer**<br>**rsQuery**<br>**rsQueryComplete**<br>**rsTestConnection**<br>**rsFlashCopy Query*** | **.sh** | **-** | | AIX, Tru64, Sun, NUMA-Q, Linux, HP-UX | `rsExecuteTask.sh -a` *`securityfilepath`* `-s` *`primaryservername`* `es_pair_12` |
| | | **-** | `" "` | OpenVMS Alpha | `rsExecuteTask -a` *`"securityfilepath"`* `-s` *`"primaryservername"`* `"es_pair_12"` |
| | **.exe** | **/** | | Windows NT, Windows 2000, Windows 2000 Datacenter | `rsExecuteTask.exe /a` *`securityfilepath`* `/s` *`primaryservername`* `es_pair_12` |
| | **.nlm** | **/** | | Novell 5.1, Novell 6.0 | `rsExecuteTask.nlm /a` *`securityfilepath`* `/s` *`primaryservername`* `es_pair_12` |
| **rsExTask**<br>**rsL2105s**<br>**rsPSrv**<br>**rsQ**<br>**rsQComp**<br>**rsTConn** | **.nlm** | **/** | | Novell 4.2 | `rsExTask.nlm /a` *`securityfilepath`* `/s` *`primaryservername`* `es_pair_12` |
| **rsFlashCopy Query*** | **.sh** | **-** | | AIX, Sun Solaris, Hewlett Packard, Linux, | `rsFlashCopyQuery.sh -a` *`securityfilepath`* `-s` *`primaryservername`* `es_pair_12` |
| | **.exe** | **/** | | Windows NT, Windows 2000, Windows 2000 Datacenter | `rsFlashCopyQuery.exe /a` *`securityfilepath`* `/s` *`primaryservername`* `es_pair_12` |

- Suffix each command with an executable file extension (for example, sh, exe, or nlm) when using it on host systems other than OpenVMS Alpha. See Table 30 for detailed descriptions and examples.
- Place the username, password, taskname, and hostname parameters inside quotation marks when specified on an OpenVMS host system. These parameters are passed to the ESS server where they are handled in a case-sensitive manner. See Table 30 for examples.
- Prefix each command flag with a minus (-) or slash (/) symbol. See Table 30 for more information.
- If necessary and authorized, use the Administration panel of the ESS Copy Services Web-based interface to manage the user ID and password for a host

system that uses the Copy Services CLI. If you enable the password-protection option on the ESS Copy Services server, you must specify one of the following flags when issuing the Copy Services CLI commands on a host system:

- Both the u flag with the username parameter and the p flag with the password parameter
- The a flag with the securityfilepath parameter. The securityfilepath file contains both the user name and the password. Use this option for additional security.

See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for detailed instructions about how to define and remove the CLI user name and password.

- When using commands other than **rsList2105s**, specify the s flag, the b flag, or both based on the following scenarios:
  - The server that is specified by the s flag is the server that the CLI makes connection to first. The server, specified by the b flag is an alternate server that the CLI will makes connection to if it fails to make connection to the server that is specified by the s flag.
  - In primary and backup server environment, the s flag is the primary server and the b flag is the backup server.
  - In dual active server environment with both servers are active, the s flag is serverA and the b flag is serverB
  - In mixed environment with a dual active server and a non-active backup server, the s flag is the dual active server and b flag is the backup server
  - Specify only the s flag with a server to check the connection to this server. If the command can establish a connection, the server starts processing it. Otherwise, it fails.
  - Specify only b flag with an alternate server to check the connection to this alternate server. If the command can establish a connection, the alternate server starts processing it. Otherwise, it fails.
  - Specify both s and b flag with different servers to check connection to the specified server with s flag. Check the alternate server that is specified with b flag if the connection to the server that is specified with s flag fails.

  If a CLI command can establish a connection to the server that is specified by the s flag, it is sent to the server for processing. If the command fails to establish a connection to the server that is specified by the s flag, the connection to the alternate server that is specified by b flag is checked. If the command can establish a connection to the alternate server specified by the b flag, it is send to the alternate server for processing.

  **Restrictions:**

  - Do not append an executable file extension to the Copy Services CLI commands on an OpenVMS Alpha host system. The OpenVMS Alpha system defines the Copy Services CLI programs as foreign command symbols and, therefore, does not append any extension.
  - Do not issue more than 15 CLI commands simultaneously to the ESS. If you want to run more than 15 commands, they must be run one after another rather than at the same time to prevent memory exceptions.

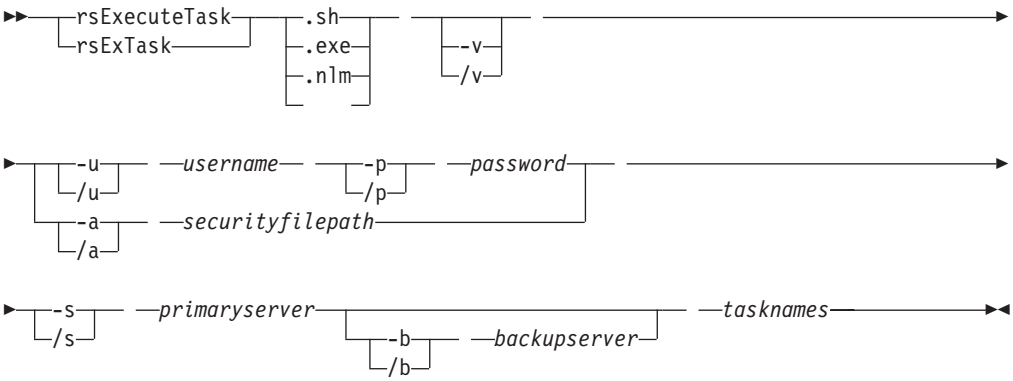
## rsExecuteTask

The **rsExecuteTask** command executes one or more ESS Copy Services tasks, as defined and saved using the ESS Copy Services Web-based interface. The command waits for the given tasks to complete processing, but will time out if not completed within 15 minutes.

**Note:** You can use the **rsQueryComplete** command to determine if PPRC or FlashCopy pairs have completed copying. Successful completion of the **rsExecuteTask** command means that the volumes are in the PPRC or FlashCopy relationship as specified in the given tasks. It does not mean that the specified relationship is indeed established.

## Syntax

The following is the complete syntax of the **rsExecuteTask** command. See “Syntax diagrams” on page ix for syntax reading instructions.




## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsExecuteTask** command:

**a** *securityfilepath*
Specifies the full path to a security file (created by the user) that contains the user name and password that are defined at the ESS Copy Services server for using Copy Services CLI commands on a host system. The a flag with the securityfilepath parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the u and p flags and associated parameters are not used.

The format of the security path file is as follows:

```
username password
```

**b** *backupserver*
Specifies+ the IP address or the complete host name of an alternate the ESS Copy Services backup server. The b flag with the backupserver parameter is optional.

**p** *password*
Specifies the password of a user name that is authorized to execute the Copy Services CLI commands. The p flag with the password parameter is required if the administrator for ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with primaryserver parameter, you must identify and configure an ESS Copy Services server.

*tasknames*
Specifies the name of one or more previously saved ESS Copy Services tasks. Separate the task names with a space when you specify more than one task. This parameter does not require a flag.

**u** *username*
Specifies the user name that is authorized to execute the Copy Services CLI commands. The u flag with the username parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

When you invoke the **rsExecuteTask** command on an AIX host system, output similar to the following is displayed:

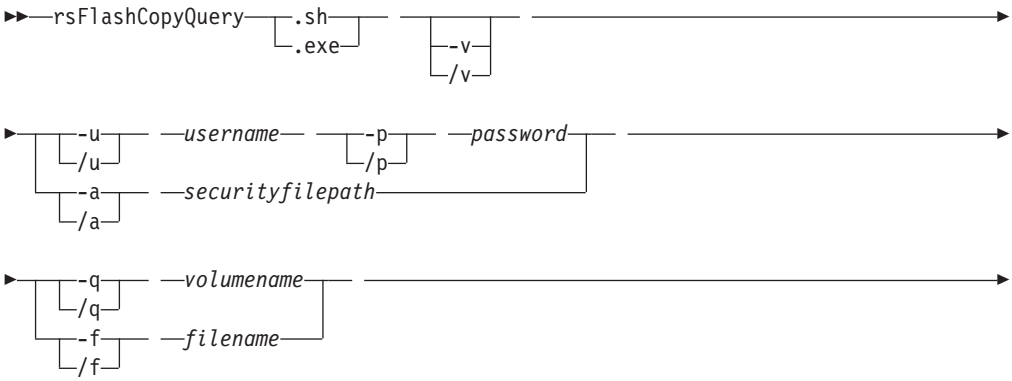
```
# ./rsExecuteTask.sh -v -u yourusername -p yourpassword -s primaryservername es_pair_12
rsExecuteTask: Got task manager reference
rsExecuteTask: *************Finding the tasks****************
rsExecuteTask: Task es_pair_12 found by task manager
rsExecuteTask: *************Scheduling the tasks*****************
rsExecuteTask: Task es_pair_12 scheduled with copy services server
rsExecuteTask: *************Monitoring the tasks*****************
rsExecuteTask: Waiting on server...
rsExecuteTask: Task es_pair_12 completed successfully
rsExecuteTask: Command successful
```

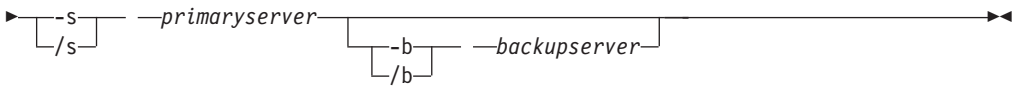
# rsFlashCopyQuery

The rsFlashCopyQuery command synchronously queries the user-specified volume or group of volumes to retrieve FlashCopy data. This data includes FlashCopy peers, out-of-sync tracks, sequence numbers, date established, date synced, and attributes.

## Syntax

The following is the complete syntax of the **rsFlashCopyQuery** command. See “Syntax diagrams” on page ix for syntax reading instructions.






## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsFlashCopyQuery** command:

**a** *securityfilepath*
Specifies the full path to the file that contains the user name and password that are defined at the ESS Copy Services server for using Copy Services CLI commands on a host system. The a flag with the securityfilepath parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the u and p flags and associated parameters are not used.

The format of the security path file is as follows:

```
username password
```

**f** *filename*
Specifies the name of a file that contains vpath names, host volume names, and volume serial numbers, all of which are to be queried. Use the f flag with the filename parameter if the q flag with the volume parameter is not used.

The format of the filename file can be either:

```
sourceVolume1 targetVolume1
sourceVolume2 targetVolume2
...
sourceVolumeN targetVolumeN
```

or

```
volume1
volume2
volume3
...
volumeN
```

**b** *backupserver*
Specify the IP address or the complete host name of an alternate ESS Copy Services backup server. The b flag with the backupserver parameter is optional.

**p** *password*
Specifies the password of a user name that is authorized to execute the Copy Services CLI commands. The p flag with the password parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with primaryserver parameter, you must identify and configure an ESS Copy Services server.

**q** *volumename*
Specifies the vpath name, host volume name, or volume serial number. Use the q flag with the volume parameter if the f flag with the filename parameter is not used.

Use the m flag if you use the **rsQuery** command for the vpath name or host volume name. Do not use the m flag if you use the **rsQuery** command for a serial number.

**u** *username*
Specifies the user name that is authorized to execute the Copy Services CLI commands. The u flag with the username parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

The following example shows the output that you see when you invoke the following command:

**- ./rsFlashCopyQuery.sh -u username -p password -s servername -q g0126866**

```
-----------------
26866:00:01
-----------------
Volume Serial = g0126866
State = Source
Peer = G0226866
Out of Sync Tracks = 0
Sequence Number = 46
Date Established = Wed Feb 11 14:39:19 MST 2004
Date Synced = Wed Feb 11 14:39:47 MST 2004
Attributes = INHIBIT_WRITES_TARGET BACKGROUND_COPY
VOLUME_FLC_PERSISTENT
CHANGE_REC_ENABLED REVERTIBLE INHIBIT_WRITES_SOURCE
```

The sample output contains one of the following fields and values:

**Volume Serial** Specifies the serial number of the volume.

**State** Specifies one of the following states:
- Source
- Target
- None

**Peer** Specifies the peer of the FlashCopy volume that is being queried.

**Out of Sync Tracks**
Specifies the number of tracks that have yet to be copied.

**Sequence Number**
Specifies the user-specified ID for the FlashCopy pair. This ID must be greater than 1 and less than 256.

**Date Established**
Specifies the date when the FlashCopy was established.

**Date Synced** Specifies the date when the last background copy was completed.

**Attributes** Specifies the attributes of the FlashCopy pair.

## rsList2105s

The **rsList2105s** command displays the mapping of a host disk name to a 2105 volume serial number.

If you have the IBM Subsystem Device Driver (SDD) running on a host system other than Linux, NUMA-Q, Tru64, and OpenVMS and if you have changed the configuration for the host, you must restart the host so that the SDD can recognize, add, or remove the paths.

If you use the **rsList2105s** command on an OpenVMS Alpha host system that is a member of an OpenVMS cluster, the output does not display information about the following devices:

- ESS volumes to which the host system has only MSCP paths
- ESS volumes to which the host system uses only MSCP paths at this time even though it has both MSCP and direct paths.

## Syntax

The following is the complete syntax of the **rsList2105s** command. See “Syntax diagrams” on page ix for syntax reading instructions.


## Flags and parameters

The **rsList2105s** command does not have any flags or parameters.

## Examples

If SDD is installed, output similar to the following is displayed when you invoke the **rsList2105s** command on an AIX host system:

```
>./rsList2105s.sh

VpathName     Serial     VolumeNames
-----------    ------     -----------
 vpath10      40EFC102    hdisk14
 vpath11      40FFC102    hdisk15
 vpath13      40CFC102    hdisk17
 vpath14      40DFC102    hdisk18
```

If SDD is not installed, output similar to the following is displayed when you invoke the **rsList2105s** command on an AIX host system:

```
>./rsList2105s.sh

disk name       2105 serial number
---------       ------------------
 hdisk14           40EFC102
 hdisk15           40FFC102
 hdisk17           40CFC102
 hdisk18           40DFC102
```

## rsPrimeServer

The **rsPrimeServer** command creates, updates, or removes a list of volumes associated with a particular host in the ESS Copy Services server. You can see the same list in the Volumes panel of the ESS Copy Services Web-based interface.

This command is useful when you use the ESS Copy Services Volumes panel to perform FlashCopy, PPRC, or both functions. In a single view, it shows the names of all hosts that are connected to the same volume.

If SDD is installed on your host system and if you have changed the configuration for the host, such as adding or removing volumes, you must perform the following steps:

1. Restart your host system so that SDD can recognize, add, or remove the paths.
2. Run the **rsPrimeServer** command to generate the current mapping for the host volumes.

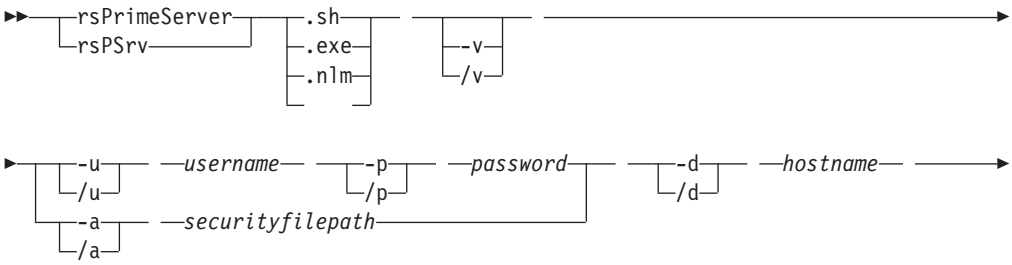
If SDD is not installed on your host system and if you have changed the configuration for the host, such as adding or removing volumes, you must run the **rsPrimeServer** command to generate the current mapping for the host volumes.

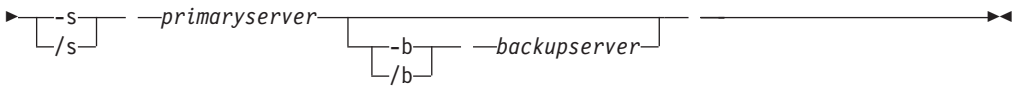
If you use the **rsPrimeServer** command on an OpenVMS Alpha host system with MSCP-only access to some ESS volumes, these volumes are not shown in the host-specific list of volumes in the ESS Copy Services server.

**Note:** This command sometimes times out if it is not completed within 15 minutes.

## Syntax

The following is the complete syntax of the **rsPrimeServer** command. See “Syntax diagrams” on page ix for syntax reading instructions.






## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsPrimeServer** command:

**a** *securityfilepath*
Specifies the full path to the file that contains the user name and password that are defined at the ESS Copy Services server for using Copy Services CLI commands on a host system. The a flag with the securityfilepath parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the u and p flags and associated parameters are not used.

The format of the security path file is as follows:

```
username password
```

**d** *hostname*
Specifies the IP address or host name to be removed. The host name must exactly match one of the listing entries on the Volumes panels of the ESS Copy Services Web-based interface. The d flag with the host name parameter is required when you are removing the hostname.

**b** *backupserver*
Specify the IP address or the complete host name of an alternate the ESS Copy Services backup server. The b flag with the backupserver parameter is optional.

**p** *password*
Specifies the password of a user name that is authorized to execute the Copy Services CLI commands. The p flag with the password parameter is required if the administrator for ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with primaryserver parameter, you must identify and configure an ESS Copy Services server.

**u** *username*
Specifies the user name that is authorized to execute the Copy Services CLI commands. The u flag with the username parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

The following example shows the output that you see when you invoke the **rsPrimeServer** command to add a host name on an AIX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -s primaryservername
rsPrimeServer: Local host is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com registered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

The following example shows the output that you see when you invoke the **rsPrimeServer** command to delete a host name on an AIX host system:

```
# ./rsPrimeServer.sh -v -u yourusername -p yourpassword -d abc.def.ghi.com
   -s primaryservername
rsPrimeServer: host to unregister is abc.def.ghi.com
rsPrimeServer: Got task manager reference
rsPrimeServer: Host abc.def.ghi.com unregistered
rsPrimeServer: Configuration change requested made to primaryserver
rsPrimeServer: Command successful
```

## rsQuery

The **rsQuery** command queries the status of one or more volumes.

You can invoke the **rsQuery** command for the vpath name, the host volume name, or the volume serial number under various conditions.

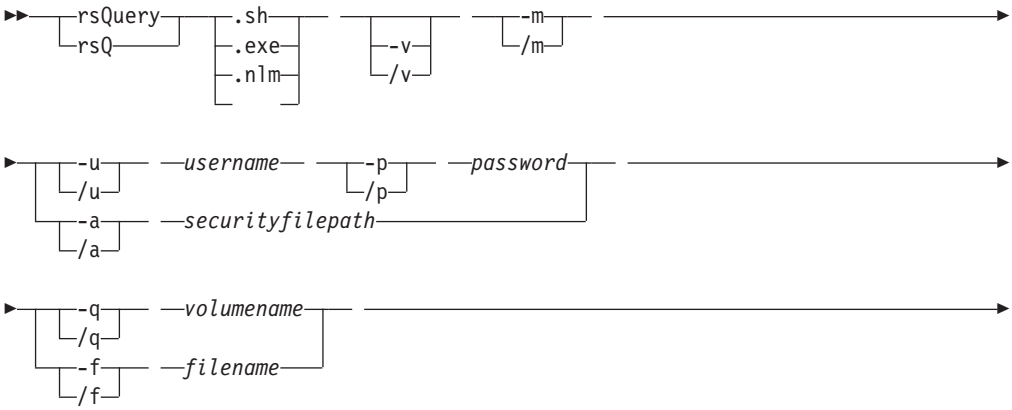
If the SDD is installed, use the **rsQuery** command for the vpath name or volume serial number. If the SDD is not installed, use the **rsQuery** command for the host volume name or volume serial number.

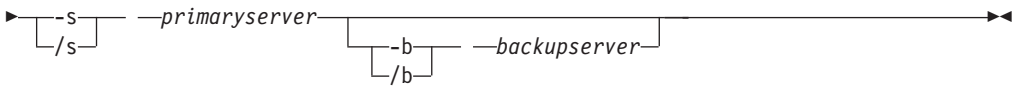
The **rsQuery** command fails on an OpenVMS host system if you specify the -m flag for a volume to which the host system has MSCP-only access. In other words, if your OpenVMS host system only has MSCP access to a volume, specify the volume serial number when using the **rsQuery** command.

**Note:** This command sometimes times out if it is not completed within 15 minutes.

## Syntax

The following is the complete syntax of the **rsQuery** command. See “Syntax diagrams” on page ix for syntax reading instructions.






## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsQuery** command:

**a** *securityfilepath*
Specifies the full path to the file that contains the user name and password that are defined at the ESS Copy Services server for using Copy Services CLI commands on a host system. The a flag with the securityfilepath parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the u and p flags and associated parameters are not used.

The format of the security path file is as follows:

```
username password
```

**f** *filename*
Specifies the name of a file that contains vpath names, host volume names, or volume serial numbers, all of which are to be queried. Use the f flag with the filename parameter if the q flag with the volume parameter is not used.

The format of the filename file can be either:

```
sourceVolume1 targetVolume1
sourceVolume2 targetVolume2
...
sourceVolumeN targetVolumeN
```

or

```
volume1
volume2
volume3
...
volumeN
```

**m** Maps host volume names to 2105 volume serial numbers. This flag enables you to use a host volume name as a volume flag.

This flag must be used in conjunction with the q flag. The following is an example of how the m flag is used with the q flag:

```
./rsQuery.sh -v -a security  -m -q vpatha -s servername
```

Use the m flag if you use the **rsQuery** command for the vpath name or host volume name. Do not use the m flag if you use the **rsQuery** command for a serial number.

**b** *backupserver*
Specify the IP address or the complete host name of an alternate the ESS Copy Services backup server. The b flag with the backupserver parameter is optional.

**p** *password*
Specifies the password of a user name that is authorized to execute the Copy Services CLI commands. The p flag with the password parameter is required if

the administrator for ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with primaryserver parameter, you must identify and configure an ESS Copy Services server.

**q** *volumename*
Specifies the vpath name, host volume name, or volume serial number. Use the q flag with the volume parameter if the f flag with the filename parameter is not used.

Use the m flag if you use the **rsQuery** command for the vpath name or host volume name. Do not use the m flag if you use the **rsQuery** command for a serial number.

**u** *username*
Specifies the user name that is authorized to execute the Copy Services CLI commands. The u flag with the username parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

The following example shows the output that you see when you invoke the **rsQuery** command to query a serial number on an AIX host system:

```
>./rsQuery.sh -v -u yourusername -v yourpassword  -q G0622532 -s primaryservername
************************Volume Information************************
Volume G0622532 found on 22532:00 as volume number 0x06
PPRC State=source, Type=synchronous, Status=copy_pending
PPRCPendingTracks=00017323
FlashCopy_state=none, Size=1.03_GB
PPRC Peer=G7A22532
Trusted Primed for Resync=no

******************************************************************
rsQuery: Command successful
```

The following example shows the output that you see when you invoke the **rsQuery** command to query a serial number on an AIX host system:

```
rsQuery -q 30026866 -s primaryservername
************************Volume Information************************
Volume 30026866 found on 26866:13 as volume number 000
Size=10.00_GB
FlashCopy_state=none,
PPRC State=simplex, Status=none
PPRC Peer=None
Trusted Primed for Resync=no
Session Type: Asynchronous PPRC
Session Number: 1
Session State: Join Pending
******************************************************************
```

The sample output contains the following fields and values:

**PPRC State** Specifies the current state of a volume in a PPRC relationship with one of the following values:

- Simplex
- Source
- Target
- Unknown

**Type** Specifies one of the following types of a volume PPRC relationships:

- Synchronous
- Extended distance

**Status** Specifies the current status of a volume in a PPRC relationship with one of the following values:

- Copy_pending
- Suspended
- Fullcopy
- None
- Unknown
- Extended Distance

If the volume status is copy_pending, the **rsQuery** command also reports the PPRCPending Sectors status for fixed blocks or PPRC PendingTracks for CKD.

**PPRCPendingTracks**
Specifies the number of out of sync tracks in the relationship at the time of the last Copy Services refresh. This data may be outdated. To obtain up-to-date track information, use the **rsquerycomplete** command.

**FlashCopy_state**
Specifies the current state of a volume in a FlashCopy relationship with one of the following values:

- Source
- Target
- None
- Unknown

**Trusted Primed for Resync**
Specifies whether the extended distance pair (B to C) in a cascading PPRC relationship is ready to be resynchronized:

- Yes
- No

**Session Type** Specifies the session type as asynchronous PPRC.

**Session Number**
Specifies the number of the asynchronous PPRC session with a value of 1 - 255.

**Session State** Specifies the current state of the asynchronous PPRC relationship with one of the following values:

- Active

- Join Pending
- Remove Pending

**First Pass** A volume remains in this state until the entire volume has been sent at least once to the secondary for an initial full volume establish or when all of the out-of-sync tracks that were indicated in the suspension bit map prior to a resynch order have been sent to the secondary. This state is specified with one of the following values:

- Yes
- No

## rsQueryComplete

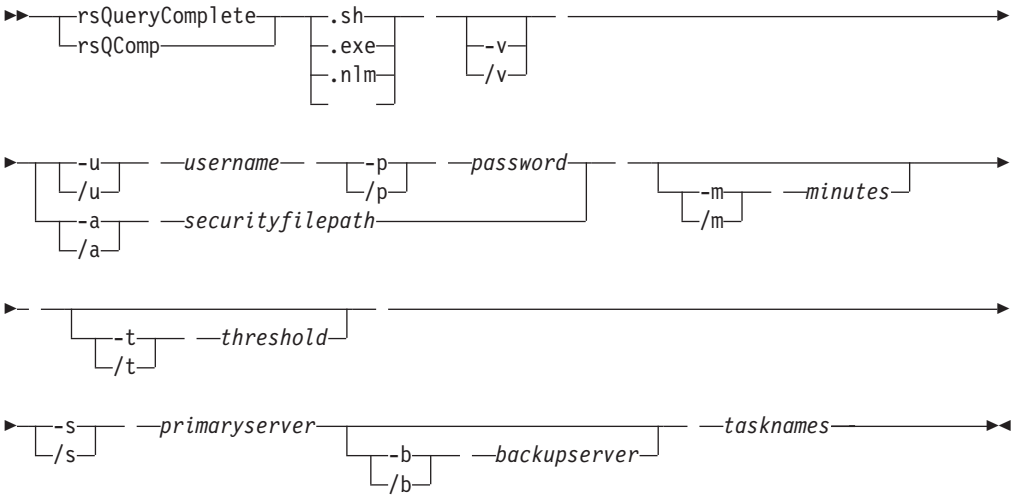
The **rsQueryComplete** command accepts the ESS Copy Services server tasks as defined and saved with the ESS Copy Services Web-based interface. It determines whether all volumes defined in the given tasks have completed the initial PPRC synchronization or FlashCopy® background copying.

**Note:** When querying FlashCopy tasks, the initial establish should be done using the **Persistent FlashCopy** option and the **With Background Copy** option. Non-persistent pairs or pairs without the background copy option specified should not be used.

When you use the **rsQueryComplete** command for grouped tasks, the output displays the first subtask until it reaches the completion threshold; and then it displays the next subtask until it reaches the completion threshold. This process repeats until all the subtasks are queried.

## Syntax

The following is the complete syntax of the **rsQueryComplete** command. See “Syntax diagrams” on page ix for syntax reading instructions.




## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsQueryComplete** command:

**a** *securityfilepath*
Specifies the full path to the file that contains the user name and password that are defined at the ESS Copy Services server for using Copy Services CLI commands on a host system. The a flag with the securityfilepath parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the u and p flags and associated parameters are not used.

The format of the security path file is as follows:

```
username password
```

**m** *minutes*
Specifies the number of minute and second intervals between status queries of the PPRC synchronization and the FlashCopy background copying. The -m flag and the minutes parameter are optional. The default is 1 minute.

The format of this parameter is as follows:

```
mm:ss
```

where *mm* stands for the number of minutes and *ss* for the number of seconds before the command issues a new query.

**b** *backupserver*
Specify the IP address or the complete host name of an alternate the ESS Copy Services backup server. The b flag with the backupserver parameter is optional.

**p** *password*
Specifies the password of a user name that is authorized to execute the Copy Services CLI commands. The p flag with the password parameter is required if the administrator for ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with primaryserver parameter, you must identify and configure an ESS Copy Services server.

*tasknames*
Specifies the name of one or more previously saved ESS Copy Services tasks. Separate the task names with a space when you specify more than one task. This parameter does not require a flag. The supported tasks for this command are establish FlashCopy and establish PPRC.

**t** *threshold*
Specifies the threshold percentage that defines the query completion status. The t flag and the threshold parameter are optional. Table 31 lists the default percentages.

*Table 31. Default Values*

| Task | Default Value |
|---|---|
| Synchronous PPRC | 100% |
| Extended Distance PPRC | 0% |
| FlashCopy with Background Copy | 100% |
| FlashCopy without Background Copy | 0% |

**u** *username*
Specifies the user name that is authorized to execute the Copy Services CLI commands. The u flag with the username parameter is required if the administrator for the ESS Copy Services server has enabled password protection for CLI commands and if the a flag with the securityfilepath parameter is not used.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

The following example shows the output that you see when you invoke the **rsQueryComplete** command and specify the minutes (m) parameter with a value of 0:10 and the threshold (t) parameter with a value of 80% on an AIX host system:

```
>./rsQueryComplete.sh -v -u yourusername -p yourpassword -m 0:10 -t 80
 -s primaryservername es_pair_12

rsQueryComplete: Got task manager reference
rsQueryComplete: --------- Task Name: es_pair_12 ---------
rsQueryComplete: Task es_pair_12 found by TaskManager
rsQueryComplete: PPRC Type = Synchronous.  Threshold = 80%
rsQueryComplete: waiting 10 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 17
rsQueryComplete: The tracks remaining to be copied = 994
rsQueryComplete: waiting 10 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 32
rsQueryComplete: The tracks remaining to be copied = 234
rsQueryComplete: waiting 10 seconds...
rsQueryComplete: Sampling volumes...
rsQueryComplete: Percentage complete = 82
rsQueryComplete: The tracks remaining to be copied = 0
rsQueryComplete: ------------------------------------------------
rsQueryComplete: Command successful
```

The sample output contains one of the following fields and values:

**PPRC Type** Specifies one of the following types of PPRC tasks:
- Synchronous
- Extended Distance

**FlashCopy Options**
Specifies one of the following types of FlashCopy tasks:
- Background Copy
- No Background Copy

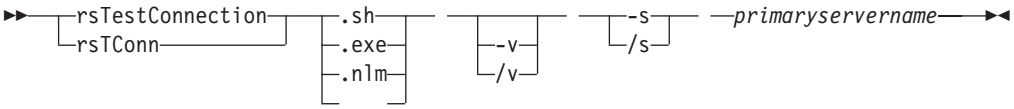
# rsTestConnection

The **rsTestConnection** command determines whether you can successfully connect to the ESS Copy Services server.

**Note:** Use the rsTestConnection command to monitor the ESS Copy Services server. In an automated script, you might use this command for error notification. For example, if the rsTestConnection command fails, the automated script can send an e-mail or other notification to the storage administrator.

## Syntax

The following is the complete syntax of the **rsTestConnection** command. See “Syntax diagrams” on page ix for syntax reading instructions.




## Flags and parameters

You can specify one or more of the following flags and parameters when you issue the **rsTestConnection** command:

**s** *primaryserver*
Specifies the IP address or the complete host name of a ESS Copy Services server. Before you use the s flag with the primaryserver parameter, you must identify and configure an ESS Copy Services server.

**v** Displays all responses from the server. This verbose flag is optional and does not require a parameter.

## Examples

The following example shows the output that you see when you invoke the **rsTestConnection** command on an AIX host system:

```
#./rsTestConnection.sh -v -s primaryservername
rsWebTest: Using yourhostname as server name
sWebTest: rsVSServer reference obtained successfully
rsWebTest: rsVSServer reference narrowed successfully
rsWebTest: HeartBeat to the server was successful.
rsWebTest: Command successful
```

# Chapter 5. Understanding Copy Services CLI messages

This chapter describes the messages and codes for the Copy Services CLI. After identifying each message, it provides a detailed explanation and suggests actions that you can take to correct the reported situation.

## Copy Services CLI messages for OpenVMS Alpha host systems

The following Copy Services CLI messages apply only to an OpenVMS Alpha host system. They use the `%Facility-Severity Symbol-Text` code format unique to the OpenVMS Alpha system environment. For the Copy Services CLI, the facility is the IBM2105 server, the severity symbol for a normal status is S for success, and the severity symbol for an error status is E for errors.

**%IBM2105-S-NORMAL Task completed or command successful**

**Explanation:** The command or task completed successfully.

**Action:** None

**%IBM2105-E-NOUSER Username not specified or missing parameter username**

**Explanation:** You specified the u flag, but you did not specify the user name parameter or you entered an invalid user name.

**Action:** Specify a valid user name after the u flag, as in `/u jsmith` on a Windows host system, and try the command again.

**%IBM2105-E-NOPWD Password not specified or missing parameter for password**

**Explanation:** You specified the u flag with the user name parameter, but you did not specify the p flag with the password parameter, or you entered an invalid password.

**Action:** Specify the p flag followed with a valid password after you use the u flag with the username parameter.

**%IBM2105-E-NOSRV No primary or backup server name specified**

**Explanation:** You did not specify the required IP address or host name of the ESS Copy Services primary or backup server.

**Action:** Specify the ESS Copy Services primary or backup server, or both, in the format of IP address or host name and try the command again.

**%IBM2105-E-NOTASK No task names specified**

**Explanation:** You did not specify a valid task name to execute the command.

**Action:** Specify at least one task name to run the command. You can use the Copy Services panels of the ESS Copy Services Web-based interface to define and save the tasks.

**%IBM2105-E-NOSERIAL Missing parameter disk serial numbers**

**Explanation:** You collected the configuration information for the ESS logical unit numbers (LUNs) configured on this host, but the ESS serial number for some of the volumes was not available.

**Action:** Verify that the ESS LUNs are correctly configured to your host system and try the command again.

**%IBM2105-E-MISDISKNUM Mismatching number of disk pairs specified**

**Explanation:** You collected the configuration information for the ESS LUNs that are configured on this host, but some of the information was not available.

**Action:** Verify that the ESS LUNs are correctly configured to your host system and try the command again.

**%IBM2105-E-NOLODISK Missing parameter local disks**

**Explanation:** You collected the configuration information for the ESS LUNs that are configured on this host, but some of the information was not available.

**Action:** Verify that the ESS LUNs are correctly configured to your host system and try the command again.

**%IBM2105-E-NODISK No disk pairs specified**

**Explanation:** You collected the configuration information for the ESS LUNs that are configured on this host, but some of the information was not available.

**Action:** Verify that the ESS LUNs are correctly

configured to your host system and try the command again.

**%IBM2105-E-NOPARHOSTN Missing parameter hostname to be deleted**

**Explanation:** You specified the d flag to remove a host definition from the ESS Copy Services, but you did not specify the valid host name.

**Action:** Specify the complete host name of the host that you want to delete and try the command again.

**%IBM2105-E-MIPARAM Missing parameters**

**Explanation:** You did not specify the q flag with the volume name parameter or the f flag with the filename parameter of the file that contains the volumes you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name of the file that contains the volumes you want to query and try the command again.

**%IBM2105-E-NOPARMMIN Missing parameter minutes between samples**

**Explanation:** You specified the m flag, but did not specify the minutes parameter.

**Action:** Specify a valid minutes parameter after the m flag and try the command again.

**%IBM2105-E-NOPARTHRE Missing parameter threshold**

**Explanation:** You specified the t flag, but did not specify the threshold parameter.

**Action:** Specify a valid threshold parameter after the t flag and try the command again.

**%IBM2105-E-NO2105VOL No 2105 volumes found**

**Explanation:** You did not assign any IBM 2105 volumes to the host system.

**Action:** Configure the required IBM 2105 volumes to your host system and try the command again. See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* and *IBM TotalStorage Enterprise Storage Server: Host Systems Attachment Guide* for more information.

**%IBM2105-E-NOVOLLIST Volume list not specified**

**Explanation:** You must specify the q flag with the volumename parameter or the f flag with the filename parameter of the file that contains the volumes that you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name of the file that contains the volumes that you want to query.

**%IBM2105-E-CONFLPARAM Conflicting parameters**

**Explanation:** You specified both the q flag with the volumename parameter and the f flag with the filename while only one of them is allowed or required to query the volumes.

**Action:** Specify either the q flag with a valid volume name or the f flag with a valid file name and try the command again.

**%IBM2105-E-MOREVOL More volumes per line**

**Explanation:** The format of the $FILENAME file is incorrect; you specified more than two volume names per line in the $FILENAME file while only one or two volume names are allowed per line.

**Action:** Specify one or two volume names per line in the $FILENAME file and try the command again.

**%IBM2105-E-FILENOTEX The volume list file $FILENAME does not exist or the Read access to $FILENAME not provided**

**Explanation:** The volume list file with the filename you specified does not exist, or you do not have permission to read the file.

**Action:** Specify a valid file name for the volume list or obtain permission to read the file and try the command again.

**%IBM2105-E-NOVOLSPEC No volumes specified or no volumes specified in a given file**

**Explanation:** You did not specify the q flag with the volumename parameter or the f flag with the filename parameter for the file that contains the volumes that you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name and try the command again.

**%IBM2105-E-INVPARAM Invalid parameter specified**

**Explanation:** You might make one or all of the following errors:

- Specified a parameter that does not exist for the given command
- Specified a flag without the required prefix symbol (- or /)
- Included a space between the flag and the proceeding symbol (- or /)

**Action:** Specify a valid flag, immediately prefixed with the required symbol and followed with a valid

parameter, and try the command again.

You can obtain more information about the command syntax and usage by issuing the command without any arguments.

---

**%IBM2105-E-MISARG Missing argument for a parameter**

**Explanation:** You specified a flag but did not follow it with a required parameter.

**Action:** Specify the flag with a valid parameter and try the command again. You can obtain more information about the command syntax and usage by issuing the command without any arguments.

---

**%IBM2105-E-NOPARAM No parameter specified**

**Explanation:** You did not specify any parameter.

**Action:** Specify a valid parameter, and a flag if required, and try the command again. You can obtain more information about the command syntax and usage by issuing the command without any arguments.

---

**%IBM2105-E-NOPARAMSEC Missing parameter securityfilepath**

**Explanation:** You specified the a flag, but did not specify the securityfilepath parameter.

**Action:** Specify the a flag with a valid security path file and try the command again.

---

**%IBM2105-E-SECFILNOTFND Missing parameter securityfilepath**

**Explanation:** You specified the a flag, but did not specify the securityfilepath parameter.

**Action:** Specify the a flag with a valid security path file and try the command again.

---

**%IBM2105-E-INCSECFILE The format of the security file $FILENAME is incorrect**

**Explanation:** The security file you specified does not have the correct format. The correct format for this file is `username password` where the user name and password are on the same line but separated by one or more spaces.

**Action:** Correct the file format and try the command again.

---

**%IBM2105-E-VOLNOTFND Some of the volumes could not be found**

**Explanation:** You issued the **rsQuery** command on volumes that could not be found on the ESS Copy Services server.

**Action:** Verify the volume names and try the command again.

---

**%IBM2105-E-NOSUCCESS Unsuccessful**

**Explanation:** The command did not complete successfully. In the case of the **rsExecuteTask** command, one or more invoked tasks did not complete successfully.

**Action:** Correct all possible problems and try the command again.

---

**%IBM2105-E-FILENNOTFND The volume $FILENAME could not be found**

**Explanation:** You specified a file that contains the volume host names and serial numbers, but the file is not found or does not exist.

**Action:** Specify a valid file name and try the command again.

---

**%IBM2105-E-NOCONNECTION Failed to connect to server**

**Explanation:** The connection to ESS Copy Services server failed due to one or all of the following errors:

- Communication problems between the host system and the server
- An incorrect user name or password
- Incompatibility between the versions of the Copy Services CLI and the ESS code
- A missing username or password parameter. When the password-protection option is enabled on the ESS Copy Services server, you must specify the user name and password or the securityfilepath parameter on your host system.

**Action:** Correct any of the possible problems and try the command again.

---

**%IBM2105-E-PRIMDOWN Primary server is down and no backup server is specified**

**Explanation:** You specified a valid primaryserver parameter, but did not specify a valid backupserver parameter. A communication problem occurred when you tried to connect to the primary server. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Specify a valid backupserver to connect to a backup server or try to connect to the primary server later.

---

**%IBM2105-E-BOTHDOWN Primary and backup servers are down**

**Explanation:** You specified valid primaryserver and backupserver parameters to connect to the servers, but a communication problem occurred. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See "Checking the ESS Copy Services server operational status" on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information.

**%IBM2105-E-CONERROR Failed while creating communication to server**

**Explanation:** A communication problem occurred when you executed the command.

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See "Checking the ESS Copy Services server operational status" on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information.

**%IBM2105-E- Failed while disconnecting from server**

**Explanation:** A communication problem occurred when you tried to disconnect from the server.

**Action:** Check the status of the communication link between your host system and the ESS Copy Services server and try the command again.

**%IBM2105-E-BACKDOWN Backup server is down and no primary server is specified**

**Explanation:** You specified a valid backupserver parameter, but did not specify a primaryserver parameter. A communication problem occurred when you tried to connect to the specified backup server. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Specify a valid primaryserver to connect to a primary server or try to connect to the backup server later.

**%IBM2105-E-NOHEARTBEAT Heartbeat to the server failed**

**Explanation:** A connection to the server cannot be established at this time. The ESS Copy Services server might not be operational or there might be a temporary network problem.

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See "Checking the ESS Copy Services server operational status" on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information.

**%IBM2105-E-SYSINT A system exception occurred**

**Explanation:** The command failed because of an internal code or communication problem.

**Action:** Correct the problem and try the command again.

**%IBM2105-E-RSECFERROR A system exception occurred while reading the security or volume file $FILENAME or the Read access to $FILENAME not provided**

**Explanation:** The command failed because of an internal code or communication problem or you do not have permission to read the file.

**Action:** Correct the error or obtain the read access and try the command again.

**%IBM2105-E-COMFAILED Command failed**

**Explanation:** A communication problem occurred when you executed the command.

**Action:** Correct the problem and try the command again.

## Copy Services CLI messages for other host systems

The following Copy Services CLI messages apply to all but the OpenVMS host systems. These host systems include:

- IBM AIX
- IBM NUMA-Q
- Compaq Tru64
- HP-UX
- Sun Solaris
- Novell Netware
- Red Hat and SuSE Linux

- Windows NT 4.0
- Windows 2000
- Windows 2000 Datacenter

**0 Task completed or command successful**

**Explanation:** The command or task completed successfully.

**Action:** None

**1 Username not specified or missing parameter username**

**Explanation:** You specified the u flag, but you did not specify the username parameter or you entered an invalid user name.

**Action:** Specify a valid user name after the u flag, as in `/u jsmith` on a Windows host system, and try the command again.

**2 Password not specified or missing parameter for password**

**Explanation:** You specified the u flag with the user name parameter, but you did not specify the p flag with the password parameter, or you entered an invalid password.

**Action:** Specify the p flag followed with a valid password after you use the u flag with the user name parameter.

**3 No primary or backup server name specified**

**Explanation:** You did not specify the required IP address or host name of the ESS Copy Services primary or backup server.

**Action:** Specify the ESS Copy Services primary or backup server, or both, in the format of IP address or host name and try the command again.

**4 No task names specified**

**Explanation:** You did not specify a valid task name to execute the command.

**Action:** Specify at least one task name to run the command. You can use the Copy Services panels of the ESS Copy Services Web-based interface to define and save the tasks.

**5 Missing parameter disk serial numbers**

**Explanation:** You collected the configuration information for the ESS logical unit numbers (LUNs) configured on this host, but the ESS serial number for some of the volumes was not available.

**Action:** Verify that the ESS LUNs are correctly configured to your host system and try the command again.

**6 Mismatching number of disk pairs specified**

**Explanation:** You provided either too many targets or too many sources.

**Action:** Try the command again specifying fewer targets or sources.

**7 Missing parameter local disks**

**Explanation:** You collected the configuration information for the ESS LUNs configured on this host, but some of the information was not available.

**Action:** Verify that the ESS LUNs are correctly configured to your host system and try the command again.

**8 No disk pairs specified**

**Explanation:** You did not specify any volumes in the command.

**Action:** Try the command again specifying volumes.

**9 Missing parameter hostname to be deleted**

**Explanation:** You specified the d flag to remove a host definition from the ESS Copy Services, but you did not specify the valid host name.

**Action:** Specify the complete host name of the host you want to delete and try the command again.

**10 Missing parameters**

**Explanation:** You did not specify the q flag with the volumename parameter or the f flag with the filename parameter of the file that contains the volumes you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name of the file that contains the volumes you want to query and try the command again.

**11 Missing parameter minutes between samples**

**Explanation:** You specified the m flag, but did not specify the minutes parameter.

**Action:** Specify a valid minutes parameter after the m

flag and try the command again.

**12 Missing parameter threshold**

**Explanation:** You specified the t flag, but did not specify the threshold parameter.

**Action:** Specify a valid threshold parameter after the t flag and try the command again.

**13 No 2105 volumes found**

**Explanation:** You did not assign any IBM 2105 volumes to the host system.

**Action:** Configure the required IBM 2105 volumes to your host system and try the command again. See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* and *IBM TotalStorage Enterprise Storage Server: Host Systems Attachment Guide* for more information.

**14 Volume list not specified**

**Explanation:** You must specify the q flag with the volumename parameter or the f flag with the filename parameter of the file that contains the volumes you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name of the file that contains the volumes you want to query.

**15 Conflicting parameters**

**Explanation:** You specified both the q flag with the volumename parameter and the f flag with the filename while only one of them is allowed or required to query the volumes.

**Action:** Specify either the q flag with a valid volume name or the f flag with a valid file name and try the command again.

**16 More volumes per line**

**Explanation:** The format of the $FILENAME file is incorrect; you specified more than two volume names per line in the $FILENAME file while only one or two volume names are allowed per line.

**Action:** Specify one or two volume names per line in the $FILENAME file and try the command again.

**17 The volume list file $FILENAME does not exist or the Read access to $FILENAME not provided**

**Explanation:** The volume list file with the filename you specified does not exist, or you do not have permission to read the file.

**Action:** Specify a valid file name for the volume list or obtain permission to read the file and try the command again.

**18 No volumes specified or no volumes specified in a given file**

**Explanation:** You did not specify the q flag with the volumename parameter or the f flag with the filename parameter for the file that contains the volumes that you want to query.

**Action:** Specify the q flag with a valid volume name or the f flag with a valid file name and try the command again.

**19 Invalid parameter specified**

**Explanation:** You might make one or all of the following errors:

- Specified a parameter that does not exist for the given command
- Specified a flag without the required prefix symbol (- or /)
- Included a space between the flag and the proceeding symbol (- or /)

**Action:** Specify a valid flag, immediately prefixed with the required symbol and followed with a valid parameter, and try the command again.

You can obtain more information about the command syntax and usage by issuing the command without any arguments.

**20 Missing argument for a parameter**

**Explanation:** You specified a flag but did not follow it with a required parameter.

**Action:** Specify the flag with a valid parameter and try the command again. You can obtain more information about the command syntax and usage by issuing the command without any arguments.

**21 No parameter specified**

**Explanation:** You did not specify any parameter.

**Action:** Specify a valid parameter, and a flag if required, and try the command again. You can obtain more information about the command syntax and usage by issuing the command without any arguments.

**22 Missing parameter securityfilepath**

**Explanation:** You specified the a flag, but did not specify the securitypathfile parameter.

**Action:** Specify the a flag with a valid security path file and try the command again.

**23 The security file $FILENAME could not be found**

**Explanation:** You specified the a flag with an invalid name or path for the file that contains the user name and password information.

**Action:** Specify a valid name for or correct path to the security file and try the command again.

**24 The format of the security file $FILENAME is incorrect**

**Explanation:** The security file you specified does not have the correct format. The correct format for this file is `username password` where the username and password are on the same line but separated by one or more spaces.

**Action:** Correct the file format and try the command again.

**25 Some of the volumes could not be found**

**Explanation:** You issued the **rsQuery** command on volumes that could not be found on the ESS Copy Services server.

**Action:** Verify the volume names and try the command again.

**26 Unsuccessful**

**Explanation:** The command did not complete successfully. In the case of the **rsExecuteTask** command, one or more invoked tasks did not complete successfully.

**Action:** Correct all possible problems and try the command again.

**27 The volume $FILENAME could not be found**

**Explanation:** You specified a file that contains the volume host names and serial numbers, but the file is not found or does not exist.

**Action:** Specify a valid file name and try the command again.

**40 Failed to connect to server**

**Explanation:** The connection to the ESS Copy Services server failed due to one or all of the following errors:

- Communication problems occur between the host system and the server
- Invalid DNS/IP address
- An incorrect user name or password
- Incompatibility between the versions of the Copy Services CLI and the ESS code
- A missing username or password parameter. When the password-protection option is enabled on the ESS Copy Services server, you must specify the user name and password or the securityfilepath parameter on your host system.

**Action:** Correct any of the possible problems and try the command again.

**41 Primary server is down and no backup server is specified**

**Explanation:** You specified a valid primaryserver parameter, but did not specify a valid backupserver parameter. A communication problem occurred when you tried to connect to the primary server. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Specify a valid backupserver to connect to a backup server or try to connect to the primary server later.

**42 Primary and backup servers are down**

**Explanation:** You specified valid primaryserver and backupserver parameters to connect to the servers, but a communication problem occurred. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See “Checking the ESS Copy Services server operational status” on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User’s Guide* for more information.

**43 Failed while creating communication to server**

**Explanation:** A communication problem occurred when you executed the command. The CLI command did not finish after 15 minutes. The problem may be because of a temporary network problem or a problem with the ESS Copy Services server not functioning correctly.

**Note:** The exact format of date and time is: dow mon dd hh:mm:ss zzz yyyy

Where:

- dow is the day of the week (Sun, Mon, Tue, Wed, Thu, Fri, Sat)
- mon is the month (Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec)
- dd is the day of the month (01 through 31) displayed as two decimal digits

- hh is the hour of the day (00 through 23) displayed as two decimal digits
- mm is the minute within the hour (00 through 59) displayed as two decimal digits
- ss is the second within the minute (00 through 61) displayed as two decimal digits
- zzz is the time zone, and may reflect daylight savings time as three letters
- yyyy is the year as four decimal digits

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See "Checking the ESS Copy Services server operational status" on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information.

---

**44 Failed while disconnecting from server**

**Explanation:** A communication problem occurred when you tried to disconnect from the server.

**Action:** Check the status of the communication link between your host system and the ESS Copy Services server and try the command again.

---

**45 Backup server is down and no primary server is specified**

**Explanation:** You specified a valid backupserver parameter, but did not specify a primaryserver parameter. A communication problem occurred when you tried to connect to the specified backup server. The problem might be a temporary network problem or with the ESS Copy Services server.

**Action:** Specify a valid primaryserver to connect to a primary server or try to connect to the backup server later.

---

**49 rsWebTest: Server ″given server name″ not found**

**Explanation:** This command checks to see if the server you specified exists.

**Action:** Check for possible typing errors involving the given server name, or replace the server name with a server that exists.

---

**50 Heartbeat to the server failed**

**Explanation:** A connection to the server cannot be established at this time. The ESS Copy Services server might not be operational or there might be a temporary network problem.

**Action:** Check your network connection and verify that the ESS Copy Services server is up and operational. See "Checking the ESS Copy Services server operational status" on page 125 and *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information.

---

**60 A system exception occurred while reading the security or volume file $FILENAME or the Read access to $FILENAME not provided**

**Explanation:** The command failed because of an internal code or communication problem or you do not have permission to read the file.

**Action:** Correct the error or obtain Read access and try the command again.

---

**62 No value is specified for the INSTALL system variable**

**Explanation:** You did not specify a value for the system INSTALL variable.

**Action:** Edit each shell script and set the INSTALL variable to the directory where you have installed the Copy Services CLI and try the command again.

---

**63 The CLI.CFG file is not found or accessible**

**Explanation:** The CLI.CFG file is not found or empty, or you do not have permission to read the file.

**Action:** Reinstall the Copy Services CLI to restore the CLI.CFG file if you have deleted it or obtain Read access and try the command again.

---

**64 No value is specified for JAVA_INSTALL in the CLI.CFG file**

**Explanation:** You did not specify a value for the JAVA_INSTALL variable in the CLI.CFG file.

**Action:** Specify a valid value for the JAVA_INSTALL variable and try the command again.

---

**65 No value is specified for JAVA_CLASSPATH in the CLI.CFG file**

**Explanation:** You did not specify a value for the JAVA_CLASSPATH variable in the CLI.CFG file.

**Action:** Specify a valid value for the JAVA_CLASSPATH variable and try the command again.

---

**66 The CLI.CFG file format is incorrect**

**Explanation:** The CLI.CFG file uses an incorrect format.

**Action:** Follow the format guidelines as described in the CLI.CFG file and try the command again.

---

**80 Command failed**

**Explanation:** A communication problem occurred when you executed the command.

**Action:** Correct the problem and try the command again.

# Chapter 6. Troubleshooting the Copy Services CLI

This chapter provides instructions for you to troubleshoot the Copy Services CLI if it does not work properly. Specifically, it helps you perform diagnostic and problem-solving tasks in the following order:

1. Testing the server connection
2. Checking the communication link
3. Verifying the ESS volume allocation
4. Relinking the Copy Services CLI images on an OpenVMS Alpha host system

## Testing the server connection

**Context:** The Copy Services CLI does not work if your host system is not properly connected to the ESS Copy Services server. Before you invoke the Copy Services CLI, issue the **rsTestConnection** command to verify the connection.

**Note:** Use the rsTestConnection command to monitor the ESS Copy Services server. In an automated script, you might use this command for error notification. For example, if rsTestConnection command fails, the automated script could send an e-mail or other notification to the storage administrator.

If the **rsTestConnection** command can establish a working connection between your host system and the ESS Copy Services server and if the Copy Services CLI still does not work, proceed to “Checking the communication link” on page 125 to continue the diagnosis.

**Steps:**

If the **rsTestConnection** command fails, perform one or both of the following tasks to correct the connection problem:

1. Verifying the ESS Copy Services server configuration.
2. Checking the ESS Copy Services server operational status.

When you issue the **rsTestConnection** command, use the appropriate file extension for your host system environment.

**Related topics:**

- See “rsTestConnection” on page 111 for more information about the **rsTestConnection** command.

## Verifying the ESS Copy Services server configuration

**Context:**

The first diagnostic task is to ensure that the ESS Copy Services server is correctly configured. Use the ESS Specialist Tools panel to access the ESS Copy Services server.

**Steps:**

Perform the following steps after you open the ESS Specialist Web-based interface:

1. Log onto the ESS Specialist as an administrator.

2. From the ESS Specialist Welcome panel, click **Tools** to invoke the Tools panel.
3. Click **Determine IPs for copyservices active servers**.
4. Click **Display the active CopyServices server**.

   The next panel displays two tables, the first of which contains the current configuration information.
5. In the current Configuration table, verify that the servers are configured and that the IP addresses are correct.

   To correct the IP address, perform the following steps:

   a. From the ESS Specialist Welcome panel, click **Tools** to invoke the Tools panel.
   b. Click the **Define copyservices active servers** link.
   c. Click the **Define copyservices server** link.
   d. Click the **Define Servers** button.
   e. Verify or correct the IP addresses.

      **Note:** The servers work correctly only under the following conditions:
      - If server A is defined and server B is not defined. If server B is the only server defined, you will receive an error.
      - If both server A and B are defined

   f. Click the **Submit Configuration** button.

      **Note:** If the window displays an error message, verify the correct IP address was entered by clicking the **Back** button. After you verify the IP address, submit the change by clicking the **Submit Configuration** button.

   If the problem persists, contact IBM support.
6. In the Current Configuration table, verify that the IP address of the ESS Copy Services primary server matches the IP address that you used when you invoked the **rsTestConnection** command.

   **Recommendation:** Configure server A as your primary and highest configured server, and server B as you backup server.

   If the IP addresses match, proceed to the next diagnostic task, “Checking the ESS Copy Services server operational status” on page 125.

   If the IP addresses do not match, perform the following steps:

   a. Use the IP address of the ESS Copy Services primary server to execute the **rsTestConnection** command.
   b. If the **rsTestConnection** command is still not successful, proceed to the next diagnostic task, “Checking the ESS Copy Services server operational status” on page 125.

## Checking the ESS Copy Services server operational status

**Context:**

The next diagnostic task ensures that the ESS Copy Services server is running. You can use the ESS Specialist Storage Allocation panel to access ESS Copy Services server.

**Steps:**

Perform the following steps to verify that the ESS Copy Services server is operational:

1. Log onto the ESS Specialist as an administrator.

   The ESS Specialist Welcome panel opens.
2. Click **Copy Services** from the ESS Specialist Welcome panel.

   If the ESS Copy Services displays the Welcome panel, it means that the ESS Copy Services server is up and running.

   If you cannot access ESS Copy Services, it is possible that the ESS Copy Services servers are not operational. You might need to restart ESS Copy Services.

   **Attention:** Restarting ESS Copy Services is a disruptive action. Use it only if no other options are available. You must ensure that ESS Copy Services is not in use before you restart or disable it. See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for more information about the impacts of restarting ESS Copy Services.
3. Restart ESS Copy Services.
4. Invoke the **rsTestConnection** command to verify your connection to the ESS Copy Services server.

   If the **rsTestConnection** command is successful but the Copy Services CLI still does not work, proceed to "Checking the communication link" to continue your diagnosis.

   If the **rsTestConnection** command is still not successful, contact your service support representative or the IBM SSR.

## Checking the communication link

**Context:**

The Copy Services CLI does not work properly if the communication link is not established between your host system and the ESS Copy Services server. The communication links are initially configured when the ESS is installed, and you can use the ESS Specialist to display and modify the ESS communications configuration.

**Steps:**

Perform the following steps to check the communication link:

1. Use the ESS Specialist to configure the communication link if none currently exists between your host system and the ESS Copy Services server.
2. See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* for detailed instructions on how to configure the ESS communication links.

3. Use the Communication Resources Work Sheet available in *IBM TotalStorage Enterprise Storage Server: Introduction and Planning Guide* to plan the ESS Communications configuration.

## Verifying the ESS volume allocation

**Context:**

To use all Copy Services CLI commands and the functions related to host volumes, you must first allocate ESS volumes to your host system. You can issue the **rsList2105s** command to list the ESS volumes that are allocated to your host system. See "rsList2105s" on page 102 for more information about the **rsList2105s.sh** command.

**Steps:**

Perform the following steps to allocate and verify ESS volumes to your host system:

1. Access the ESS Specialist.
2. From the ESS Specialist Welcome panel, click **Storage Allocation**.

   If your host system is configured in the ESS, you will see an icon indicating the configuration.
3. Click **Tabular View** from the ESS Specialist Storage Allocation panel.

   Sort the table using the first column (Host/SSID) as the first sort. Scroll down to find your host system in the first column. The serial numbers of the logical volumes assigned to your host system are displayed in the third column.
4. Use the appropriate operating system commands to configure new logical volumes to your host system. See *IBM TotalStorage Enterprise Storage Server: Web Interface User's Guide* and *IBM TotalStorage Enterprise Storage Server: Host Systems Attachment Guide* for more information.
5. Issue the **rsList2105s** command to list the ESS logical volumes that are currently assigned to your host system.
6. Verify that in the Tabular View of the ESS Specialist, the logical volume serial numbers configured to your host system match those in the output from the **rsList2105s** command. Shut down and restart your host system if they do not match.

## Relinking the Copy Services CLI images on an OpenVMS Alpha host system

**Context:**

For privileged images, an OpenVMS host system performs a more restrictive version-checking at the image-activation time. A system upgrade might cause version mismatches between the existing privileged images and post-upgrade system libraries.

The Copy Services CLI images are linked on your host system during the installation process. To resolve possible version mismatches after system upgrades, the installation process keeps all Copy Services CLI object files in the ibm2105$cli directory and provides a procedure to relink all images.

**Steps:**

Perform the following steps to recreate the image files:

1. Log onto your host system as a user with the `syslck`, `sysprv` (or a system UIC), `tmpmbx`, and `cmkrnl` privileges.
2. Issue the `@IBM2105$MANAGER:CLI_LINK.COM` command.
3. Issue the `@IBM2105$MANAGER:IBM2105$STARTUP.COM` command to install new images.

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# Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully.

## Features

These are the major accessibility features in the IBM TotalStorage Enterprise Storage Server information:

1. You can use screen-reader software and a digital speech synthesizer to hear what is displayed on the screen. IBM Home Page Reader version 3.0 has been tested.
2. You can operate features using the keyboard instead of the mouse.

## Navigating by keyboard

You can use keys or key combinations to perform operations and initiate menu actions that can also be done through mouse actions. You can navigate the IBM TotalStorage Enterprise Storage Server information from the keyboard by using the shortcut keys for your browser or Home Page Reader. See your browser Help for a list of shortcut keys that it supports. See the following Web site for a list of shortcut keys supported by Home Page Reader:

`http://www-306.ibm.com/able/solution_offerings/keyshort.html`

## Accessing the publications

You can find HTML versions of the IBM TotalStorage Enterprise Storage Server information at the following Web site:

`http://www.ehone.ibm.com/public/applications/publications/cgibin/pbi.cgi`

You can access the information using IBM Home Page Reader 3.0.

# Glossary

This glossary includes terms for the IBM TotalStorage Enterprise Storage Server (ESS) and other Seascape solution products.

This glossary includes selected terms and definitions from:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172–1990, copyright 1990 by the American National Standards Institute (ANSI), 11 West 42nd Street, New York, New York 10036. Definitions derived from this book have the symbol (A) after the definition.
- The *IBM Glossary of Computing Terms*, which is available online at the following Web site: http://www.ibm.com/ibm/terminology/. Definitions derived from this book have the symbol (GC) after the definition.
- The *Information Technology Vocabulary* developed by Subcommittee 1, Joint Technical Committee 1, of the International Organization for Standardization and the International Electrotechnical Commission (ISO/IEC JTC1/SC1). Definitions derived from this book have the symbol (I) after the definition. Definitions taken from draft international standards, committee drafts, and working papers that the ISO/IEC JTC1/SC1 is developing have the symbol (T) after the definition, indicating that final agreement has not been reached among the participating National Bodies of SC1.

This glossary uses the following cross-reference forms:

**See** Refers the reader to one of two kinds of related information:

- A term that is the expanded form of an abbreviation or acronym. This expanded form of the term contains the full definition.
- A synonym or more preferred term

**See also**
Refers the reader to one or more related terms.

**Contrast with**
Refers the reader to a term that has an opposite or substantively different meaning.

## Numerics

**750.** A model of the Enterprise Storage Server featuring a 2-way processor with limited physical storage capacity. This model can be updated to the model 800.

**800.** A model of the Enterprise Storage Server featuring a standard processor or an optional Turbo processor. The Model 800 supports RAID 5, RAID 10, and 15000 rpm drives. Model 800 supersedes Model F20.

**2105.** The machine number for the IBM TotalStorage Enterprise Storage Server (ESS). Models of the ESS are expressed as the number 2105 followed by "Model <xxx>", such as 2105 Model 800. The 2105 Model 100 is an ESS expansion enclosure that is typically referred to simply as the Model 100. See also *IBM TotalStorage Enterprise Storage Server* and *Model 100*.

**3390.** The machine number of an IBM disk storage system. The ESS, when interfaced to IBM S/390 or zSeries hosts, is set up to appear as one or more 3390 devices, with a choice of 3390-2, 3390-3, or 3390-9 track formats.

**3990.** The machine number of an IBM control unit.

**7133.** The machine number of an IBM disk storage system. The Model D40 and 020 drawers of the 7133 can be installed in the 2105-100 expansion enclosure of the ESS.

**8-pack.** See *disk eight pack*.

## A

**access.** (1) To obtain the use of a computer resource. (2) In computer security, a specific type of interaction between a subject and an object that results in flow of information from one to the other.

**access-any mode.** One of the two access modes that can be set for the ESS during initial configuration. It enables all fibre-channel-attached host systems with no defined access profile to access all logical volumes on the ESS. With a profile defined in ESS Specialist for a particular host, that host has access only to volumes that are assigned to the WWPN for that host. See also *pseudo host* and *worldwide port name*.

**ACK.** See *request for acknowledgment and acknowledgment*.

**active Copy Services server.** The Copy Services server that manages the Copy Services domain. Either the primary or the backup Copy Services server can be

the active Copy Services server. The backup Copy Services server is available to become the active Copy Services server if the primary Copy Services server fails. See also *Copy Services client* and *primary Copy Services server*. Contrast with *backup Copy Services server*.

**agent.** A program that automatically performs some service without user intervention or on a regular schedule. See also *subagent*.

**alert.** A message or log that a storage facility generates as the result of error event collection and analysis. An alert indicates that a service action is required.

**allegiance.** In Enterprise Systems Architecture/390, a relationship that is created between a device and one or more channel paths during the processing of certain conditions. See also *implicit allegiance*, *contingent allegiance*, and *reserved allegiance*.

**allocated storage.** In an ESS, the space that is allocated to volumes but not yet assigned. Contrast with *assigned storage*.

**American National Standards Institute (ANSI).** An organization of producers, consumers, and general interest groups that establishes the procedures by which accredited organizations create and maintain voluntary industry standards in the United States. (A)

**Anonymous.** In ESS Specialist, the label on an icon that represents all connections that are using fibre-channel adapters between the ESS and hosts and that are not completely defined to the ESS. See also *anonymous host*, *pseudo host*, and *access-any mode*.

**anonymous host.** Synonym for *pseudo host*. Contrast with *Anonymous* and *pseudo host*.

**ANSI.** See *American National Standards Institute*.

**APAR.** See *authorized program analysis report*. (GC)

**arbitrated loop.** A fibre-channel topology that enables the interconnection of a set of nodes. See also *point-to-point connection* and *switched fabric*.

**array.** An ordered collection, or group, of physical devices (disk drive modules) that is used to define logical volumes or devices. In the ESS, an array is a group of disks that the user designates to be managed by the RAID technique. See also *redundant array of independent disks*.

**ASCII.** (American National Standard Code for Information Interchange) The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), that is used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters. (A) Some organizations, including IBM, have used the parity bit to expand the basic code set.

**assigned storage.** On an ESS, the space allocated to a volume and assigned to a port.

**asynchronous cascading PPRC.** An optional feature of the Enterprise Storage Server (ESS) that uses a third ESS to allow a secondary PPRC volume to become a primary PPRC volume or a primary PPRC volume to become a secondary volume to another primary PPRC volume. See also *synchronous PPRC* and *asynchronous PPRC*.

**asynchronous PPRC.** An optional feature of the Enterprise Storage Server that provides a 2-site extended distance remote copy. Data that is written by the host to the ESS at the local site is automatically maintained at the remote site. See also *synchronous PPRC*.

**authorized program analysis report (APAR).** A request for correction of a defect in a current release of an IBM-supplied program. (GC)

**availability.** The degree to which a system or resource is capable of performing its normal function. See *data availability*.

# B

**backup Copy Services server.** One of two Copy Services servers in a Copy Services domain. The other Copy Services server is the primary Copy Services server. The backup Copy Services server is available to become the active Copy Services server if the primary Copy Services server fails. A Copy Services server is software that runs in one of the two clusters of an ESS and manages data-copy operations for that Copy Services server group. See also *Copy Services client* and *primary Copy Services server*. Contrast with *active Copy Services server*.

**bay.** In the ESS, the physical space used for installing SCSI, ESCON, and fibre-channel host adapter cards. The ESS has four bays, two in each cluster. See also *service boundary*.

**bit.** (1) Either of the digits 0 or 1 when used in the binary numeration system. (T) (2) The storage medium required to store a single binary digit. See also *byte*.

**block.** (1) A string of data elements recorded or transmitted as a unit. The elements may be characters, words, or physical records. (T) (2) In the ESS, a group of consecutive bytes used as the basic storage unit in fixed-block architecture (FBA). All blocks on the storage device are the same size (fixed size). See also *fixed-block architecture* and *data record*.

**byte.** (1) A group of eight adjacent binary digits that represent one EBCDIC character. (2) The storage medium required to store eight bits. See also *bit*.

# C

**cache.** A special-purpose buffer storage, smaller and faster than main storage, used to hold a copy of instructions and data obtained from main storage and likely to be needed next by the processor. (T)

**cache fast write.** In the ESS, a form of the fast-write operation in which the storage server writes the data directly to cache, where it is available for later destaging.

**cache hit.** An event that occurs when a read operation is sent to the cluster, and the requested data is found in cache. The opposite of *cache miss*.

**cache memory.** Memory, typically volatile memory, that a storage server uses to improve access times to instructions or data. The cache memory is typically smaller and faster than the primary memory or storage medium. In addition to residing in cache memory, the same data also resides on the storage devices in the storage facility.

**cache miss.** An event that occurs when a read operation is sent to the cluster, but the data is not found in cache. The opposite of *cache hit*.

**call home.** A communication link established between the ESS and a service provider. The ESS can use this link to place a call to IBM or to another service provider when it requires service. With access to the machine, service personnel can perform service tasks, such as viewing error logs and problem logs or initiating trace and dump retrievals. See also *heartbeat* and *remote technical assistance information network*.

**cascading.** (1) Connecting network controllers to each other in a succession of levels, to concentrate many more lines than a single level permits. (2) In high-availability cluster multiprocessing (HACMP), cascading pertains to a cluster configuration in which the cluster node with the highest priority for a particular resource acquires the resource if the primary node fails. The cluster node relinquishes the resource to the primary node upon reintegration of the primary node into the cluster.

**catcher.** A server that service personnel use to collect and retain status data that an ESS sends to it.

**CCR.** See *channel command retry*.

**CCW.** See *channel command word*.

**CD.** See *compact disc*.

**CEC.** See *computer-electronic complex*.

**channel.** In Enterprise Systems Architecture/390, the part of a channel subsystem that manages a single I/O interface between a channel subsystem and a set of control units.

**channel command retry (CCR).** In Enterprise Systems Architecture/390, the protocol used between a channel and a control unit that enables the control unit to request that the channel reissue the current command.

**channel command word (CCW).** In Enterprise Systems Architecture/390, a data structure that specifies an I/O operation to the channel subsystem.

**channel path.** In Enterprise Systems Architecture/390, the interconnection between a channel and its associated control units.

**channel subsystem.** In Enterprise Systems Architecture/390, the part of a host computer that manages I/O communication between the program and any attached control units.

**channel-subsystem image.** In Enterprise Systems Architecture/390, the logical functions that a system requires to perform the function of a channel subsystem. With ESCON multiple image facility (EMIF), one channel subsystem image exists in the channel subsystem for each logical partition (LPAR). Each image appears to be an independent channel subsystem program, but all images share a common set of hardware facilities.

**CKD.** See *count key data*.

**CLI.** See *command-line interface*. See also *Copy Services command-line interface*.

**cluster.** (1) In the ESS, a partition capable of performing all ESS functions. With two clusters in the ESS, any operational cluster can take over the processing of a failing cluster. (2) In the AIX operating system, a group of nodes within a complex.

**cluster processor complex (CPC).** In the ESS, the unit within a cluster that provides the management function for the ESS. It consists of cluster processors, cluster memory, and related logic.

**command-line interface (CLI).** An interface provided by an operating system that defines a set of commands and enables a user (or a script-like language) to issue these commands by typing text in response to the command prompt (for example, DOS commands or UNIX shell commands). See also *Copy Services command-line interface*.

**compact disc.** An optically read disc, typically storing approximately 660 MB. CD-ROM (compact disc read-only memory) refers to the read-only format used to distribute ESS code and documentation.

**compression.** (1) The process of eliminating gaps, empty fields, redundancies, and unnecessary data to shorten the length of records or blocks. (2) Any encoding that reduces the number of bits used to represent a given message or record. (GC)

**computer-electronic complex (CEC).** The set of hardware facilities associated with a host computer.

**concurrent copy.** A facility on a storage server that enables a program to make a backup of a data set while the logical volume remains available for subsequent processing. The data in the backup copy is frozen at the point in time that the server responds to the request.

**concurrent installation of licensed internal code.** Process of installing licensed internal code on an ESS while applications continue to run.

**concurrent maintenance.** Service that is performed on a unit while it is operational.

**concurrent media maintenance.** Service performed on a disk drive module (DDM) without losing access to the data.

**configure.** In storage, to define the logical and physical configuration of the input/output (I/O) subsystem through the user interface that the storage facility provides for this function.

**consistency group.** A group of volumes participating in FlashCopy relationships in a logical subsystem, across logical subsystems, or across Model 2105 Enterprise Storage Servers that must be kept in a consistent state to ensure data integrity.

**consistency group interval time.** The value in seconds that indicates the length of time between the formation of consistency groups.

**consistent copy.** A copy of a data entity (a logical volume, for example) that contains the contents of the entire data entity at a single instant in time.

**console.** A user interface to a server, for example, the interface provided on a personal computer. See also *IBM TotalStorage ESS Master Console*.

**contingent allegiance.** In Enterprise Systems Architecture/390, a relationship that is created in a control unit between a device and a channel when the channel accepts unit-check status. The allegiance causes the control unit to guarantee access; the control unit does not present the busy status to the device. The allegiance enables the channel to retrieve sense data that is associated with the unit-check status on the channel path associated with the allegiance.

**control path.** The route that is established from the master ESS to the subordinate ESS when more than one ESS participates in the asynchronous PPRC session. If there is only one ESS (the master ESS) in the asynchronous PPRC session, no control path is required.

**control unit (CU).** (1) A device that coordinates and controls the operation of one or more input/output devices, and synchronizes the operation of such devices with the operation of the system as a whole. (2) In Enterprise Systems Architecture/390, a storage server with ESCON, FICON, or OEMI interfaces. The control unit adapts a native device interface to an I/O interface that an ESA/390 host system supports. (3) In the ESS, the portion of the ESS that supports the attachment of emulated count key data devices over ESCON, FICON, or OEMI interfaces. See also *cluster*.

**control-unit image.** In Enterprise Systems Architecture/390, a logical subsystem that is accessed through an ESCON or FICON I/O interface. One or more control-unit images exist in each control unit. Each image appears as an independent control unit, but all control-unit images share a common set of hardware facilities. The ESS can emulate 3990-3, TPF, 3990-6, or 2105 control units.

**control-unit-initiated reconfiguration (CUIR).** A software mechanism that the ESS uses to request that an operating system of a zSeries or S/390 host verify that one or more subsystem resources can be taken offline for service. The ESS can use this process to automatically vary channel paths offline and online to facilitate bay service or concurrent code installation. Depending on the operating system, support for this process might be model dependent, might depend on the IBM TotalStorage Enterprise Storage Server Subsystem Device Driver, or might not exist.

**Coordinated Universal Time (UTC).** The international standard of time that is kept by atomic clocks around the world.

**Copy Services CLI.** See *Copy Services command-line interface*.

**Copy Services client.** Software that runs on each ESS cluster in the Copy Services server group and 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

See also *active Copy Services server*, *backup Copy Services server*, and *primary Copy Services server*.

**Copy Services command-line interface (Copy Services CLI).** In the ESS, command-line interface software provided with ESS Copy Services and used for invoking Copy Services functions from host systems attached to the ESS. See also *command-line interface*.

**Copy Services domain.** A collection of user-designated ESS clusters participating in Copy Services functions managed by a designated active Copy Services server. See also *Copy Services server*, *dual-active server*, and *single-active server*.

**Copy Services server.** An ESS cluster that the Copy Services administrator designates to perform the ESS Copy Services functions. See also *active Copy Services server*, *backup Copy Services server*, and *primary Copy Services server*.

**Copy Services server group.** A collection of user-designated ESS clusters participating in Copy Services functions that a designated, active, Copy Services server manages. A Copy Services server group is also called a Copy Services domain. See also *active Copy Services server*, *backup Copy Services server*, and *primary Copy Services server*.

**count field.** The first field of a count key data (CKD) record. This eight-byte field contains a four-byte track address (CCHH). It defines the cylinder and head that are associated with the track, and a one-byte record number (R) that identifies the record on the track. It defines a one-byte key length that specifies the length of the record's key field (0 means no key field). It defines a two-byte data length that specifies the length of the record's data field (0 means no data field). Only the end-of-file record has a data length of zero.

**count key data (CKD).** In Enterprise Systems Architecture/390, a data-record format employing self-defining record formats in which each record is represented by up to three fields: a *count* field identifying the record and specifying its format, an optional *key* field that can be used to identify the data area contents, and an optional *data* field that typically contains the user data. For CKD records on the ESS, the logical volume size is defined in terms of the device emulation mode (3390 or 3380 track format). The count field is always 8 bytes long and contains the lengths of the key and data fields, the key field has a length of 0 to 255 bytes, and the data field has a length of 0 to 65 535 or the maximum that will fit on the track. See also *data record*.

**CPC.** See *cluster processor complex*.

**CRC.** See *cyclic redundancy check*.

**CU.** See *control unit*.

**CUIR.** See *control-unit initiated reconfiguration*.

**custom volume.** In the ESS, a volume in count-key-data (CKD) format that is not a standard volume, which means that it does not necessarily present the same number of cylinders and capacity to its assigned logical control unit as provided by one of the following standard S/390 volume types: 3390-2, 3390-3, 3390-9, 3390-2 (3380-track mode), or 3390-3 (3380-track mode). See also *count-key-data*, *interleave*, *standard volume*, and *volume*.

**CUT.** See *Coordinated Universal Time*.

**cyclic redundancy check (CRC).** A redundancy check in which the check key is generated by a cyclic algorithm. (T)

**cylinder.** A unit of storage on a CKD device with a fixed number of tracks.

# D

**DA.** See *device adapter*. See also *SSA adapter*.

**daisy chain.** See *serial connection*.

**DASD.** See *direct access storage device*.

**DASD fast write (DFW).** A function of a storage server in which active write data is stored in nonvolatile cache, thus avoiding exposure to data loss.

**data availability.** The degree to which data is available when needed, typically measured as a percentage of time that the system would be capable of responding to any data request (for example, 99.999% available).

**data compression.** A technique or algorithm used to encode data such that the encoded result can be stored in less space than the original data. The original data can be recovered from the encoded result through a reverse technique or reverse algorithm. See also *compression*.

**Data Facility Storage Management Subsystem (DFSMS).** An operating environment that helps automate and centralize the management of storage. To manage storage, DFSMS provides the storage administrator with control over data class, storage class, management class, storage group, and automatic class selection routine definitions.

**data field.** The optional third field of a count key data (CKD) record. The count field specifies the length of the data field. The data field contains data that the program writes.

**data record.** The basic unit of S/390 and zSeries storage on an ESS, also known as a count-key-data (CKD) record. Data records are stored on a track. The records are sequentially numbered starting with 0. The first record, R0, is typically called the track descriptor record and contains data that the operating system normally uses to manage the track. See also *count-key-data* and *fixed-block architecture*.

**data set FlashCopy.** An option of the Enterprise Storage Server that allows a volume to participate in multiple concurrent FlashCopy relationships at one time.

**data sharing.** The ability of multiple host systems to concurrently utilize data that they store on one or more storage devices. The storage facility enables configured storage to be accessible to any, or all, attached host systems. To use this capability, the host program must be designed to support data that it is sharing.

**DDM.** See *disk drive module*.

**DDM group.** See *disk eight pack*.

**dedicated storage.** Storage within a storage facility that is configured such that a single host system has exclusive access to the storage.

**demote.** To remove a logical data unit from cache memory. A storage server demotes a data unit to make room for other logical data units in the cache or because the logical data unit is not valid. The ESS must destage logical data units with active write units before they can be demoted.

**destaging.** Movement of data from an online or higher priority to an offline or lower priority device. The ESS stages incoming data into cache and then destages it to disk.

**device.** In Enterprise Systems Architecture/390, a disk drive.

**device adapter (DA).** A physical component of the ESS that provides communication between the clusters and the storage devices. The ESS has eight device adapters that it deploys in pairs, one from each cluster. DA pairing enables the ESS to access any disk drive from either of two paths, providing fault tolerance and enhanced availability.

**device address.** In Enterprise Systems Architecture/390, the field of an ESCON or FICON device-level frame that selects a specific device on a control-unit image.

**device ID.** In the ESS, the unique two-digit hexadecimal number that identifies the logical device.

**device interface card.** A physical subunit of a storage cluster that provides the communication with the attached device drive modules.

**device number.** In Enterprise Systems Architecture/390, a four-hexadecimal-character identifier, for example 13A0, that the systems administrator associates with a device to facilitate communication between the program and the host operator. The device number is associated with a subchannel.

**device sparing.** A subsystem function that automatically copies data from a failing device drive module to a spare device drive module. The subsystem maintains data access during the process.

**DFS.** See *distributed file service*.

**DFSMS.** See *Data Facility Storage Management Subsystem*.

**direct access storage device (DASD).** (1) A mass storage medium on which a computer stores data. (2) A disk device.

**disk cage.** A container for disk drives. Each disk cage supports eight disk eight packs (64 disks).

**disk drive.** Standard term for a disk-based nonvolatile storage medium. The ESS uses hard disk drives as the primary nonvolatile storage media to store host data.

**disk drive module (DDM).** A field replaceable unit that consists of a single disk drive and its associated packaging.

**disk drive module group.** See *disk eight pack*.

**disk eight pack.** In the ESS, a group of eight disk drive modules (DDMs) installed as a unit in a DDM bay.

**disk group.** In the ESS, a collection of disk drives in the same SSA loop set up by the ESS to be available to be assigned as a RAID-formatted array. A disk group can be formatted as count key data or fixed block, and as RAID or non-RAID, or it can be left unformatted. A disk group is a logical assemblage of eight disk drives. Contrast with *disk eight pack*.

**distributed file service (DFS).** A service that provides data access over IP networks.

**DNS.** See *domain name system*.

**domain.** (1) That part of a computer network in which the data processing resources are under common control. (2) In TCP/IP, the naming system used in hierarchical networks. (3) A Copy Services server group, in other words, the set of clusters the user designates to be managed by a particular Copy Services server.

**domain name system (DNS).** In TCP/IP, the server program that supplies name-to-address translation by mapping domain names to internet addresses. The address of a DNS server is the internet address of the server that hosts the DNS software for the network.

**dotted decimal notation.** A convention used to identify IP addresses. The notation consists of four 8-bit numbers written in base 10. For example, `9.113.76.250` is an IP address that contains the octets 9, 113, 76, and 250.

**drawer.** A unit that contains multiple device drive modules and provides power, cooling, and related interconnection logic to make the device drive modules accessible to attached host systems.

**drive.** (1) A peripheral device, especially one that has addressed storage media. See also *disk drive module*. (2) The mechanism used to seek, read, and write information on a storage medium.

**duplex.** (1) Regarding ESS Copy Services, the state of a volume pair after PPRC has completed the copy operation and the volume pair is synchronized. (2) In general, pertaining to a communication mode in which data can be sent and received at the same time.

**dynamic sparing.** The ability of a storage server to move data from a failing disk drive module (DDM) to a spare DDM while maintaining storage functions.

# E

**E10.** The predecessor of the F10 model of the ESS. See also *F10*.

**E20.** The predecessor of the F20 model of the ESS. See also *F20*.

**EBCDIC.** See *extended binary-coded decimal interchange code*.

**EC.** See *engineering change*.

**ECKD.** See *extended count key data*.

**eight pack.** See *disk eight pack*.

**electrostatic discharge (ESD).** An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.

**emergency power off (EPO).** A means of turning off power during an emergency, usually a switch.

**EMIF.** See *ESCON multiple image facility*.

**enclosure.** A unit that houses the components of a storage subsystem, such as a control unit, disk drives, and power source.

**end of file.** A coded character recorded on a data medium to indicate the end of the medium. On a count-key-data direct access storage device, the subsystem indicates the end of a file by including a record with a data length of zero.

**engineering change (EC).** An update to a machine, part, or program.

**Enterprise Storage Server.** See *IBM TotalStorage Enterprise Storage Server*.

**Enterprise Systems Architecture/390 (ESA/390).** An IBM architecture for mainframe computers and peripherals. Processor systems that follow the ESA/390 architecture include the ES/9000® family. See also *z/Architecture*.

**Enterprise Systems Connection (ESCON).** (1) An Enterprise Systems Architecture/390 and zSeries computer peripheral interface. The I/O interface uses ESA/390 logical protocols over a serial interface that configures attached units to a communication fabric. (2) A set of IBM products and services that provide a dynamically connected environment within an enterprise.

**EPO.** See *emergency power off*.

**ERDS.** See *error-recording data set*.

**ERP.** See *error recovery procedure*.

**error-recording data set (ERDS).** On S/390 and zSeries hosts, a data set that records data-storage and data-retrieval errors. A service information message (SIM) provides the error information for the ERDS.

**error recovery procedure (ERP).** Procedures designed to help isolate and, where possible, to recover from errors in equipment. The procedures are often used in conjunction with programs that record information on machine malfunctions.

**ESA/390.** See *Enterprise Systems Architecture/390*.

**ESCD.** See *ESCON director*.

**ESCON.** See *Enterprise System Connection*.

**ESCON channel.** An S/390 or zSeries channel that supports ESCON protocols.

**ESCON director (ESCD).** An I/O interface switch that provides for the interconnection of multiple ESCON interfaces in a distributed-star topology.

**ESCON host systems.** S/390 or zSeries hosts that attach to the ESS with an ESCON adapter. Such host systems run on operating systems that include MVS, VSE, TPF, or versions of VM.

**ESCON multiple image facility (EMIF).** In Enterprise Systems Architecture/390, a function that enables LPARs to share an ESCON channel path by providing each LPAR with its own channel-subsystem image.

**EsconNet.** In ESS Specialist, the label on a pseudo host icon that represents a host connection that uses the ESCON protocol and that is not completely defined on the ESS. See also *pseudo host* and *access-any mode*.

**ESD.** See *electrostatic discharge*.

**eserver.** See *IBM @server*.

**ESS.** See *IBM TotalStorage Enterprise Storage Server*.

**ESS Batch Configuration tool.** A program that automatically configures an ESS. The configuration is based on data that IBM service personnel enter into the program.

**ESS Copy Services.** In the ESS, a collection of optional software features, with a Web-browser

interface, used for configuring, managing, and monitoring data-copy functions.

**ESS Copy Services CLI.** See *Copy Services Command-Line Interface*.

**ESS Expert.** See *IBM TotalStorage Enterprise Storage Server Expert*.

**ESS Master Console.** See *IBM TotalStorage ESS Master Console*.

**ESSNet.** See *IBM TotalStorage Enterprise Storage Server Network*.

**ESS Specialist.** See *IBM TotalStorage Enterprise Storage Server Specialist*.

**Expert.** See *IBM TotalStorage Enterprise Storage Server Expert*.

**extended binary-coded decimal interchange code (EBCDIC).** An IBM-developed coding scheme used to represent various alphabetic, numeric, and special symbols with a coded character set of 256 eight-bit codes.

**extended count key data (ECKD).** An extension of the count key data (CKD) architecture.

**Extended Remote Copy (XRC).** A function of a storage server that assists a control program to maintain a consistent copy of a logical volume on another storage facility. All modifications of the primary logical volume by any attached host are presented in order to a single host. The host then makes these modifications on the secondary logical volume.

**extent.** A continuous space on a disk that is occupied by or reserved for a particular data set, data space, or file. The unit of increment is a track. See also *multiple allegiance* and *parallel access volumes*.

# F

**F10.** A model of the ESS featuring a single-phase power supply. It has fewer expansion capabilities than the Model F20.

**F20.** A model of the ESS featuring a three-phase power supply. It has more expansion capabilities than the Model F10, including the ability to support a separate expansion enclosure.

**fabric.** In fibre-channel technology, a routing structure, such as a switch, receives addressed information and routes 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*.

**failback.** Pertaining to a cluster recovery from failover following repair. See also *failover*.

**failover.** In the ESS, pertaining to the process of transferring all control to a single cluster when the other cluster in the ESS fails. See also *cluster*.

**fast write.** A write operation at cache speed that does not require immediate transfer of data to a disk drive. The subsystem writes the data directly to cache, to nonvolatile storage, or to both. The data is then available for destaging. A fast-write operation reduces the time an application must wait for the I/O operation to complete.

**FBA.** See *fixed-block architecture*.

**FC.** See *feature code*. **Note**: *FC* is a common abbreviation for fibre channel in the industry, but the ESS customer documentation library reserves *FC* for feature code.

**FC-AL.** See *Fibre Channel-Arbitrated Loop*.

**FCP.** See *fibre-channel protocol*.

**FCS.** See *fibre-channel standard*.

**feature code (FC).** A code that identifies a particular orderable option and that is used by service personnel to process hardware and software orders. Individual optional features are each identified by a unique feature code.

**fibre channel.** A data-transmission architecture based on the ANSI fibre-channel standard, which supports full-duplex communication. The ESS supports data transmission over fiber-optic cable through its fibre-channel adapters. See also *fibre-channel protocol* and *fibre-channel standard*.

**Fibre Channel-Arbitrated Loop (FC-AL).** An implementation of the fibre-channel standard that uses a ring topology for the communication fabric. Refer to American National Standards Institute (ANSI) X3T11/93-275. In this topology, two or more fibre-channel end points are interconnected through a looped interface. The ESS supports this topology.

**fibre-channel connection (FICON).** A fibre-channel communications protocol designed for IBM mainframe computers and peripherals.

**fibre-channel protocol (FCP).** A protocol used in fibre-channel communications with five layers that define how fibre-channel ports interact through their physical links to communicate with other ports.

**fibre-channel standard (FCS).** An ANSI standard for a computer peripheral interface. The I/O interface defines a protocol for communication over a serial interface that configures attached units to a communication fabric. The protocol has two layers. The IP layer defines basic interconnection protocols. The upper layer supports one or more logical protocols (for example, FCP for SCSI command protocols and

SBCON for ESA/390 command protocols). Refer to American National Standards Institute (ANSI) X3.230-199x. See also *fibre-channel protocol*.

**fibre-channel topology.** An interconnection topology supported on fibre-channel adapters. See also *point-to-point connection*, *switched fabric*, and *arbitrated loop*.

**FICON.** See *fibre-channel connection*.

**FiconNet.** In ESS Specialist, the label on a pseudo host icon that represents a host connection that uses the FICON protocol and that is not completely defined on the ESS. See also *pseudo host* and *access-any mode*.

**field replaceable unit (FRU).** An assembly that is replaced in its entirety when any one of its components fails. In some cases, a field replaceable unit might contain other field replaceable units. (GC)

**FIFO.** See *first-in-first-out*.

**File Transfer Protocol (FTP).** In TCP/IP, an application protocol used to transfer files to and from host computers. See also *Transmission Control Protocol/Internet Protocol*.

**firewall.** A protection against unauthorized connection to a computer or a data storage system. The protection is usually in the form of software on a gateway server that grants access to users who meet authorization criteria.

**first-in-first-out (FIFO).** A queuing technique in which the next item to be retrieved is the item that has been in the queue for the longest time. (A)

**fixed-block architecture (FBA).** An architecture for logical devices that specifies the format of and access mechanisms for 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.

**fixed-block device.** 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 attach with a SCSI or fibre-channel interface. See also *fibre channel* and *small computer systems interface*.

**FlashCopy.** An optional feature for the ESS that can make an instant copy of data, that is, a point-in-time copy of a volume.

**FlashCopy sequence number.** A 4-byte value passed as input on an Establish FlashCopy command that is associated with the established FlashCopy relationship. Withdraw FlashCopy commands can use this number to coordinate Withdraw FlashCopy actions only with FlashCopy relationships that have matching sequence numbers.

**FRU.** See *field replaceable unit*.

**FTP.** See *File Transfer Protocol*.

**full duplex.** See *duplex*.

**fuzzy copy.** A function of the PPRC Extended Distance feature wherein modifications to the primary logical volume are performed on the secondary logical volume at a later time. The original order of update is not strictly maintained. See also *PPRC Extended Distance*.

# G

**GB.** See *gigabyte*.

**GDPS.** See *Geographically Dispersed Parallel Sysplex*.

**Geographically Dispersed Parallel Sysplex (GDPS).** An S/390 multisite application- availability solution.

**gigabyte (GB).** A gigabyte of storage is $10^9$ bytes. A gigabyte of memory is $2^{30}$ bytes.

**group.** In ESS documentation, a nickname for two different kinds of groups, depending on the context. See *disk eight pack* or *Copy Services server group*.

# H

**HA.** See *host adapter*.

**HACMP.** See *High-Availability Cluster Multi-Processing*.

**hard disk drive (HDD).** (1) A storage medium within a storage server used to maintain information that the storage server requires. (2) A mass storage medium for computers that is typically available as a fixed disk (such as the disks used in system units of personal computers or in drives that are external to a personal computer) or a removable cartridge.

**Hardware Configuration Data (HCD).** An OS/390 and z/OS application used to define the I/O configuration to both the host operating system and the cluster-processor complex within the channel subsystem. The configuration program is available in three versions: stand-alone, VM/370, and MVS.

**hardware service manager (HSM).** An option on an AS/400 or iSeries host that enables the user to display and work with system hardware resources and to debug input-output processors (IOP), input-output adapters (IOA), and devices.

**HCD.** See *Hardware Configuration Data*.

**HDA.** See *head and disk assembly*.

**HDD.** See *hard disk drive*.

**hdisk.** An AIX term for storage space.

**head and disk assembly (HDA).** The portion of an HDD associated with the medium and the read/write head.

**heartbeat.** A status report sent at regular intervals from the ESS. The service provider uses this report to monitor the health of the call home process. See also *call home*, *heartbeat call home record*, and *remote technical assistance information network*.

**heartbeat call home record.** Machine operating and service information sent to a service machine. These records might include such information as feature code information and product logical configuration information.

**hierarchical storage management.** (1) A function in storage management software, such as Tivoli Storage Management or Data Facility Storage Management Subsystem/MVS (DFSMS/MVS), that automatically manages free space based on the policy that the storage administrator sets. (2) In AS/400 storage management, an automatic method to manage and distribute data between the different storage layers, such as disk units and tape library devices.

**High-Availability Cluster Multi-Processing (HACMP).** Software that provides host clustering, so that a failure of one host is recovered by moving jobs to other hosts within the cluster.

**high-speed link (HSL).** A hardware connectivity architecture that links system processors to system input/output buses and other system units.

**home address (HA).** A nine-byte field at the beginning of a track that contains information that identifies the physical track and its association with a cylinder. In the ESS, the acronym HA is shared between home address and host adapter. See also *host adapter*.

**hop.** Interswitch connection. A hop count is the number of connections that a particular block of data traverses between source and destination. For example, data traveling from one hub over a wire to another hub traverses one hop.

**host.** See *host system*.

**host adapter (HA).** A physical subunit of a storage server that provides the ability to attach to one or more host I/O interfaces. The Enterprise Storage Server has four HA bays, two in each cluster. Each bay supports up to four host adapters.

In the ESS, the acronym HA is shared between home address and host adapter. See also *home address*.

**host name.** The Internet address of a machine in the network. In the ESS, the host name can be entered in the host definition as the fully qualified domain name of the attached host system, such as `mycomputer.city.company.com`, or as the subname of the fully qualified domain name, for example, `mycomputer`. See also *host system*.

**host processor.** A processor that controls all or part of a user application network. In a network, the processing unit in which the data communication access method resides. See also *host system*.

**host system.** A computer, either of the mainframe (S/390 or zSeries) or of the open-systems type, that is connected to the ESS. S/390 or zSeries hosts are connected to the ESS through ESCON or FICON interfaces. Open-systems hosts are connected to the ESS by SCSI or fibre-channel interfaces.

**hot plug.** Pertaining to the ability to add or remove a hardware facility or resource to a unit while power is on.

**HSL.** See *high-speed link*.

**HSM.** See *hierarchical storage management* or *Hardware Service Manager*.

# I

**IBM @server.** The IBM brand name for a series of server products that are optimized for e-commerce. The products include the iSeries, pSeries, xSeries, and zSeries.

**IBM product engineering (PE).** The third-level of IBM service support. Product engineering is composed of IBM engineers who have experience in supporting a product or who are knowledgeable about the product.

**IBM TotalStorage.** The brand name used to identify storage products from IBM, including the IBM TotalStorage Enterprise Storage Server (ESS). See also *IBM TotalStorage Enterprise Storage Server* and *IBM TotalStorage Enterprise Storage Server Specialist*.

**IBM TotalStorage Enterprise Storage Server (ESS).** A member of the Seascape product family of storage servers and attached storage devices (disk drive modules). The ESS provides for high-performance, fault-tolerant storage and management of enterprise data, providing access through multiple concurrent operating systems and communication protocols. High performance is provided by multiple symmetrical multiprocessors, integrated caching, RAID support for the disk drive modules, and disk access through a high-speed serial storage architecture (SSA) interface.

**IBM TotalStorage Enterprise Storage Server Expert (ESS Expert).** Formerly called IBM StorWatch Enterprise Storage Server Expert, the software that gathers performance data from the ESS and presents it through a Web browser.

**IBM TotalStorage Enterprise Storage Server Specialist (ESS Specialist).** Software with a Web-browser interface for configuring the ESS.

**IBM TotalStorage Enterprise Storage Server Network (ESSNet).** A private network providing Web browser access to the ESS. IBM installs the ESSNet software on an IBM workstation called the IBM TotalStorage ESS Master Console, supplied with the first ESS delivery.

**IBM TotalStorage ESS Master Console (ESS Master Console).** An IBM workstation (formerly named the ESSNet console) that IBM installs to provide the ESSNet facility when they install the ESS. It includes a Web browser that provides links to the ESS user interface, including ESS Specialist and ESS Copy Services.

**IBM Subsystem Device Driver (SDD).** Software that is designed to support the multipath configuration environments in the ESS. SDD resides in a host system with the native disk device driver.

**ID.** See *identifier*.

**inband FlashCopy.** An option of the Enterprise Storage Server that establishes and withdraws FlashCopy pairs at the remote site without having a Copy Services Web interface connection to the remote site.

**incremental FlashCopy.** An option of the Enterprise Storage Server that creates a point-in-time data copy without copying an entire volume for each point-in-time copy.

**identifier (ID).** A unique name or address that identifies things such as programs, devices, or systems.

**IML.** See *initial microcode load*.

**implicit allegiance.** In Enterprise Systems Architecture/390, a relationship that a control unit creates between a device and a channel path when the device accepts a read or write operation. The control unit guarantees access to the channel program over the set of channel paths that it associates with the allegiance.

**initial microcode load (IML).** The action of loading microcode for a computer into that computer's storage.

**initial program load (IPL).** The action of loading software into a computer, typically an operating system that controls the computer.

**initiator.** A SCSI device that communicates with and controls one or more targets. An initiator is typically an I/O adapter on a host computer. A SCSI initiator is analogous to an S/390 channel. A SCSI logical unit is analogous to an S/390 device. Contrast with *target*.

**i-node.** The internal structure in an AIX operating system that describes the individual files in the operating system. It contains the code, type, location, and owner of a file.

**input/output (I/O).** Pertaining to (a) input, output, or both or (b) a device, process, or channel involved in data input, data output, or both.

**input/output configuration data set.** A configuration definition built by the I/O configuration program (IOCP) and stored on disk files associated with the processor controller.

**interleave.** In the ESS, to automatically create two striped partitions across the drives in a RAID-5 array, both of which use the count-key-data (CKD) record format.

**Internet Protocol (IP).** In the Internet suite of protocols, a protocol without connections that routes data through a network or interconnecting networks and acts as an intermediary between the higher protocol layers and the physical network. The upper layer supports one or more logical protocols (for example, a SCSI-command protocol and an ESA/390 command protocol). Refer to ANSI X3.230-199*x*. The IP acronym is the IP in TCP/IP. See also *Transmission Control Protocol/Internet Protocol*.

**invalidate.** To remove a logical data unit from cache memory because it cannot support continued access to the logical data unit on the device. This removal might be the result of a failure within the storage server or a storage device that is associated with the device.

**I/O.** See *input/output*.

**I/O adapter (IOA).** In the ESS, an input-output adapter on the PCI bus.

**IOCDS.** See *input/output configuration data set*.

**IOCP.** See *I/O Configuration Program*.

**I/O Configuration Program (IOCP).** A program that defines to a system all the available I/O devices and channel paths.

**I/O device.** An addressable read and write unit, such as a disk drive device, magnetic tape device, or printer.

**I/O interface.** An interface that enables a host to perform read and write operations with its associated peripheral devices.

**I/O Priority Queueing.** A facility in the Workload Manager of OS/390 that enables the system

administrator to set priorities for queueing I/Os from different system images. See also *multiple allegiance* and *parallel access volume*.

**I/O processor (IOP).** Controls input-output adapters and other devices.

**I/O sequential response time.** The time an I/O request is queued in processor memory waiting for previous I/Os to the same volume to complete.

**IOSQ.** See *I/O sequential response time*.

**IP.** See *Internet Protocol*.

**IPL.** See *initial program load*.

**iSeries.** An IBM @server product that emphasizes integration. It is the successor to the AS/400 family of servers.

# J

**Java Virtual Machine (JVM).** A software implementation of a central processing unit (CPU) that runs compiled Java code (applets and applications). (GC)

**JVM.** See *Java Virtual Machine*.

# K

**KB.** See *kilobyte*.

**key field.** The second (optional) field of a count key data record. The key length is specified in the count field. The key length determines the field length. The program writes the data in the key field and use the key field to identify or locate a given record. The subsystem does not use the key field.

**kilobyte (KB).** (1) For processor storage, real, and virtual storage, and channel volume, $2^{10}$ or 1024 bytes. (2) For disk storage capacity and communications volume, 1000 bytes.

**Korn shell.** Interactive command interpreter and a command programming language.

**KPOH.** See *thousands of power-on hours*.

# L

**LAN.** See *local area network*.

**last-in first-out (LIFO).** A queuing technique in which the next item to be retrieved is the item most recently placed in the queue. (A)

**LBA.** See *logical block address*.

**LCU.** See *logical control unit*.

**least recently used (LRU).** (1) The algorithm used to identify and make available the cache space that contains the least-recently used data. (2) A policy for a caching algorithm that chooses to remove from cache the item that has the longest elapsed time since its last access.

**LED.** See *light-emitting diode*.

**LIC.** See *licensed internal code*.

**licensed internal code (LIC).** Microcode that IBM does not sell as part of a machine, but licenses to the customer. LIC is implemented in a part of storage that is not addressable by user programs. Some IBM products use it to implement functions as an alternate to hard-wired circuitry.

**LIFO.** See *last-in first-out*.

**light-emitting diode (LED).** A semiconductor chip that gives off visible or infrared light when activated.

**link address.** On an ESCON or FICON interface, the portion of a source or destination address in a frame that ESCON or FICON uses to route a frame through an ESCON or FICON director. ESCON or FICON associates the link address with a specific switch port that is on the ESCON or FICON director. Equivalently, it associates the link address with the channel subsystem or control unit link-level functions that are attached to the switch port.

**link-level facility.** The ESCON or FICON hardware and logical functions of a control unit or channel subsystem that allow communication over an ESCON or FICON write interface and an ESCON or FICON read interface.

**local area network (LAN).** A computer network located on a user's premises within a limited geographic area.

**local e-mail.** An e-mail configuration option for storage servers that are connected to a host-system network that does not have a domain name system (DNS) server.

**logical address.** On an ESCON or FICON interface, the portion of a source or destination address in a frame used to select a specific channel-subsystem or control-unit image.

**logical block address (LBA).** The address assigned by the ESS to a sector of a disk.

**logical control unit (LCU).** See *control-unit image*.

**logical data unit.** A unit of storage that is accessible on a given device.

**logical device.** The facilities of a storage server (such as the ESS) associated with the processing of I/O operations directed to a single host-accessible emulated

I/O device. The associated storage is referred to as a logical volume. The logical device is mapped to one or more host-addressable units, such as a device on an S/390 I/O interface or a logical unit on a SCSI I/O interface, such that the host initiating I/O operations to the I/O-addressable unit interacts with the storage on the associated logical device.

**logical partition (LPAR).** In Enterprise Systems Architecture/390, a set of functions that create the programming environment in which more than one logical partition (LPAR) is established on a processor. An LPAR is conceptually similar to a virtual machine environment except that the LPAR is a function of the processor. Also, the LPAR does not depend on an operating system to create the virtual machine environment.

**logical path.** (1) The relationship between a channel image and a control-unit image that designates the physical path to be used for device-level communications between these images. The logical path is established as part of the channel and control-unit initialization procedures by the exchange of link-level frames. (2) In the ESS with the Peer-to-Peer Remote Copy (PPRC) feature, the relationship between a source logical subsystem (LSS) and a target LSS that is created over a physical path through the interconnection fabric used for PPRC functions. An LSS is a primary control unit, which performs the functions of a channel image.

**logical subsystem (LSS).** In the ESS, a topological construct that consists of a group of up to 256 logical devices. An ESS can have up to 16 CKD-formatted logical subsystems (4096 CKD logical devices) and also up to 16 fixed-block logical subsystems (4096 fixed-block logical devices). The logical subsystem facilitates configuration of the ESS and might have other implications relative to the operation of certain functions. There is a one-to-one mapping between a CKD logical subsystem and an S/390 control-unit image.

For S/390 or zSeries hosts, a logical subsystem represents a logical control unit (LCU). Each control-unit image is associated with only one logical subsystem. See also *control-unit image*.

**logical unit.** In open systems, a logical disk drive.

**logical unit number (LUN).** In the SCSI protocol, a unique number used on a SCSI bus to enable it to differentiate between a maximum of eight separate devices, each of which is a logical unit.

**logical volume.** The storage medium associated with a logical disk drive. A logical volume typically resides on one or more storage devices. The ESS administrator defines this unit of storage. The logical volume, when residing on a RAID-formatted array, is spread over the drives in the array.

**logical volume manager (LVM).** A set of system commands, library routines, and other tools that allow the user to establish and control logical volume storage. The LVM maps data between the logical view of storage space and the physical disk drive module.

**longitudinal redundancy check (LRC).** (1) A method of error checking during data transfer that involves checking parity on a row of binary digits that are members of a set that forms a matrix. Longitudinal redundancy check is also called a longitudinal parity check. (2) In the ESS, a mechanism that the ESS uses for locating errors. The LRC checks the data as it progresses from the host, through the ESS controller, into the device adapter, and to the array.

**longwave laser adapter.** A connector used between a host and the ESS to support longwave fibre-channel communication.

**loop.** The physical connection between a pair of device adapters in the ESS. See also *device adapter*.

**LPAR.** See *logical partition*.

**LRC.** See *longitudinal redundancy check*.

**LRU.** See *least recently used*.

**LSS.** See *logical subsystem*.

**LUN.** See *logical unit number*.

**LVM.** See *logical volume manager*.

# M

**machine level control (MLC).** A database that contains the EC level and configuration of products in the field.

**machine reported product data (MRPD).** Product data gathered by a machine and sent to a destination such as an IBM support server or RETAIN. These records might include such information as feature code information and product logical configuration information.

**mainframe.** A computer, usually in a computer center, with extensive capabilities and resources to which other computers may be connected so that they can share facilities. (T)

**maintenance analysis procedure (MAP).** A hardware maintenance document that gives an IBM service representative a step-by-step procedure for tracing a symptom to the cause of a failure.

**Management Information Base (MIB).** (1) A collection of objects that can be accessed by means of a network management protocol. (GC) (2) In the ESS, the MIB record conforms to the Open Systems Interconnection (OSI) standard defined by the International Organization

for Standardization (ISO) for the exchange of information. See also *simple network management protocol*.

**MAP.** See *maintenance analysis procedure*.

**Master Console.** See *IBM TotalStorage ESS Master Console*.

**master ESS.** The ESS that controls the creation of consistency groups in the asynchronous PPRC session. The master ESS sends commands to subordinate ESSs. An ESS can be a master for only one asynchronous PPRC session. Contrast with *subordinate ESS*.

**maximum consistency group drain time.** The value in seconds that indicates the maximum time that writes from the local site are delayed to the remote site while the current consistency group is being formed at the remote site. When this time is exceeded, the current attempt to form a consistency group is ended and another attempt is started. If this time is exceeded five times, this maximum time is ignored on the next attempt to form a consistency group. The default value is the larger of four minutes or two times the consistency group interval time if this value is set to zero.

**maximum coordination time.** The value in milliseconds that indicates the maximum time that is allowed for host I/O to be delayed during the coordination of the primary volumes of an asynchronous PPRC session. The default is 50 milliseconds if this value is set to zero.

**MB.** See *megabyte*.

**MCA.** See *Micro Channel architecture*.

**MDM.** See *Multiple Device Manager*.

**mean time between failures (MTBF).** (1) A projection of the time that an individual unit remains functional. The time is based on averaging the performance, or projected performance, of a population of statistically independent units. The units operate under a set of conditions or assumptions. (2) For a stated period in the life of a functional unit, the mean value of the lengths of time between consecutive failures under stated conditions. (I) (A)

**medium.** For a storage facility, the disk surface on which data is stored.

**megabyte (MB).** (1) For processor storage, real and virtual storage, and channel volume, $2^{20}$ or 1 048 576 bytes. (2) For disk storage capacity and communications volume, 1 000 000 bytes.

**MES.** See *miscellaneous equipment specification*.

**MIB.** See *management information base*.

**Micro Channel architecture (MCA).** The rules that define how subsystems and adapters use the Micro Channel bus in a computer. The architecture defines the services that each subsystem can or must provide.

**Microsoft Internet Explorer (MSIE).** Web browser software manufactured by Microsoft.

**migration.** In the ESS, the replacement of a system or subsystem with a different type of system or subsystem, such as replacing a SCSI host adapter with a fibre-channel host adapter. When used in the context of data migration regarding the ESS, the transfer of data from one storage facility to another, such as from a 3390 to the ESS.

**MIH.** See *missing-interrupt handler*.

**mirrored pair.** Two units that contain the same data. The system refers to them as one entity.

**mirroring.** In host systems, the process of writing the same data to two disk units within the same auxiliary storage pool at the same time.

**miscellaneous equipment specification (MES).** IBM field-installed change to a machine.

**missing-interrupt handler (MIH).** An MVS and MVS/XA facility that tracks I/O interrupts. MIH informs the operator and creates a record whenever an expected interrupt fails to occur before a specified elapsed time is exceeded.

**MLC.** See *machine level control*.

**mobile solutions terminal (MoST).** The mobile terminal used by service personnel.

**mode conditioning patch cable.** A cable that converts a single-mode signal from a longwave adapter into a light signal that is appropriate for multimode fibre. Another mode conditioning patch cable is required at the terminating end of the multimode fibre to convert the signal back to a single-mode signal for a longwave adapter.

**Model 100.** A 2105 Model 100, often simply referred to as a Mod 100, is an expansion enclosure for the ESS. See also *2105*.

**MoST.** See *mobile solutions terminal*.

**MRPD.** See *machine reported product data*.

**MSA.** See *multiport serial adapter*.

**MSIE.** See *Microsoft Internet Explorer*.

**MTBF.** See *mean time between failures*.

**multiple allegiance.** An ESS hardware function that is independent of software support. This function enables multiple system images to concurrently access the

same logical volume on the ESS as long as the system images are accessing different extents. See also *extent* and *parallel access volumes*.

**Multiple Device Manager (MDM).** A component of the IBM TotalStorage Productivity Center that allows administrators to configure, manage, and monitor the performance of SAN storage devices from a single console.

**multiple relationship FlashCopy.** An option of the Enterprise Storage Server that creates backup copies from one source to multiple targets by simultaneously establishing multiple FlashCopy relationships.

**multiple virtual storage (MVS).** Implies MVS/390, MVS/XA, MVS/ESA, and the MVS element of the OS/390 operating system.

**multiplex.** The action of transmitting simultaneously.

**multiport serial adapter (MSA).** An adapter on the ESS Master Console that has multiple ports to which ESSs can be attached.

**multiprocessor.** A computer that includes two or more processors that have common access to a main storage. For the ESS, the multiprocessors operate in parallel.

**MVS.** See *multiple virtual storage*.

# N

**name server.** A server that stores names of the participating ESS clusters.

**Netfinity.** IBM Intel-processor-based server; predecessor to the IBM xSeries server.

**Netscape Navigator.** Web browser software manufactured by Netscape.

**network manager.** A program or group of programs that is used to monitor, manage, and diagnose the problems of a network. (GC)

**node.** The unit that is connected in a fibre-channel network. An ESS is a node in a fibre-channel network.

**non-RAID.** A disk drive set up independently of other disk drives and not set up as part of a disk eight pack to store data using the redundant array of disks (RAID) data-striping methodology.

**nonremovable medium.** A recording medium that cannot be added to or removed from a storage device.

**nonvolatile storage (NVS).** In the ESS, memory that stores active write data to avoid data loss in the event of a power loss.

**NVS.** See *nonvolatile storage*.

# O

**octet.** In Internet Protocol addressing, one of the four parts of a 32-bit integer presented in dotted decimal notation. See also *dotted decimal notation*.

**OEMI.** See *original equipment manufacturer's information*.

**open system.** A system whose characteristics comply with standards made available throughout the industry and that therefore can be connected to other systems complying with the same standards. Applied to the ESS, such systems are those hosts that connect to the ESS through SCSI or FCP protocols. See also *small computer system interface* and *fibre-channel protocol*.

**organizationally unique identifier (OUI).** An IEEE-standards number that identifies an organization with a 24-bit globally unique assigned number referenced by various standards. OUI is used in the family of 802 LAN standards, such as Ethernet and Token Ring.

**original equipment manufacturer's information (OEMI).** A reference to an IBM guideline for a computer peripheral interface. The interface uses ESA/390 logical protocols over an I/O interface that configures attached units in a multidrop bus topology.

**OS/390.** The IBM operating system that includes and integrates functions that many IBM software products (including the MVS operating system) previously provided for the IBM S/390 family of enterprise servers.

**OS/400.** The IBM operating system that runs the IBM AS/400 and iSeries @server families of servers.

**OUI.** See *organizationally unique identifier*.

# P

**panel.** The formatted display of information that appears on a display screen.

**parallel access volume (PAV).** An advanced function of the ESS that enables OS/390 and z/OS systems to issue concurrent I/O requests against a count key data logical volume by associating multiple devices of a single control-unit image with a single logical device. Up to eight device addresses can be assigned to a PAV. The PAV function enables two or more concurrent write operations to the same logical volume, as long as the write operations are not to the same extents. See also *extent*, *I/O Priority Queueing*, and *multiple allegiance*.

**parity.** A data checking scheme used in a computer system to ensure the integrity of the data. The RAID implementation uses parity to re-create data if a disk drive fails.

**path group.** In ESA/390 architecture, a set of channel paths that are defined to a control unit as being associated with a single logical partition (LPAR). The channel paths are in a group state and are online to the host. See also *logical partition*.

**path group identifier.** In ESA/390 architecture, the identifier that uniquely identifies a given logical partition (LPAR). The path group identifier is used in communication between the LPAR program and a device. The identifier associates the path group with one or more channel paths, thereby defining these paths to the control unit as being associated with the same LPAR. See also *logical partition*.

**PAV.** See *parallel access volume*.

**PCI.** See *peripheral component interconnect*.

**PDU.** See *protocol data unit*.

**PE.** See *IBM product engineering*.

**Peer-to-Peer Remote Copy (PPRC).** A function of a storage server that constantly updates a secondary copy of a logical volume to match changes made to a primary logical volume. The primary and secondary volumes can be on the same storage server or on separate storage servers. See also *synchronous PPRC* and *PPRC Extended Distance*.

**peripheral component interconnect (PCI).** An architecture for a system bus and associated protocols that supports attachments of adapter cards to a system backplane.

**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.

**pinned data.** Data that is held in cache until either an error condition is corrected and it can be moved to disk storage or until the data is discarded by a host command. Pinned data conditions can only occur on an ESS Model 800 during fast-write or dual-copy functions.

**point-to-point connection.** A fibre-channel topology that enables the direct interconnection of ports. See also *arbitrated loop* and *switched fabric*.

**port.** In the ESS, a physical connection on a host adapter to the cable that connects the ESS to hosts, switches, or another ESS. The ESS uses SCSI and ESCON host adapters that have two ports per adapter, and fibre-channel host adapters that have one port. See also *ESCON*, *fibre channel*, *host adapter*, and *small computer system interface*.

**POST.** See *power-on self test*.

**power-on self test (POST).** A diagnostic test that servers or computers run when they are turned on.

**PPRC.** See *Peer-to-Peer Remote Copy*.

**PPRC Extended Distance.** An optional feature for the ESS that maintains a fuzzy copy of a logical volume on the same ESS or on another ESS. In other words, all modifications that any attached host performs on the primary logical volume are also performed on the secondary logical volume at a later point in time. The original order of update is not strictly maintained. See also *Peer-to-Peer Remote Copy (PPRC)* and *synchronous PPRC*.

**PPRC-XD.** See *PPRC Extended Distance*.

**predictable write.** A write operation that can cache without knowledge of the existing format on the medium. All write operations on FBA DASD devices are predictable. On CKD DASD devices, a write operation is predictable if it does a format write operation for the first data record on the track.

**primary control unit.** The ESS to which a PPRC primary device is physically attached.

**primary Copy Services server.** One of two Copy Services servers in a Copy Services server group. The primary Copy Services server is the active Copy Services server until it fails; it is then replaced by the backup Copy Services server. A Copy Services server is software that runs in one of the two clusters of an ESS and performs data-copy operations within that group. See *active Copy Services server* and *backup Copy Services server*.

**primary device.** One of the devices in a dual-copy or remote-copy volume pair. All channel commands to the logical volume are directed to the primary device. The data on the primary device is duplicated on the secondary device. See also *secondary device*.

**product engineering.** See *IBM product engineering*.

**program.** On a computer, a generic term for software that controls the operation of the computer. Typically, the program is a logical assemblage of software modules that perform multiple related tasks.

**program-controlled interruption.** An interruption that occurs when an I/O channel fetches a channel command word with the program-controlled interruption flag on.

**program temporary fix (PTF).** A temporary solution to, or bypass of, a problem diagnosed by IBM as the result of a defect in a current unaltered release of a licensed program. (GC)

**promote.** To add a logical data unit to cache memory.

**protected volume.** In AS/400, a disk storage device that is protected from data loss by RAID techniques. An AS/400 host does not mirror a volume configured as a protected volume, while it does mirror all volumes configured as unprotected volumes. The ESS, however, can be configured to indicate that an AS/400 volume is protected or unprotected and give it RAID protection in either case.

**protocol data unit (PDU).** A unit of data specified in the protocol of a given layer and consisting of protocol control information for the layer and, possibly, user data for the layer.

**pSeries.** The product name of an IBM @server product that emphasizes performance. It is the successor to the RS/6000 family of servers.

**pseudo host.** A host connection that is not explicitly defined to the ESS and that has access to at least one volume that is configured on the ESS. The FiconNet pseudo host icon represents the FICON protocol. The EsconNet pseudo host icon represents the ESCON protocol. The pseudo host icon labelled `Anonymous` represents hosts connected through the FCP protocol. *Anonymous host* is a commonly used synonym for *pseudo host*. The ESS adds a pseudo host icon only when the ESS is set to access-any mode. See also *access-any mode*.

**PTF.** See *program temporary fix*.

**PV Links.** Short for Physical Volume Links, an alternate pathing solution from Hewlett-Packard that provides for multiple paths to a volume, as well as static load balancing.

# R

**R0.** See *track-descriptor record*.

**rack.** See *enclosure*.

**RAID.** See *redundant array of independent disks*. RAID is also commonly expanded to redundant array of *inexpensive* disks. See also *array*.

**RAID 5.** A type of RAID that optimizes cost-effective performance while emphasizing use of available capacity through data striping. RAID 5 provides fault tolerance for up to two failed disk drives by distributing parity across all the drives in the array plus one parity disk drive. The ESS automatically reserves spare disk drives when it assigns arrays to a device adapter pair (DA pair). See also *device adapter*, *RAID 10*, and *redundant array of independent disks*.

**RAID 10.** A type of RAID that optimizes high performance while maintaining fault tolerance for up to two failed disk drives by by striping volume data across several disk drives and mirroring the first set of disk drives on an identical set. The ESS automatically reserves spare disk drives when it assigns arrays to a device adapter pair (DA pair). See also *device adapter*, *RAID 5*, and *redundant array of independent disks*.

**random access.** A mode of accessing data on a medium in a manner that requires the storage device to access nonconsecutive storage locations on the medium.

**rank.** See *array*.

**redundant array of independent disks (RAID).** A methodology of grouping disk drives for managing disk storage to insulate data from a failing disk drive.

**remote technical assistance information network (RETAIN).** The initial service tracking system for IBM service support, which captures heartbeat and call-home records. See also *support catcher* and *support catcher telephone number*.

**REQ/ACK.** See *request for acknowledgment and acknowledgment*.

**request for acknowledgment and acknowledgment (REQ/ACK).** A cycle of communication between two data transport devices for the purpose of verifying the connection, which starts with a request for acknowledgment from one of the devices and ends with an acknowledgment from the second device. The REQ and ACK signals help to provide uniform timing to support synchronous data transfer between an initiator and a target. The objective of a synchronous data transfer method is to minimize the effect of device and cable delays.

**reserved allegiance.** In Enterprise Systems Architecture/390, a relationship that is created in a control unit between a device and a channel path when the device completes a Sense Reserve command. The allegiance causes the control unit to guarantee access (busy status is not presented) to the device. Access is over the set of channel paths that are associated with the allegiance; access is for one or more channel programs until the allegiance ends.

**RETAIN.** See *remote technical assistance information network*.

# S

**S/390.** IBM enterprise servers based on Enterprise Systems Architecture/390 (ESA/390). *S/390* is the currently accepted shortened form of the original name *System/390*.

**S/390 storage.** (1) Storage arrays and logical volumes that are defined in the ESS as connected to S/390 servers. This term is synonymous with count-key-data storage. (2) In ESS documentation, when noted, the term can refer to both S/390 and zSeries storage. See also *zSeries storage*.

**SAID.** See *system adapter identification number*.

**SAM.** See *sequential access method*.

**SAN.** See *storage area network*.

**SBCON.** See *Single-Byte Command Code Sets Connection*.

**screen.** The physical surface of a display device upon which information is shown to users.

**SCSI.** See *small computer system interface*.

**SCSI device.** A disk drive connected to a host through an I/O interface using the SCSI protocol. A SCSI device is either an initiator or a target. See also *initiator* and *small computer system interface*.

**SCSI-FCP.** Synonym for fibre-channel protocol, a protocol used to transport data between an open-systems host and a fibre-channel adapter on an ESS. See also *fibre-channel protocol* and *small computer system interface*.

**SCSI host systems.** Host systems that are attached to the ESS with a SCSI interface. Such host systems run on UNIX, OS/400, Windows NT, Windows 2000, or Novell NetWare operating systems.

**SCSI ID.** A unique identifier 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.

**SDD.** See *IBM Subsystem Device Driver*.

**Seascape architecture.** A storage system architecture that IBM developed for open-systems servers and S/390 and zSeries host systems. It provides storage solutions that integrate software, storage management, and technology for disk, tape, and optical storage.

**secondary control unit.** The ESS to which a PPRC secondary device is physically attached.

**secondary device.** One of the devices in a dual-copy or remote-copy volume pair that contains a duplicate of the data on the primary device. Unlike the primary device, the secondary device might only accept a limited subset of data. See also *primary device.*

**self-timed interface (STI).** An interface that has one or more conductors that transmit information serially between two interconnected units without requiring any clock signals to recover the data. The interface performs clock recovery independently on each serial data stream and uses information in the data stream to determine character boundaries and inter-conductor synchronization.

**sequential access.** A mode of accessing data on a medium in a manner that requires the storage device to access consecutive storage locations on the medium.

**sequential access method (SAM).** An access method for storing, deleting, or retrieving data in a continuous sequence based on the logical order of the records in the file.

**serial connection.** A method of device interconnection for determining interrupt priority by connecting the interrupt sources serially.

**serial storage architecture (SSA).** An IBM standard for a computer peripheral interface. The interface uses a SCSI logical protocol over a serial interface that configures attached targets and initiators in a ring topology. See also *SSA adapter*.

**server.** (1) A host that provides certain services to other hosts that are referred to as clients. (2) A functional unit that provides services to one or more clients over a network. (GC)

**service boundary.** A category that identifies a group of components that are unavailable for use when one of the components of the group is being serviced. Service boundaries are provided on the ESS, for example, in each host bay and in each cluster.

**service information message (SIM).** A message sent by a storage server to service personnel through an S/390 operating system.

**service personnel.** A generalization referring to individuals or companies authorized to service the ESS. The terms *service provider*, *service representative*, and *IBM service support representative (SSR)* refer to types of service personnel. See also *service support representative*.

**service processor.** A dedicated processing unit used to service a storage facility.

**service support representative (SSR).** Individuals or a company authorized to service the ESS. This term also refers to a service provider, a service representative, or an IBM service support representative (SSR). An IBM SSR installs the ESS.

**session.** A collection of volumes within a logical subsystem that are managed together during the creation of consistent copies of data. All volumes in a session must transfer their data successfully to the remote site before the increment can be called complete.

**shared storage.** In an ESS, storage that is configured so that multiple hosts can concurrently access the storage. The storage has a uniform appearance to all hosts. The host programs that access the storage must have a common model for the information on a storage

device. The programs must be designed to handle the effects of concurrent access.

**shortwave laser adapter.** A connector used between host and ESS to support shortwave fibre-channel communication.

**SIM.** See *service information message*.

**Simple Network Management Protocol (SNMP).** In the Internet suite of protocols, a network management protocol that is used to monitor routers and attached networks. SNMP is an application layer protocol. Information on devices managed is defined and stored in the application's Management Information Base (MIB). (GC) See also *management information base*.

**simplex volume.** A volume that is not part of a FlashCopy, XRC, or PPRC volume pair.

**Single-Byte Command Code Sets Connection (SBCON).** The ANSI standard for the ESCON or FICON I/O interface.

**small computer system interface (SCSI).** A standard hardware interface that enables a variety of peripheral devices to communicate with one another. (GC)

**smart relay host.** A mail relay or mail gateway that has the capability to correct e-mail addressing problems.

**SMIT.** See *System Management Interface Tool*.

**SMP.** See *symmetrical multiprocessor*.

**SNMP.** See *Simple Network Management Protocol*.

**SNMP agent.** A server process that resides on a network node and is responsible for communicating with managers regarding that node. The node is represented as a managed object, which has various fields or variables that are defined in the appropriate MIB.

**SNMP manager.** A managing system that runs a managing application or suite of applications. These applications depend on Management Information Base (MIB) objects for information that resides on the managed system. Managers generate requests for this MIB information, and an SNMP agent on the managed system responds to these requests. A request can either be the retrieval or modification of MIB information.

**software transparency.** Criteria applied to a processing environment that states that changes do not require modifications to the host software in order to continue to provide an existing function.

**spare.** A disk drive on the ESS that can replace a failed disk drive. A spare can be predesignated to allow automatic dynamic sparing. Any data preexisting on a disk drive that is invoked as a spare is destroyed by the dynamic sparing copy process.

**spatial reuse.** A feature of serial storage architecture that enables a device adapter loop to support many simultaneous read/write operations. See also *serial storage architecture*.

**Specialist.** See *IBM TotalStorage Enterprise Storage Server Specialist*.

**SSA.** See *serial storage architecture*.

**SSA adapter.** A physical adapter based on serial storage architecture. SSA adapters connect disk drive modules to ESS clusters. See also *serial storage architecture*.

**SSID.** See *subsystem identifier*.

**SSR.** See *service support representative*.

**stacked status.** In Enterprise Systems Architecture/390, the condition when the control unit is in a holding status for the channel, and the last time the control unit attempted to present the status, the channel responded with the stack-status control.

**stage operation.** The operation of reading data from the physical disk drive into the cache.

**staging.** To move data from an offline or low-priority device back to an online or higher priority device, usually on demand of the system or on request of the user.

**standard volume.** In the ESS, a volume that emulates one of several S/390 volume types, including 3390-2, 3390-3, 3390-9, 3390-2 (3380-track mode), or 3390-3 (3380-track mode), by presenting the same number of cylinders and capacity to the host as provided by the native S/390 volume type of the same name.

**STI.** See *self-timed interface*.

**storage area network.** A network that connects a company's heterogeneous storage resources.

**storage complex.** Multiple storage facilities.

**storage device.** A physical unit that provides a mechanism to store data on a given medium such that it can be subsequently retrieved. See also *disk drive module*.

**storage facility.** (1) A physical unit that consists of a storage server integrated with one or more storage devices to provide storage capability to a host computer. (2) A storage server and its attached storage devices.

**storage server.** A physical unit that manages attached storage devices and provides an interface between them and a host computer by providing the function of one or more logical subsystems. The storage server can provide functions that the storage device does not provide. The storage server has one or more clusters.

**striping.** A technique that distributes data in bit, byte, multibyte, record, or block increments across multiple disk drives.

**subagent.** An extension to an SNMP agent that permits a user to dynamically add, or in some cases replace, additional management variables in the local MIB, thereby providing a means of extending the range of information that network managers can access. See also *agent*.

**subchannel.** A logical function of a channel subsystem associated with the management of a single device.

**subordinate ESS.** The ESS that receives commands from the master ESS and is specified when an asynchronous PPRC session is started. The subordinate ESS forms consistency groups and performs other asynchronous PPRC processing. A subordinate ESS can only be controlled by one ESS master. Contrast with *master ESS*.

**Subsystem Device Driver.** See *IBM TotalStorage Enterprise Storage Server Subsystem Device Driver*.

**subsystem identifier (SSID).** A number that uniquely identifies a logical subsystem within a computer installation.

**support catcher telephone number.** The telephone number that connects the support catcher server to the ESS to receive a trace or dump package. See also *support catcher* and *remote technical assistance information network*.

**switched fabric.** A fibre-channel topology in which ports are interconnected through a switch. Fabric switches can also be interconnected to support numerous ports on a single network. See also *arbitrated loop* and *point-to-point connection*.

**symmetrical multiprocessor (SMP).** An implementation of a multiprocessor computer consisting of several identical processors configured in a way that any subset of the set of processors is capable of continuing the operation of the computer. The ESS contains four processors set up in SMP mode.

**synchronous PPRC.** A function of a storage server that maintains a consistent copy of a logical volume on the same storage server or on another storage server. All modifications that any attached host performs on the primary logical volume are also performed on the secondary logical volume. See also *Peer-to-Peer Remote Copy* and *PPRC Extended Distance*.

**synchronous write.** A write operation whose completion is indicated after the data has been stored on a storage device.

**System/390.** See *S/390*.

**system adapter identification number (SAID).** In the ESS, the unique identification number automatically assigned to each ESS host adapter for use by ESS Copy Services.

**System Management Interface Tool (SMIT).** An interface tool of the AIX operating system for installing, maintaining, configuring, and diagnosing tasks.

**System Modification Program.** A program used to install software and software changes on MVS systems.

# T

**TAP.** See *Telocator Alphanumeric Protocol*.

**target.** A SCSI device that acts as a subordinate to an initiator and consists of a set of one or more logical units, each with an assigned logical unit number (LUN). The logical units on the target are typically I/O devices. A SCSI target is analogous to an S/390 control unit. A SCSI initiator is analogous to an S/390 channel. A SCSI logical unit is analogous to an S/390 device. See also *small computer system interface*.

**TB.** See *terabyte*.

**TCP/IP.** See *Transmission Control Protocol/Internet Protocol*.

**Telocator Alphanumeric Protocol (TAP).** An industry standard protocol for the input of paging requests.

**terabyte (TB).** (1) Nominally, 1 000 000 000 000 bytes, which is accurate when speaking of bandwidth and disk storage capacity. (2) For ESS cache memory, processor storage, real and virtual storage, a terabyte refers to $2^{40}$ or 1 099 511 627 776 bytes.

**terminal emulator.** In the ESS, a function of the ESS Master Console that allows it to emulate a terminal.

**thousands of power-on hours (KPOH).** A unit of time used to measure the mean time between failures (MTBF).

**time sharing option (TSO).** An operating system option that provides interactive time sharing from remote terminals.

**TotalStorage.** See *IBM TotalStorage*.

**TPF.** See *transaction processing facility*.

**track.** A unit of storage on a CKD device that can be formatted to contain a number of data records. See also *home address*, *track-descriptor record*, and *data record*.

**track-descriptor record (R0).** A special record on a track that follows the home address. The control program uses it to maintain certain information about the track. The record has a count field with a key length

of zero, a data length of 8, and a record number of 0. This record is sometimes referred to as R0.

**transaction processing facility (TPF).** A high-availability, high-performance IBM operating system, designed to support real-time, transaction-driven applications. The specialized architecture of TPF is intended to optimize system efficiency, reliability, and responsiveness for data communication and database processing. TPF provides real-time inquiry and updates to a large, centralized database, where message length is relatively short in both directions, and response time is generally less than three seconds. Formerly known as the Airline Control Program/Transaction Processing Facility (ACP/TPF).

**Transmission Control Protocol (TCP).** A communications protocol used in the Internet and in any network that follows the Internet Engineering Task Force (IETF) standards for internetwork protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet Protocol (IP) as the underlying protocol.

**Transmission Control Protocol/Internet Protocol (TCP/IP).** (1) A combination of data-transmission protocols that provide end-to-end connections between applications over interconnected networks of different types. (2) A suite of transport and application protocols that run over the Internet Protocol. (GC) See also *Internet Protocol* and *Transmission Control Protocol*.

**transparency.** See *software transparency*.

**TSO.** See *time sharing option*.

**turbo processor.** In the ESS, a faster multiprocessor that has six processors with common access to the main storage.

# U

**UFS.** UNIX filing system.

**Ultra-SCSI.** An enhanced small computer system interface.

**unconfigure.** To delete the configuration.

**unit address.** In Enterprise Systems Architecture/390, the address associated with a device on a given control unit. On ESCON or FICON interfaces, the unit address is the same as the device address. On OEMI interfaces, the unit address specifies a control unit and device pair on the interface.

**unprotected volume.** An AS/400 term that indicates that the AS/400 host recognizes the volume as an unprotected device, even though the storage resides on a RAID-formatted array and is, therefore, fault tolerant by definition. The data in an unprotected volume can be mirrored. Also referred to as an *unprotected device*.

**upper-layer protocol.** The layer of the Internet Protocol (IP) that supports one or more logical protocols (for example, a SCSI-command protocol and an ESA/390 command protocol). Refer to ANSI X3.230-199*x*.

**UTC.** See *Coordinated Universal Time*.

**utility device.** The ESA/390 term for the device used with the Extended Remote Copy facility to access information that describes the modifications performed on the primary copy.

# V

**virtual machine facility.** A virtual data processing machine that appears to the user to be for the exclusive use of that user, but whose functions are accomplished by sharing the resources of a shared data processing system. An alternate name for the VM/370 IBM operating system.

**vital product data (VPD).** Information that uniquely defines the system, hardware, software, and microcode elements of a processing system.

**VM.** The root name of several IBM operating systems, such as VM/XA, VM/ESA, VM/CMS, and z/VM. See also *virtual machine facility*.

**volume.** In Enterprise Systems Architecture/390, the information recorded on a single unit of recording medium. Indirectly, it can refer to the unit of recording medium itself. On a nonremovable-medium storage device, the term can also indirectly refer to the storage device associated with the volume. When multiple volumes are stored on a single storage medium transparently to the program, the volumes can be referred to as logical volumes.

**volume label.** In the ESS, a unique identifier that a user assigns to a logical volume.

**VPD.** See *vital product data*.

**VSE/ESA.** IBM operating system, the letters of which represent virtual storage extended/enterprise systems architecture.

# W

**Web Copy Services.** See *ESS Copy Services*.

**worldwide node name (WWNN).** A unique 64-bit identifier for a host that contains a fibre-channel port. See also *worldwide port name*.

**worldwide port name (WWPN).** A unique 64-bit identifier associated with a fibre-channel adapter port. It

is assigned in an implementation- and protocol-independent manner.

**write hit.** A write operation in which the requested data is in the cache.

**write penalty.** The performance impact of a classical RAID-5 write operation.

**WWPN.** See *worldwide port name*.

# X

**XD.** See *PPRC Extended Distance*.

**XRC.** See *Extended Remote Copy*.

**xSeries.** The product name of an IBM @server product that emphasizes industry-standard server scalability and self-managing server technologies. It is the successor to the Netfinity family of servers.

# Z

**z/Architecture.** An IBM architecture for mainframe computers and peripherals. The IBM @server zSeries family of servers uses the z/Architecture architecture. It is the successor to the S/390 and 9672 family of servers. See also *Enterprise Systems Architecture/390*.

**z/OS.** An operating system for the IBM @server product line that supports 64-bit real storage.

**zSeries.** (1) An IBM @server family of servers that emphasizes near-zero downtime. (2) IBM enterprise servers based on z/Architecture.

**zSeries storage.** Storage arrays and logical volumes that are defined in the ESS as connected to zSeries servers. See also *S/390 storage*.

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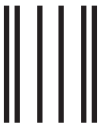

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